FCC PART 15C TEST REPORT FOR CERTIFICATION On Behalf of

ION Audio, LLC

Remote For Projected LED Fog Machine Product

Model Number: Lighted Fogger Remote

Additional Model:iUL20; Lighted Fogger Remotexx; iUL20xx

FCC ID: 2AB3E-IUL20

Prepared for:	ION Audio, LLC			
	200 SCENIC VIEW DRIVE, SUITE 201, CUMBERLAND, RI 02864,			
	U.S.A			
Prepared By:	EST Technology Co., Ltd.			
	Chilingxiang, Qishantou, Santun, Houjie, Dongguan, Guangdong, China			
Tel: 86-769-83081888-808				

Report Number:	ESTE-R1808001
Date of Test:	Jul. 13 ~ 31, 2018
Date of Report:	Aug. 01, 2018

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Test Report Verification

	Test Report Verification				
Applicant: Address:	ION Audio, LLC 200 Scenic View Drive, Cumberland, RI 02864 U.S.A.				
Manufacturer Address:	ION Audio, LLC 200 Scenic View Drive, Cumberland, RI 02864 U.S.A.				
E.U.T:	Remote For Projected LED Fog Machine Product				
Model Number:	Lighted Fogger Remote				
Additional Model:	iUL20; Lighted Fogger Remotexx; iUL20xx Note: "x" is a variable, it can be 0-9, A-Z or blank. They are identical to each other, only except for model name, appearance in color or decorating parts and silkscreen for marketing purpose.				
Power Supply:	DC 3V From Battery				
Test Voltage:	DC 3V				
Trade Name:	ION Serial No.:				
Date of Receipt:	Jul. 12, 2018 Date of Test: Jul. 12 ~ 30, 2018				
Test Specification:	FCC Rules and Regulations Part 15 Subpart C:2017 ANSI C63.10:2013				
Test Result:	The device described above is tested by EST Technology Co., Ltd The measurement results were contained in this test report and EST Technology Co., Ltd. was assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT to be technically compliance with the FCC Rules and Regulations Part 15 Subpart C requirements.				
	This report applies to above tested sample only and shall not be reproduced in part without written approval of EST Technology Co., Ltd. Date: Aug. 01, 2018				
Prepared by:	Reviewed by: Approved by: EST				
Ring/Assistant	Tony / Engineer Iceman, Hu / Manager				
Other Aspects: None.					

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1. GENERAL INFORMATION

1.1. Description of Device (EUT)

Product Name	:	Remote For Projected LED Fog Machine Product
FCC ID	:	2AB3E-IUL20
Model Number	:	Lighted Fogger Remote
Operation frequency	:	2425 MHz
Number of channel		1
Number of chamiles	•	1
Antenna	:	PCB antenna 1.5 dBi gain
Modulation	:	GFSK
Sample Type	:	Prototype production

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2. SUMMARY OF TEST

2.1. Summary of test result

Description of Test Item	Standard	Results			
Device Line Conducted Emissions	FCC Part 15C: 15.207	N/A			
Power Line Conducted Emissions	ANSI C63.10-2013				
	FCC Part 15C: 15.209				
Radiated Emission Test	FCC Part 15C: 15.249	PASS			
	ANSI C63.10-2013				
20 dB Bandwidth Test	FCC Part 15: 15.249	PASS			
20 db bandwidth Test	ANSI C63.10-2013	rass			
Band Edge Compliance Test	FCC Part 15: 15.215	PASS			
Band Edge Compitance Test	ANSI C63.10-2013	I ASS			
Antenna requirement	FCC Part 15: 15.203	PASS			
N/A is an abbreviation for Not Applicable.					

