

TEST REPORT

Report No.: 17050023HKG-002

LIGHTAIR HOLDING AB

Application For Certification
(Original Grant)

FCC ID: YJ5CEILINGMODEL

Air Purifier

PREPARED AND CHECKED BY:

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Date: June 22, 2017

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TEST REPORT

GENERAL INFORMATION

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Manufacturer:	N/A
Manufacturer Address:	N/A
Brand Name:	LightAir, LifeAir
Mode:	LAIFSK2
Additional Model:	LAIFSK-XXXXXX
Type of EUT:	Consumer ISM Device
Description of EUT:	Air Purifier
Serial Number:	N/A
FCC ID:	YJ5CEILINGMODEL
Date of Sample Submitted:	May 02, 2017
Date of Test:	May 02, 2017 to June 16, 2017
Report No.:	17050023HKG-002
Report Date:	June 22, 2017
Environmental Conditions:	Temperature: +10 to 40°C Humidity: 10 to 90%

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SUMMARY OF TEST RESULT

TEST SPECIFICATION	REFERENCE	RESULTS
Field Strength Limit	18.305	Pass
Conduction Limit	18.307	Pass

The equipment under test is found to be complying with the following standards:
FCC Part 18, October 1, 2015 Edition

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1.0 GENERAL DESCRIPTION

1.1 Product Description

The Equipment Under Test (EUT) is an Air Purifier. The EUT is powered by 100-240VAC. The EUT will generate a high voltage to ionize the surrounding air and produce negative ions. The negative ions will attach to the positively charged harmful particles in the air like dust, pollen, bacteria, mold, pet dander, virus etc, which accumulates and drop out of the air.

The Model: LAIFSK-XXXXXX is the same as the Model: LAIFSK2 in hardware aspect. The difference in model number serves as marketing strategy. Suffix (XXXXXX) represent the different colors.

For electronic filing, the brief circuit description is saved with filename: descri.pdf.

1.2 Related Submittal(s) Grants

This is a single application for certification of an Air Purifier. No other related submittal grants.

1.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the FCC procedures in MP-5, "Methods of Measurements of Radio Noise Emissions form ISM equipment" 1986". All radiated measurements were performed in an 3m Chamber. Preliminary scans were performed in the 3m Chamber only to determine worst case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application.

1.4 Test Facility

The 3m Chamber used to collect the radiated data is located at HKPC Building, 78 Tat Chee Avenue, Kowloon, Hong Kong. (HKPC). And conducted measurement facility is located at Workshop No. 3, G/F., World-Wide Industrial Centre, 43-47 Shan Mei Street, Fo Tan, Sha Tin, N.T., Hong Kong. This test facility and site measurement data have been placed on file with the FCC and IC No. 2042V-1.

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2.0 SYSTEM TEST CONFIGURATION

2.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in FCC/OST MP-5(1986).

The device was powered by 100-240VAC 50/60Hz.

For maximizing emissions below 30 MHz, the EUT was rotated through 360°, the centre of the loop antenna was placed 1 meter above the ground, and the antenna polarization was changed. For maximizing emission at and above 30 MHz, the EUT was rotated through 360°, the antenna height was varied from 1 meter to 4 meters above the ground plane, and the antenna polarization was changed. This step by step procedure for maximizing emissions led to the data report in Exhibit 3.0.

The rear of unit shall be flushed with the rear of the table.

The equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). The EUT was mounted to a plastic stand if necessary and placed on the wooden turntable, which enabled the engineer to maximize emissions through its placement in the three orthogonal axes.

2.2 EUT Exercising Software

There was no special software to exercise the device.

2.3 Special Accessories

There are no special accessories necessary for compliance of this product.

