



RF Exposure Evaluation

For

Lithe Audio Ltd

WIFI CEILING SPEAKER

Test Model: LWF1V3

Additional Model No.: LWF1V3/IP

Prepared for : Lithe Audio Ltd
Address : Unit 4 IO Centre, Salbrook Road Industrial Estate, Salbrook Road, RH1 5GJ, Salfords, Redhill, Surrey, United Kingdom

Prepared by : Shenzhen LCS Compliance Testing Laboratory Ltd.
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Date of receipt of test sample : May 16, 2025
Number of tested samples : 2
Sample No. : A250512119-1, A250512119-2
Serial number : Prototype
Date of Test : May 16, 2025 ~ June 02, 2025
Date of Report : June 05, 2025



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RF Exposure Evaluation	
Report Reference No.	LCSA05155003EF
Date of Issue	June 05, 2025
Testing Laboratory Name	Shenzhen LCS Compliance Testing Laboratory Ltd.
Address	101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China
Testing Location/ Procedure	Full application of Harmonised standards ■ Partial application of Harmonised standards □ Other standard testing method □
Applicant's Name	Lithe Audio Ltd
Address	Unit 4 IO Centre, Salbrook Road Industrial Estate, Salbrook Road, RH1 5GJ, Salfords, Redhill, Surrey, United Kingdom
Test Specification	
Standard	FCC KDB publication 447498 D01 General RF Exposure Guidance v06 FCC CFR 47 part1 1.1310 FCC CFR 47 part2 2.1091
Test Report Form No.	TRF-4-E-215 A/0
TRF Originator	Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF	Dated 2011-03
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Test Item Description	WIFI CEILING SPEAKER
Trade Mark	N/A
Test Model	LWF1V3
Ratings	Please Refer to Page 6
Result	Pass

Compiled by:

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Gavin Liang

Gavin Liang/ Manager



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RF Exposure Evaluation

Test Report No. : LCSA05155003EF	<u>June 05, 2025</u> Date of issue
---	---------------------------------------

EUT.....	: WIFI CEILING SPEAKER
Test Model.....	: LWF1V3
Applicant.....	: Lithe Audio Ltd
Address.....	: Unit 4 IO Centre, Salbrook Road Industrial Estate, Salbrook Road,RH1 5GJ, Salfords, Redhill, Surrey, United Kingdom
Telephone.....	: /
Fax.....	: /
Manufacturer.....	: Lithe Audio Ltd
Address.....	: Unit 4 IO Centre, Salbrook Road Industrial Estate, Salbrook Road,RH1 5GJ, Salfords, Redhill, Surrey, United Kingdom
Telephone.....	: /
Fax.....	: /
Factory.....	: Lithe Audio Ltd
Address.....	: Unit 4 IO Centre, Salbrook Road Industrial Estate, Salbrook Road,RH1 5GJ, Salfords, Redhill, Surrey, United Kingdom
Telephone.....	: /
Fax.....	: /

Test Result	Pass
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The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.





Revision History

Report Version	Issue Date	Revision Content	Revised By
000	June 05, 2025	Initial Issue	---





TABLE OF CONTENTS

Description	Page
1. Product Information	6
2. Evaluation Method	8
3. Limit	8
4. MPE Calculation Method	9
5. Antenna Information	9
6. Conducted Power	10
7. Manufacturing Tolerance	12
8. Measurement Results	15
9. Conclusion	17
10. Description of Test Facility	17
11. Measurement Uncertainty	17