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2.2. Test Facilities

EMC Lab	•	Certificated by CNAS, CHINA Registration No.: L5288 Date of registration: November 13, 2017 Certificated by A2LA, USA Registration No.: 4366.01 Date of registration: November 07, 2017 Certificated by FCC, USA Designation Number: CN1215 Registration No.: 722932 Date of registration: November 21, 2017 Certificated by Industry Canada Registration No.: 9405A Date of registration: December 03, 2015 Certificated by VCCI, Japan Registration No.: R-13663; C-14103 Date of registration: July 25, 2017 This Certificate is valid until: July 24, 2020 Certificated by TUV Rheinland, Germany Registration No.: UA 50195514 0001 Date of registration: February 07, 2015 Certificated by TUV/PS, Shenzhen Registration No.: SCN1017 Date of registration: January 27, 2011 Certificated by Intertek ETL SEMKO Registration No.: 2011-RTL-L2-64 Date of registration: April 28, 2011
		Registration No.: 2011-RTL-L2-64
Name of Firm	•	EST Technology Co., Ltd.
Site Location	:	Chilingxiang, Qishantou, Santun, Houjie, Dongguan, Guangdong, China

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2.3. Measurement uncertainty

Test Item	Uncertainty
Uncertainty for Conduction emission test	±3.48dB
Uncertainty for spurious emissions test	±4.60 dB(Polarize: H)
(30MHz-1GHz)	±4.68 dB(Polarize: V)
Uncertainty for spurious emissions test (1GHz to 18GHz)	±4.96dB
Uncertainty for radio frequency	7×10 ⁻⁸
Uncertainty for conducted RF Power	0.20dB
Uncertainty for Power density test	0.26dB

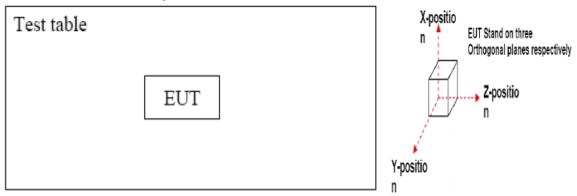
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

2.4. Assistant equipment used for test

2.4.1. N/A

2.5. Block Diagram

For radiated emissions test: EUT was placed on a turn table, which is 0.8 or 1.5 meter high above ground. EUT was be set into TX test mode by software.



(EUT: Remote For Projected LED Fog Machine Product) Note: We test X-axis, Y-axis, and Z-axis,. The Y-axis is the worst mode, so only the worst mode test data was included in the report.

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2.6. Test mode

The test software was used to control EUT work in Continuous TX mode.

Mode	Frequency
TX	2425 MHz

2.7. Channel List

Channel	Frequency
No.	(MHz)
1	2425

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2.8. Test Equipment

2.8.1. For conducted emission test

Equipment	Manufacturer	Model No.	Serial No.	Calibration	Last Cal.	Next Cal.
				Body		
EMI Test Receiver	Rohde	ESHS30	832354	CEPREI	June 15,18	1 Year
	& Schwarz					
Artificial Mains Network	Rohde	ENV216	101260	CEPREI	June 15,18	1 Year
	& Schwarz					
Pulse Limiter	Rohde	ESH3-Z2	101100	CEPREI	June 15,18	1 Year
	& Schwarz					
Test Software	Audix	e3-6.111221a	N/A	N/A	N/A	N/A

2.8.2. For radiated emission test(9 kHz-30MHz)

Equipment	Manufacturer	Model No.	Serial No.	Calibration	Last Cal.	Next Cal.
				Body		
EMI Test	Rohde	ESR7	101780	CEPREI	June 15,18	1 Year
Receiver	& Schwarz					
Active Loop Antenna	SCHWARZB	FMZB1519	1519-038	CEPREI	October	1 Year
	ECK				08,17	
Test Software	Audix	e3-6.111221a	N/A	N/A	N/A	N/A

2.8.3. For radiated emission test(30-1000MHz)

Equipment	Manufacturer	Model No.	Serial No.	Calibration	Last Cal.	Next Cal.
				Body		
EMI Test	Rohde	ESR7	101780	CEPREI	June 15,18	1 Year
Receiver	& Schwarz					
Bilog Antenna	Teseq	CBL 6111D	27090	CEPREI	June 15,18	1 Year
Test Software	Audix	e3-6.111221a	N/A	N/A	N/A	N/A

2.8.4. For radiated emission test(above 1GHz)

Equipment	Manufacturer	Model No.	Serial No.	Calibration	Last Cal.	Next Cal.
				Body		
Horn Antenna	SCHWARZB	BBHA 9120 D	BBHA912	CEPREI	June 18,18	1 Year
	ECK		0D1002			
Horn Antenna	SCHWARZB	BBHA9170	BBHA917	CEPREI	June 18,18	1Year
	ECK		0242			
Signal Amplifier	SCHWARZB	BBV9718	9718-212	CEPREI	June 15,18	1 Year
	ECK					
Spectrum Analyzer	Rohde	FSV	103173	CEPREI	June 15,18	1 Year
	&Schwarz					
PSA Series Spertrum	Agilent	E4447A	MY50180	CEPREI	June 15,18	1Year
Analyzer			031			
Test Software	Audix	e3-6.111221a	N/A	N/A	N/A	N/A