2.4 Measurement Uncertainty

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

2.5 Support Equipment List and Description

N/A

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3.0 EMISSION RESULTS

Data is included of the worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

3.1 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any), Distance Factor from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF - AG - DF$$

where FS = Field Strength in dB μ V/m

RA = Receiver Amplitude (including preamplifier) in dB μ V

CF = Cable Attenuation Factor in dB

AF = Antenna Factor in dB

AG = Amplifier Gain in dB

DF = Distance Factor in dB = $20 \log 3/300 = -40\text{dB}$ (3m to 300m)

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows:

$$FS = RR + LF$$

where FS = Field Strength in dB μ V/m

RR = RA - AG - DF in dB μ V

LF = CF + AF in dB

Assume a receiver reading of 52.0 dB μ V is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB are added. The amplifier gain of 29 dB and distance factor of 20 dB are subtracted, giving a field strength of 12 dB μ V/m. This value in dB μ V/m was converted to its corresponding level in μ V/m.

$$\text{Level in } \mu\text{V/m} = \text{Common Antilogarithm } [(12 \text{ dB}\mu\text{V/m})/20] = 3.98 \mu\text{V/m}$$

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3.2 Radiated Emission Configuration Photograph

The worst case in radiated emission was found at 11.000 kHz

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

3.3 Radiated Emission Data

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Judgment: Passed by 10.8 dB

3.4 Conducted Emission Configuration Photograph

The worst case in line-conducted emission was found at 370.5 kHz

For electronic filing, the worst case line-conducted configuration photographs are saved with filename: conducted photo.pdf.

3.5 Conducted Emission Data

A graph and a data table of conducted emission test are shown in following page.

Judgment: Pass by 3.74 dB

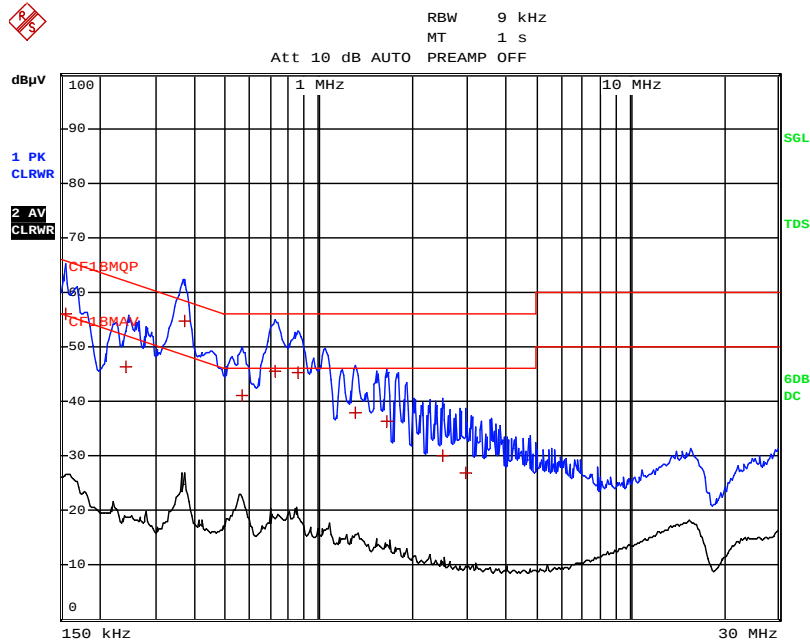
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CONDUCTED EMISSION

Model: LAIFSK2

Date of Test: May 29, 2017

Worst-Case Operating Mode: Air Purifier On



EDIT PEAK LIST (Final Measurement Results)				
Trace1:	CF18MQP			
Trace2:	CF18MAV			
Trace3:	---			
TRACE	FREQUENCY	LEVEL dBμV		DELTA LIMIT dB
1 Quasi Peak	154.5 kHz	56.09	N	-9.66
1 Quasi Peak	244.5 kHz	46.43	N	-15.50
1 Quasi Peak	370.5 kHz	54.74	N	-3.74
1 Quasi Peak	564 kHz	41.17	N	-14.82
1 Quasi Peak	721.5 kHz	45.66	N	-10.33
1 Quasi Peak	856.5 kHz	45.27	N	-10.73
1 Quasi Peak	1.3155 MHz	37.80	N	-18.19
1 Quasi Peak	1.6665 MHz	36.41	N	-19.58
1 Quasi Peak	2.5035 MHz	30.05	L1	-25.94
1 Quasi Peak	2.9715 MHz	26.98	L1	-29.01

Note: Measurement Uncertainty is ± 4.2 dB at a level of confidence of 95%.