**1. Product Information**

EUT	: WIFI CEILING SPEAKER
Test Model	: LWF1V3
Additional Model No.	: LWF1V3/IP
Model Declaration	: PCB board, structure and internal of these model(s) are the same, So no additional models were tested
Ratings	: Input: DC 24V, 2.5A For AC Adapter Input: 100-240V~, 50/60Hz, 1.5A Max Adapter Output: 24.0V---2.5A, 60.0W
Hardware Version	: PP1.0
Software Version	: 3357.106
Bluetooth	:
Frequency Range	: 2402MHz~2480MHz
Channel Number	: 79 channels for Bluetooth V5.2 (DSS) 40 channels for Bluetooth V5.2 (DTS)
Channel Spacing	: 1MHz for Bluetooth V5.2 (DSS) 2MHz for Bluetooth V5.2 (DTS)
Modulation Type	: GFSK, $\pi/4$ -DQPSK, 8-DPSK for Bluetooth V5.2 (DSS) GFSK for Bluetooth V5.2 (DTS)
Bluetooth Version	: V5.2
Antenna Description	: Internal Antenna, 2.21dBi(Max.)
WIFI(2.4G Band)	:
Frequency Range	: 2412MHz~2462MHz
Channel Number	: 11 Channels for 20MHz bandwidth (2412~2462MHz) 7 Channels for 40MHz bandwidth (2422~2452MHz)
Channel Spacing	: 5MHz
Modulation Type	: IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK) IEEE 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK)
Antenna Description	: Internal Antenna, 2.21dBi(Max.)
WIFI(5.2G Band)	:
Frequency Range	: 5180MHz~5240MHz
Channel Number	: 4 Channels for 20MHz bandwidth(5180MHz~5240MHz) 2 channels for 40MHz bandwidth(5190MHz~5230MHz) 1 channels for 80MHz bandwidth(5210MHz)
Modulation Type	: IEEE 802.11a/n: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11ac: OFDM (256QAM, 64QAM, 16QAM, QPSK, BPSK)
Antenna Description	: Internal Antenna, 0.57dBi(Max.)
WIFI(5.8G Band)	:





Frequency Range	: 5745MHz~5825MHz
Channel Number	: 5 channels for 20MHz bandwidth(5745MHz~5825MHz) 2 channels for 40MHz bandwidth(5755MHz~5795MHz) 1 channels for 80MHz bandwidth(5775MHz)
Modulation Type	: IEEE 802.11a/n: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11ac: OFDM (256QAM, 64QAM, 16QAM, QPSK, BPSK)
Antenna Description	: Internal Antenna, 0.57dBi(Max.)
Exposure category	: General population/uncontrolled environment
EUT Type	: Production Unit
Device Type	: Mobile Device
Note: For a more detailed antenna description, please refer to the antenna specifications or the antenna report provided by the customer.	





2. Evaluation Method

Systems operating under the provisions of FCC 47 CFR section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as mobile device whereby a distance of 0.2m normally can be maintained between the user and the device, and below RF Permissible Exposure limit shall comply with.

In accordance with KDB447498D01 for Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modelled or measured field strengths or power density, is ≤ 1.0 . The MPE ratio of each antenna is determined at the minimum test separation distance required by the operating configurations and exposure conditions of the host device, according to the ratio of field strengths or power density to MPE limit, at the test frequency. Either the maximum peak or spatially averaged results from measurements or numerical simulations may be used to determine the MPE ratios. Spatial averaging does not apply when MPE is estimated using simple calculations based on far-field plane-wave equivalent conditions. The antenna installation and operating requirements for the host device must meet the minimum test separation distances required by all antennas, in both standalone and simultaneous transmission operations, to satisfy compliance.

3. Limit

3.1 Refer Evaluation Method

[ANSI C95.1-2019](#): IEEE Standard for Safety Levels with Respect to Human Exposure to Electric, Magnetic, and Electromagnetic Fields, 0 Hz to 300 GHz

[FCC KDB publication 447498 D01 General 1 RF Exposure Guidance v06](#): Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.

[FCC CFR 47 part1 1.1310](#): Radiofrequency radiation exposure limits.

[FCC CFR 47 part2 2.1091](#): Radiofrequency radiation exposure evaluation: mobile devices.