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3. RADIATED EMISSIONS

3.1. Limit

FREQUENCY	DISTANCE	FIELD STREN	NGTHS LIMIT	
MHz	Meters	μV/m	dB(µV)/m	
30 ~ 88	3	100	40.0	
88 ~ 216	3	150	43.5	
216 ~ 960	3	200	46.0	
960 ~ 1000	3	500	54.0	
Above 1000	3	74.0 dB(μV)/m (Peak)		
		$54.0 \text{ dB}(\mu\text{V})/\text{m} \text{ (Average)}$		

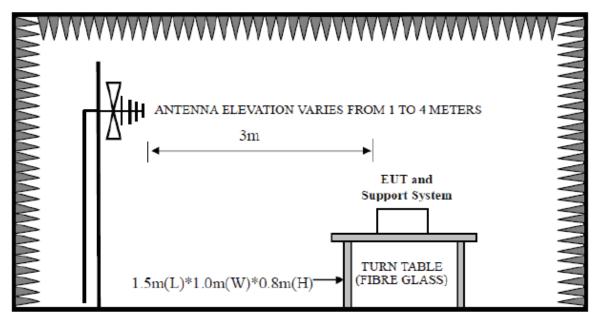
Remark : (1) Emission level $dB\mu V = 20 log Emission level \mu V/m$

- (2) The smaller limit shall apply at the cross point between two frequency bands.
- (3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system

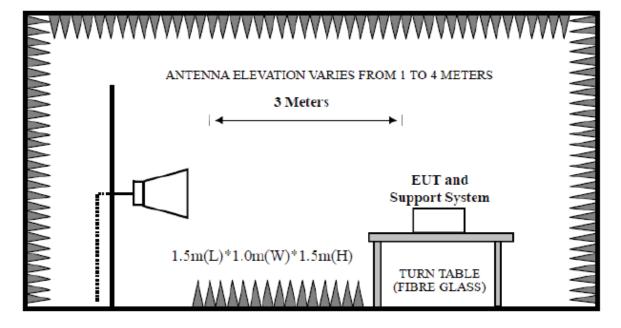
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3.2. Block Diagram of Test setup

30~1000MHz



Above 1GHz



EST

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3.3. Test Procedure

EUT was placed on a turn table, which is 0.8 meter high above ground for 30~1000MHz test, and wiich is 1.5 meter high above ground for above 1GHz test. The turn table can rotate 360 degrees to determine the position of the maximum emission level. Power on the EUT and let it working in test mode, then test it. EUT is set 3 meters away from the receiving antenna, which is mounted on a antenna tower. The antenna can be moved up and down between 1 meter and 4 meters to find out the maximum emission level. Both horizontal and vertical polarization of the antenna are set on test.

The bandwidth of the EMI test receiveris set at 120kHz for frequency range from 30MHz to 1000 MHz.

The bandwidth of the Spectrum's VBW is set at 1MHz and RBW is set at 1MHz for peak emissions measurement above 1GHz and 1MHz RBW, 10Hz VBW for average emissions measure above 1GHz

PEAK detector, 1MHz/1MHz for PAEK measurement, PEAK detector, 1MHz/10Hz for Average measurement

The frequency range from 30MHz to 10th harmonic (25GHz) are checked.

The EUT position(X.-axis, Y-axis, Z-axis) were checked and worse case was happened in Y-axis position. So Y-axis position was chose for find measurement.

3.4. Test Result

Pass

Note: 1. For emissions above 1GHz, if peak level comply with average limit, then the average level is deemed to comply with average limit.