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RADIATED EMISSIONS

Model: LAIFSK2

Date of Test: May 29, 2017

Worst-Case Operating Mode: Air Purifier + LED

Table 1
Pursuant to FCC Part 18 Section 18.305 Requirement

Frequency (kHz)	Reading at 3m (dBμV)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Calculated at 300m (dBμV/m)	Limit at 300m (dBμV/m)	Margin (dB)
10.900	34.5	18.1	52.6	12.6	23.5	-10.9
11.000	34.6	18.1	52.7	12.7	23.5	-10.8
14.650	32.7	18.1	50.8	10.8	23.5	-12.7
152.250	36.1	10.3	46.4	6.4	23.5	-17.1
154.500	36.5	10.3	46.8	6.8	23.5	-16.7

- NOTES:
1. Average detector data unless otherwise stated.
 2. Frequency range scanned: 9kHz to 30MHz.
 3. Only emissions significantly above equipment noise floor are reported.
 4. Loop antenna was used for emission below 30MHz.
 5. Reading at 3m data includes the cable factor.
 6. Measurement Uncertainty is ± 5.3 dB at a level of confidence of 95%.

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4.0 EQUIPMENT PHOTOGRAPHS

For electronic filing, the photographs are saved with filename: external photos.pdf and internal photos.pdf.

5.0 PRODUCT LABELLING

For electronics filing, the FCC ID label artwork and the label location are saved with filename: label.pdf.

6.0 TECHNICAL SPECIFICATIONS

For electronic filing, the block diagram and schematic of the tested EUT are saved with filename: block.pdf and circuit.pdf respectively.

7.0 INSTRUCTION MANUAL

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: manual.pdf.

This manual will be provided to the end-user with each unit sold/leased in the United States.

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8.0 EMISSIONS TEST PROCEDURES

The following is a description of the test procedure used by Intertek Testing Services Hong Kong Ltd. in the measurements of Industrial, Scientific and Medical equipment operating under FCC methods of measurements of radio noise emissions from industrial, scientific and medical equipment.

Radiated emissions measurement

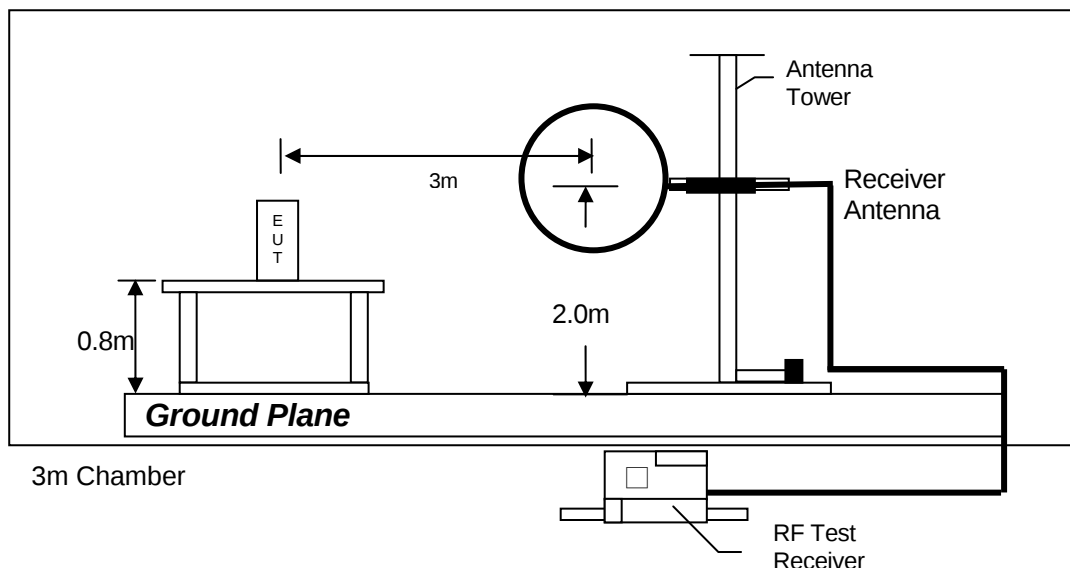
The equipment under test (EUT) is placed on a wooden turntable which is 1.5 x 1 meter dimension and approximately 1 meter in height above the ground plane. During the radiated emissions test, the turntable is rotated to resulting in maximum emissions. The antenna polarization is varied during the testing to search for maximum signal levels. For loop antenna, the height of the antenna is set at 2 meters. For biconical and log-periodic antenna, the antenna height is varied from one to four meters.