3.2 Limit

Limits for Maximum Permissible Exposure (MPE)/Controlled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
0.3 – 3.0	614	1.63	(100) *	6
3.0 – 30	1842/f	4.89/f	(900/f ²)*	6
30 – 300	61.4	0.163	1.0	6
300 – 1500	/	/	f/300	6
1500 – 100,000	/	/	5	6

Limits for Maximum Permissible Exposure (MPE)/Uncontrolled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for Occupational/Uncontrolled Exposure				
0.3 – 3.0	614	1.63	(100) *	30
3.0 – 30	824/f	2.19/f	(180/f ²)*	30
30 – 300	27.5	0.073	0.2	30
300 – 1500	/	/	f/1500	30
1500 – 100,000	/	/	1.0	30

F=frequency in MHz

*=Plane-wave equivalent power density





4. MPE Calculation Method

Predication of MPE limit at a given distance
Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG / 4\pi R^2$$

Where: S=power density

P=power input to antenna

G=power gain of the antenna in the direction of interest relative to an isotropic radiator

R=distance to the center of radiation of the antenna

5. Antenna Information

EUT can only use antennas certificated as follows provided by manufacturer;

Internal/ External Identification	Antenna type and antenna number	Operate frequency band	Maximum antenna gain	Notes
Internal	Internal Antenna	2400MHz ~ 2500MHz	Bluetooth: 2.21dBi 2.4GWIFI: 2.21dBi	Bluetooth /2.4G WIFI Antenna
Internal	Internal Antenna	5000MHz ~ 6000MHz	5GWIFI: 0.57dBii	5G WIFI Antenna



**6. Conducted Power**

[BT]

Mode	Channel	Frequency (MHz)	Peak Conducted Output Power (dBm)
1-DH5	0	2402	0.95
	39	2441	2.25
	78	2480	1.65
2-DH5	0	2402	2.48
	39	2441	3.7
	78	2480	2.93
3-DH5	0	2402	2.79
	19	2441	4.03
	39	2480	3.2

[BT LE]

Mode	Channel	Frequency (MHz)	Peak Conducted Output Power (dBm)
BLE 1M	0	2402	-1.03
	19	2440	1.51
	39	2480	0.39

[2.4G WIFI]

Mode	Channel	Frequency (MHz)	Peak Conducted Output Power (dBm)
IEEE 802.11b	1	2412	14.02
	6	2437	13.58
	11	2462	13.24
IEEE 802.11g	1	2412	14.52
	6	2437	13.96
	11	2462	13.68
IEEE 802.11n HT20	1	2412	13.92
	6	2437	13.37
	11	2462	13.18
IEEE 802.11n HT40	3	2422	12.67
	6	2437	11.53
	9	2452	12.33





[5.2G WIFI]

Mode	Channel	Frequency (MHz)	Max Conducted Power(dBm)
11A	36	5180	16.4
	40	5200	16.26
	48	5240	15
11N20 SISO	36	5180	16.62
	40	5200	16.55
	48	5240	14.96
11N40 SISO	38	5190	15.36
	46	5230	13.93
11AC20 SISO	36	5180	16.6
	40	5200	16.4
	48	5240	14.9
11AC40 SISO	38	5190	14.43
	46	5230	13.81
11AC80 SISO	42	5210	13.97

[5.8G WIFI]

Mode	Channel	Frequency (MHz)	Max Conducted Power(dBm)
11A	149	5745	15.94
	157	5785	15.09
	165	5825	15.13
11N20 SISO	149	5745	15.23
	157	5785	14.44
	165	5825	14.94
11N40 SISO	151	5755	14.73
	159	5795	14.01
11AC20 SISO	149	5745	15.16
	157	5785	14.29
	165	5825	14.83
11AC40 SISO	151	5755	14.71
	159	5795	14.04
11AC80 SISO	155	5775	13.64





7. Manufacturing Tolerance

[BT]