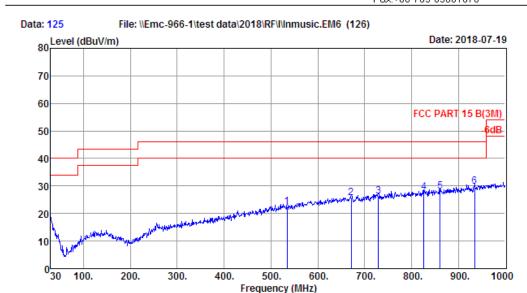
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3.5. Test Data

30 MHz - 1000 MHz

EST Technology

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: 1# 966 Chamber Site no. Data no. : 125 : 3m 37062 Ant. pol. : VERTICAL Dis. / Ant.

Limit : FCC PART 15 B(3M)

Env. / Ins. : Temp:23.6'; Humi:56%; Press:101.52kPa

: Viking Engineer

: Remote For Projected LED Fog Machine EUT

Product

Power : DC 3V

: Lighted Fogger Remote M/N

Test Mode : TX Mode

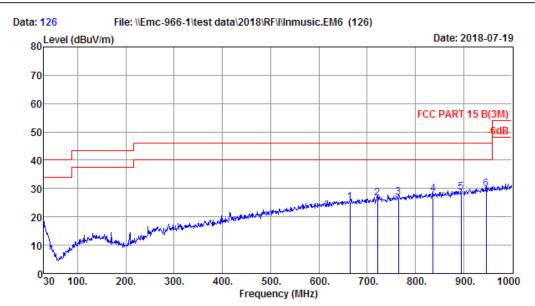
	Freq.	ANT Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	534.40	18.95	2.99	0.62	22.56	46.00	23.44	QP
2	671.17	21.11	3.46	1.15	25.72	46.00	20.28	QP
3	729.37	21.68	3.69	0.93	26.30	46.00	19.70	QP
4	826.37	23.00	3.91	0.75	27.66	46.00	18.34	QP
5	861.29	23.40	3.94	0.57	27.91	46.00	18.09	QP
6	935.01	24.30	4.39	1.12	29.81	46.00	16.19	QP

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading. 2. Margin= Limit - Emission Level.

3. The emission levels that are 20dB below the official limit are not reported.

EST Technology Co., Ltd EST

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Site no. : 1# 966 Chamber Data no. : 126
Dis. / Ant. : 3m 37062 Ant. pol. : HORIZONTAL

Limit : FCC PART 15 B(3M)

Env. / Ins. : Temp:23.6'; Humi:56%; Press:101.52kPa

Engineer : Viking

EUT : Remote For Projected LED Fog Machine

Product Power : DC 3V

M/N : Lighted Fogger Remote

Test Mode : TX Mode

	Freq.	ANT Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	664.38	21.10	3.44	0.50	25.04	46.00	20.96	QP
2	721.61	21.54	3.70	1.34	26.58	46.00	19.42	QP
3	765.26	22.45	3.81	0.68	26.94	46.00	19.06	QP
4	837.04	23.14	3.89	0.94	27.97	46.00	18.03	QP
5	895.24	23.80	4.09	0.70	28.59	46.00	17.41	QP
6	946.65	24.40	4.59	0.93	29.92	46.00	16.08	QP

Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.

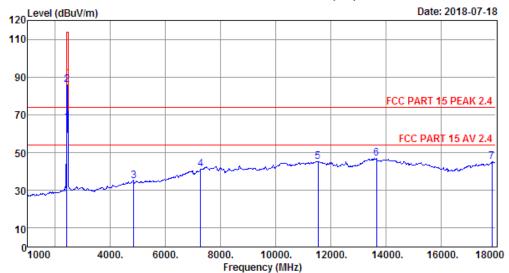
2. Margin= Limit - Emission Level.

3. The emission levels that are 20dB below the official limit are not reported.

EST

Chilingxiang, Qishantou, Santun, Houjie, Dongguan, Guangdong, China Tel:+86-769-83081888 Fax:+86-769-83081878





Site no. : 1# 966 Chamber Data no. : 117
Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : VERTICAL