According to FCC/OCT MP-5 (1986), the frequency range scanned is 9 kHz to 400MHz in field strength emission. The detector function of the measurement is set to average. For line conducted emission, the frequency range scanned is from 0.15MHz to 30MHz in quasi peak and average measurement.

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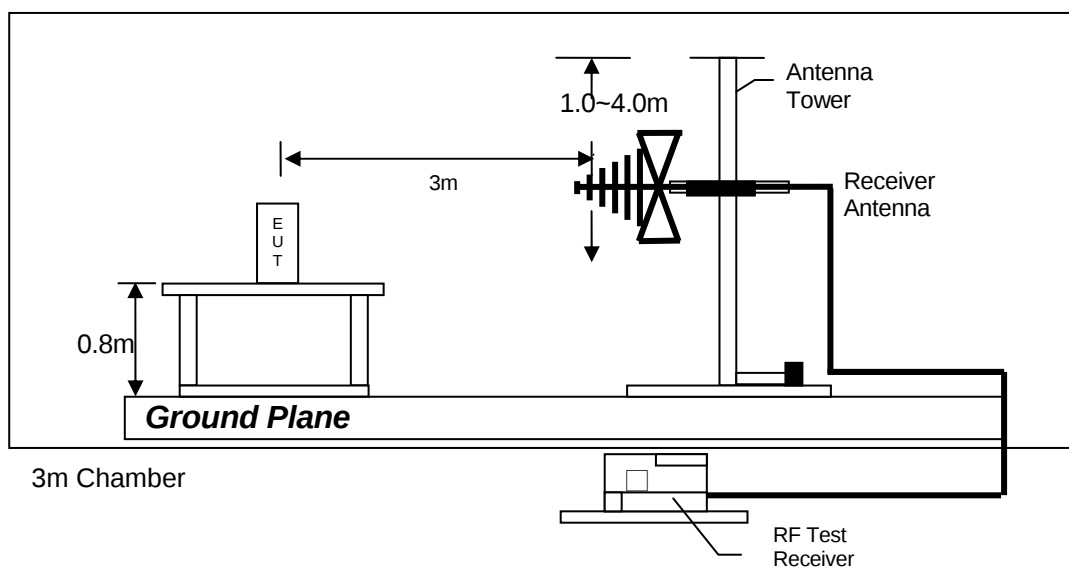
8.1 Radiated Emission Test Setup

The figure below shows the test setup, which is utilized to make these measurements.