Limit : FCC PART 15 PEAK 2.4

Env. / Ins. : Temp:24.8'; Humi:53%; Press:101.52kPa

Engineer : Viking

EUT : Remote For Projected LED Fog Machine

Product

Power : DC 3V

M/N : Lighted Fogger Remote

Test Mode : 2425MHz TX

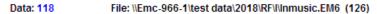
		Freq.	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
_	1	2425.00	27.43	3.24	35.00	70.50	66.17	94.00	27.83	Average
	2	2425.00	27.43	3.24	35.00	90.25	85.92	114.00	28.08	Peak
	3	4850.00	32.12	4.70	35.12	33.09	34.79	74.00	39.21	Peak
	4	7275.00	36.71	6.05	33.36	31.62	41.02	74.00	32.98	Peak
	5	11540.00	40.05	8.27	32.49	29.52	45.35	74.00	28.65	Peak
	6	13665.00	41.43	9.89	32.62	28.08	46.78	74.00	27.22	Peak
	7	17864.00	44.34	12.34	31.29	19.76	45.15	74.00	28.85	Peak

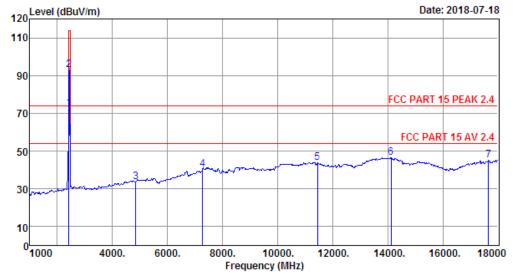
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.

- 2. Margin= Limit Emission Level.
- The emission levels that are 20dB below the official limit are not reported.



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Site no. : 1# 966 Chamber Data no. : 118
Dis. / Ant. : 3m ANT9120D 1-18G Ant. pol. : HORIZONTAL

Limit : FCC PART 15 PEAK 2.4

Env. / Ins. : Temp:24.8'; Humi:53%; Press:101.52kPa

Engineer : Viking

EUT : Remote For Projected LED Fog Machine

Product Power : DC 3V

M/N : Lighted Fogger Remote

Test Mode : 2425MHz TX

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2425.00	27.43	3.24	35.00	76.85	72.52	94.00	21.48	Average
2	2425.00	27.43	3.24	35.00	97.20	92.87	114.00	21.13	Peak
3	4850.00	32.12	4.70	35.12	32.11	33.81	74.00	40.19	Peak
4	7275.00	36.71	6.05	33.36	31.03	40.43	74.00	33.57	Peak
5	11455.00	40.08	8.28	32.62	28.22	43.96	74.00	30.04	Peak
6	14124.00	41.58	10.14	33.04	27.79	46.47	74.00	27.53	Peak
7	17660.00	43.80	11.90	31.25	20.50	44.95	74.00	29.05	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.

2. Margin= Limit - Emission Level.

The emission levels that are 20dB below the official limit are not reported.



FCC ID: 2AB3E-IUL20

18000MHz - 25000MHz

Pass

Note: The amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.



4. 20 DB BANDWIDTH

4.1. Test Procedure

The transmitter output was coupled to a spectrum analyzer via a antenna. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100kHz RBW and 300kHz VBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

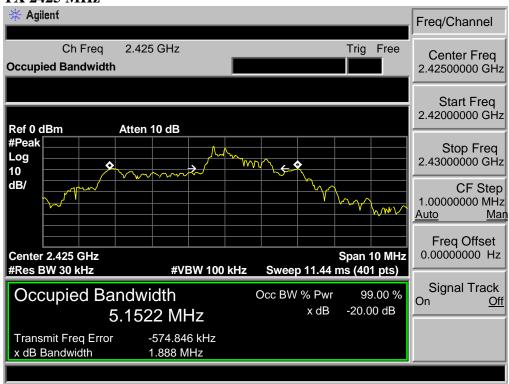
4.2. Test Result

EUT: Remote For Projected LED Fog Machine Product									
M/N: Lighted Fogger Remote									
Test date: 2018-07-25 Test site: RF site Tested by: Tony Tang									
Mode	Freq (MHz)	20dB Bandwidth (MHz)	Limit (kHz)	Conclusion					
TX	2425	1.888	/	PASS					

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4.3. Test Data

TX 2425 MHz

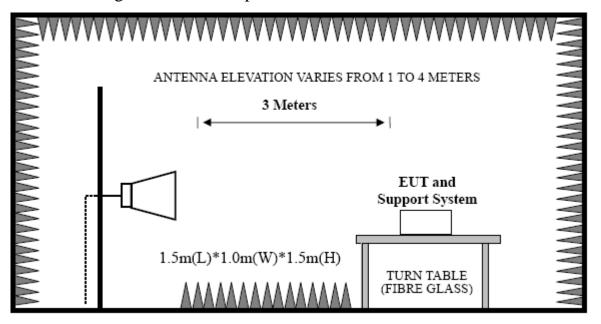




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5. BAND EDGE COMPLIANCE

5.1. Block Diagram of Test setup



5.2. Test Procedure

EUT was placed on a turn table, which is 1.5 meter high above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. Power on the EUT and let it working in test mode, then test it. EUT is set 3 meters away from the receiving antenna, which is mounted on a antenna tower. The antenna can be moved up and down between 1 meter and 4 meters to find out the maximum emission level. Both horizontal and vertical polarization of the antenna are set on test.

Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of emissions

Peak: RBW = 1MHz, VBW = 1MHz, Detector=PEAK detector, Sweep time = auto. AV: RBW = 1MHz, VBW = 10Hz, Detector=PEAK detector, Sweep time = auto.

The EUT position(X.-axis, Y-axis, Z-axis) were checked and worse case was happened in Y-axis position. So Y-axis position was chose for find measurement.

5.3. Test Result

Pass.

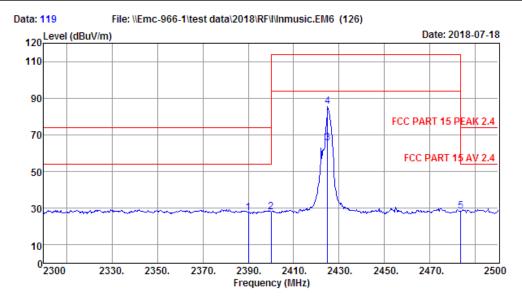
Note: If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.

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5.4. Test Data

EST Technology

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Site no. : 1# 966 Chamber Data no. : 119 : 3m ANT9120D 1-18G : FCC PART 15 PEAK 2.4 Ant. pol. : HORIZONTAL Dis. / Ant.

Limit

Env. / Ins. : Temp:24.8'; Humi:53%; Press:101.52kPa

Engineer : Viking

: Remote For Projected LED Fog Machine

Product

Power : DC 3V

: Lighted Fogger Remote

Test Mode : 2425MHz TX

(MHz)		Loss (dB)	(dB)	Reading (dBuV)	Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
390.00 2	27.35	3.21	34.87	31.77	27.46	74.00	46.54	Peak
100.00 2	27.35	3.21	34.94	32.21	27.83	74.00	46.17	Peak
125.00 2	27.43	3.24	35.00	70.06	65.73	94.00	28.27	Average
125.00 2	27.43	3.24	35.00	89.71	85.38	114.00	28.62	Peak
183.50 2	27.56	3.29	35.21	32.81	28.45	74.00	45.55	Peak
	390.00 2 100.00 2 125.00 2	390.00 27.35 100.00 27.35 125.00 27.43 125.00 27.43	390.00 27.35 3.21 100.00 27.35 3.21 125.00 27.43 3.24 125.00 27.43 3.24	390.00 27.35 3.21 34.87 100.00 27.35 3.21 34.94 125.00 27.43 3.24 35.00 125.00 27.43 3.24 35.00	390.00 27.35 3.21 34.87 31.77 100.00 27.35 3.21 34.94 32.21 125.00 27.43 3.24 35.00 70.06 125.00 27.43 3.24 35.00 89.71	890.00 27.35 3.21 34.87 31.77 27.46 800.00 27.35 3.21 34.94 32.21 27.83 825.00 27.43 3.24 35.00 70.06 65.73 825.00 27.43 3.24 35.00 89.71 85.38	890.00 27.35 3.21 34.87 31.77 27.46 74.00 100.00 27.35 3.21 34.94 32.21 27.83 74.00 125.00 27.43 3.24 35.00 70.06 65.73 94.00 125.00 27.43 3.24 35.00 89.71 85.38 114.00	890.00 27.35 3.21 34.87 31.77 27.46 74.00 46.54 800.00 27.35 3.21 34.94 32.21 27.83 74.00 46.17 825.00 27.43 3.24 35.00 70.06 65.73 94.00 28.27 825.00 27.43 3.24 35.00 89.71 85.38 114.00 28.62

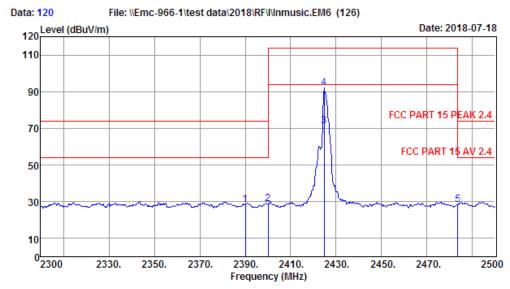
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.