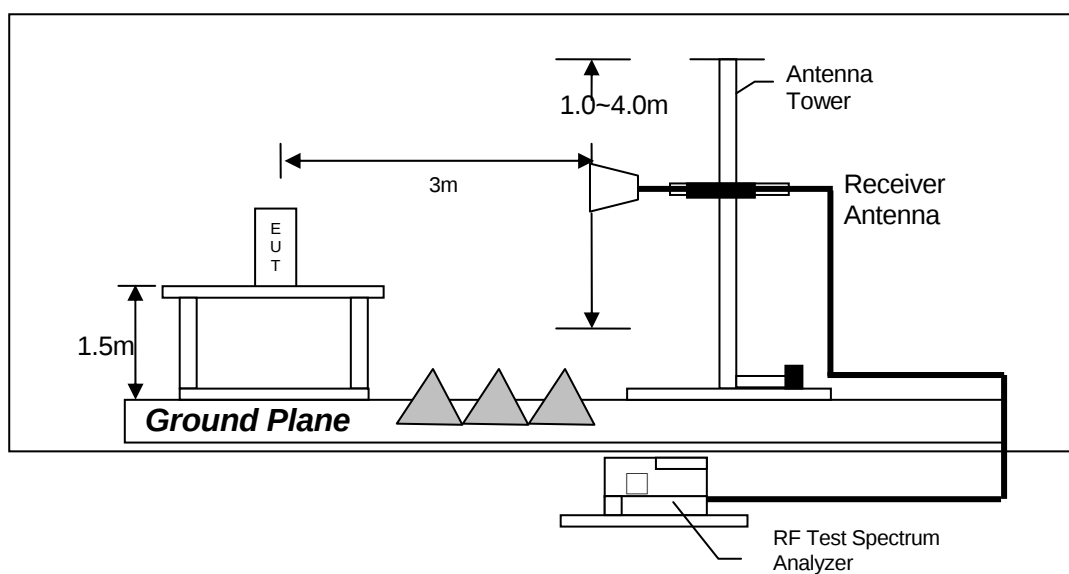


Test setup of radiated emissions below 30MHz

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Test setup of radiated emissions up to 1GHz



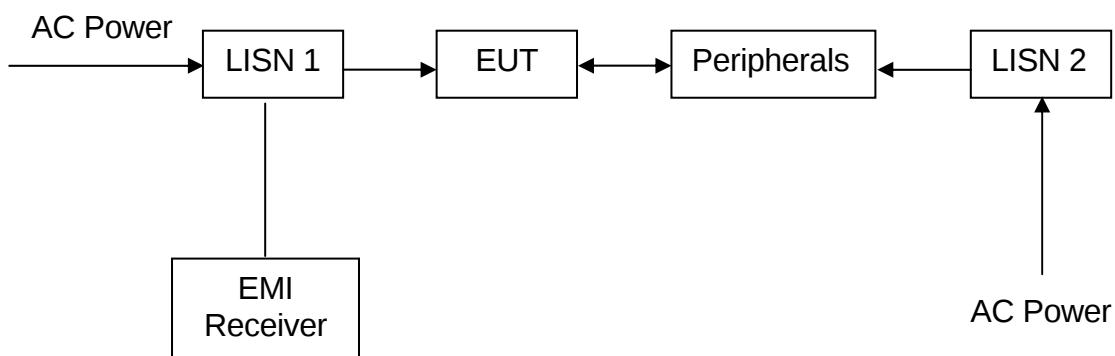
Test setup of radiated emissions above 1GHz

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8.2 Conducted Emission Test Procedures

Measurements of power line conducted radio noise shall be expressed as the voltage developed across the 50-ohm port terminated by a 50-ohm measuring instrument. All voltage measurements shall be made at the plug end of the EUT power cord, e.g. , by the use of mating plugs and receptacles on the EUT and LISN.

8.3 Conducted Emission Test Setup



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9.0 EQUIPMENT LIST

1) Radiated Emissions Test

EQUIPMENT	Test Receiver	Active Loop Antenna
Cal. No.	EMC597	EMC107
Manufacturer	R & S	EMCO
Model No.	ESU40	6502
Cal Date	Jul. 26, 2016	Oct. 27, 2016
Due Date	Jul. 26, 2017	Oct. 27, 2017

2) Conducted Emissions Test

EQUIPMENT	EMI Test Receiver	LISN
Registration No.	EW-2666	EW-2874
Manufacturer	R&S	R&S
Model No.	ESCI7	ENV-216
Calibration Date	Jun. 17, 2016	Mar. 16, 2017
Calibration Due Date	Jun. 17, 2017	Mar. 16, 2018

END OF TEST REPORT