2. Margin= Limit - Emission Level.

3. The emission levels that are 20dB below the official limit are not reported.

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Chilingxiang, Qishantou, Santun, Houjie, Dongguan, Guangdong, China Tel:+86-769-83081888 Fax:+86-769-83081878



Data no. : 120 Ant. pol. : VERTICAL Site no. : 1# 966 Chamber Dis. / Ant. : 3m ANT9120D 1-18G Limit : FCC PART 15 PEAK 2.4

Env. / Ins. : Temp:24.8'; Humi:53%; Press:101.52kPa

Engineer : Viking

EUT : Remote For Projected LED Fog Machine

Product

: DC 3V

: Lighted Fogger Remote

: 2425MHz TX Test Mode

		Ant.	Cable	Amp		Emission			
	Freq. (MHz)	Factor (dB/m)	Loss (dB)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2390.00	27.35	3.21	34.87	32.56	28.25	74.00	45.75	Peak
2	2400.00	27.35	3.21	34.94	33.30	28.92	74.00	45.08	Peak
3	2424.80	27.43	3.24	35.00	75.73	71.40	94.00	22.60	Average
4	2424.80	27.43	3.24	35.00	96.53	92.20	114.00	21.80	Peak
5	2483.50	27.56	3.29	35.21	32.65	28.29	74.00	45.71	Peak

Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.

2. Margin= Limit - Emission Level.

3. The emission levels that are 20dB below the official limit are not reported.

6. ANTENNA REQUIREMENTS

6.1. Limit

For intentional device, according to FCC 47 CFR 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. And according to FCC 47 CFR Section 15.249 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

6.2. Result

The antennas used for this product are PCB Antenna and that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is only 1.5dBi.

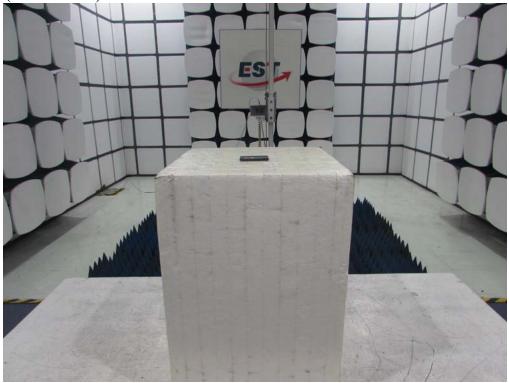
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7. Testsetup photo

Radiated Test (30-1000 MHz)



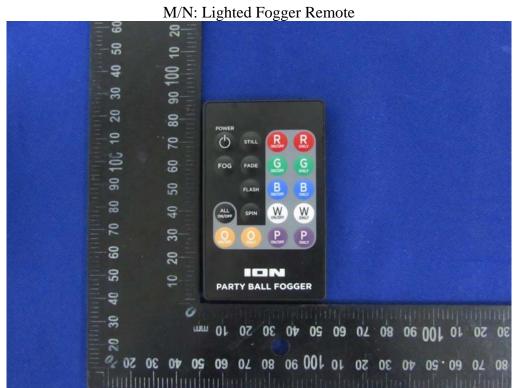
Radiated Test (Above 1GHz)

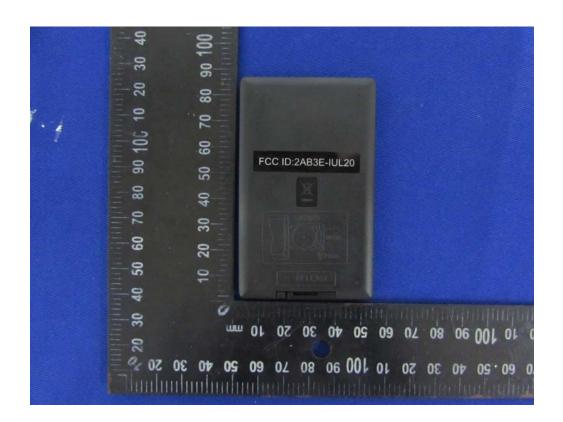


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8. PHOTO OF EUT

External Photos







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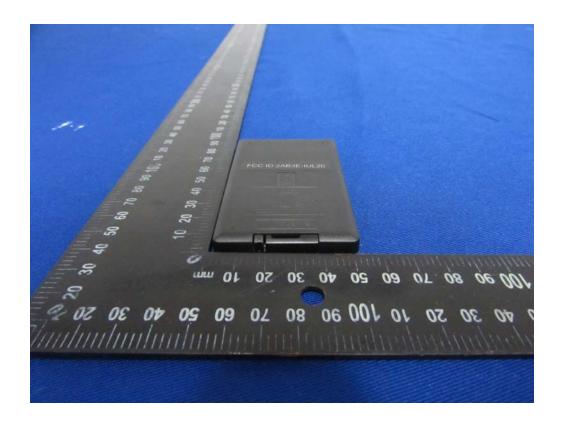


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External Photos



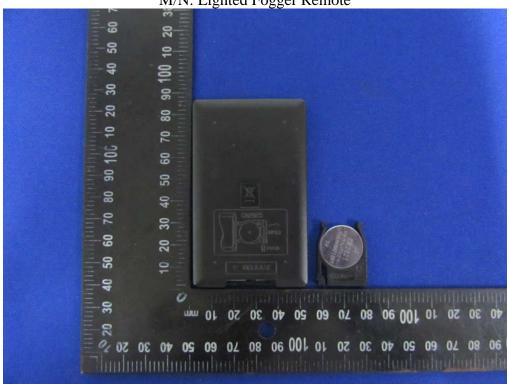


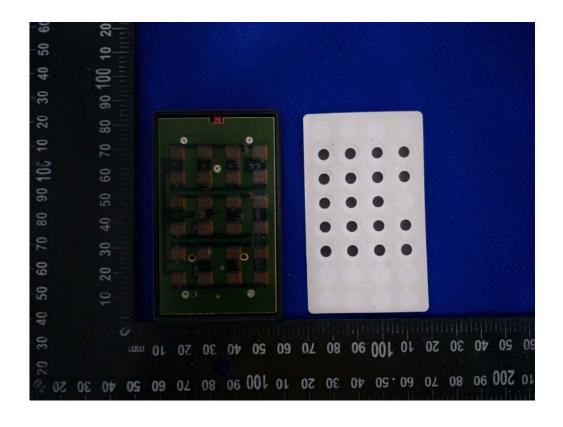
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Internal Photos

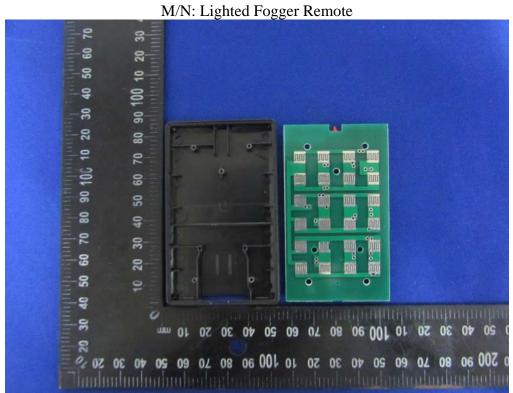


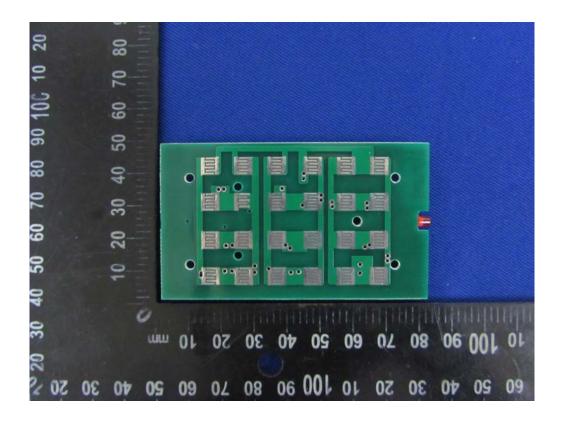




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Internal Photos







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Internal Photos

M/N: Lighted Fogger Remote

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