GFSK (Peak)			
Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	0	2.0	1.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
$\pi/4$ -DQPSK (Peak)			
Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	2.0	3.0	2.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
8DPSK (Peak)			
Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	2.0	4.0	3.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0

[BT LE]

GFSK (Peak)			
Channel	Channel 0	Channel 19	Channel 39
Target (dBm)	-1.0	1.0	0
Tolerance $\pm$ (dB)	1.0	1.0	1.0

[2.4G WIFI]

IEEE 802.11b (Peak)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	14.0	13.0	13.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
IEEE 802.11g (Peak)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	14.0	13.0	13.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
IEEE 802.11n HT20 (Peak)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	13.0	13.0	13.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
IEEE 802.11n HT40 (Peak)			
Channel	Channel 3	Channel 6	Channel 9
Target (dBm)	12.0	11.0	12.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0





[5.2G WIFI]

11A (Average)			
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	16.0	16.0	15.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
11N20 (Average)			
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	16.0	16.0	14.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
11N40 (Average)			
Channel	Channel 38	Channel 46	
Target (dBm)	15.0	13.0	
Tolerance $\pm$ (dB)	1.0	1.0	
11AC20 (Average)			
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	16.0	16.0	14.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
11AC40 (Average)			
Channel	Channel 38	Channel 46	
Target (dBm)	14.0	13.0	
Tolerance $\pm$ (dB)	1.0	1.0	
11AC80 (Average)			
Channel	Channel 42		
Target (dBm)	13.0		
Tolerance $\pm$ (dB)	1.0		





[5.8G WIFI]

11A (Average)			
Channel	Channel 149	Channel 157	Channel 165
Target (dBm)	15.0	15.0	15.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
11N20 (Average)			
Channel	Channel 149	Channel 157	Channel 165
Target (dBm)	15.0	14.0	14.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
11N40 (Average)			
Channel	Channel 151	Channel 159	
Target (dBm)	14.0	14.0	
Tolerance $\pm$ (dB)	1.0	1.0	
11AC20 (Average)			
Channel	Channel 149	Channel 157	Channel 165
Target (dBm)	15.0	14.0	14.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
11AC40 (Average)			
Channel	Channel 151	Channel 159	
Target (dBm)	14.0	14.0	
Tolerance $\pm$ (dB)	1.0	1.0	
11AC80 (Average)			
Channel	Channel 155		
Target (dBm)	13.0		
Tolerance $\pm$ (dB)	1.0		





8. Measurement Results

8.1 Standalone MPE Evaluation

As declared by the Applicant, the EUT is a wireless device used in a fix application, at least 20 cm from any body part of the user or nearby persons; from the maximum EUT RF output power, the minimum separation distance, $r=20\text{cm}$, as well as the gain of the used antenna refer to antenna information, the RF power density can be obtained.

[BT]

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW				
GFSK	3.0	1.9953	2.21	1.6634	0.0007	1.0000
$\pi/4$ -DQPSK	4.0	2.5119	2.21	1.6634	0.0008	1.0000
8-DPSK	5.0	3.1623	2.21	1.6634	0.0010	1.0000

[BT LE]

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW				
GFSK	2.0	1.5849	2.21	1.6634	0.0005	1.0000

[2.4G WIFI]

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW				
IEEE 802.11b	15.0	31.6228	2.21	1.6634	0.0105	1.0000
IEEE 802.11g	15.0	31.6228	2.21	1.6634	0.0105	1.0000
IEEE 802.11n HT20	14.0	25.1189	2.21	1.6634	0.0083	1.0000
IEEE 802.11n HT40	13.0	19.9526	2.21	1.6634	0.0066	1.0000

[5.2G WIFI]

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW				
IEEE 802.11a	17.0	50.1187	0.57	1.1402	0.0114	1.0000
IEEE 802.11n HT20	17.0	50.1187	0.57	1.1402	0.0114	1.0000
IEEE 802.11n HT40	16.0	39.8107	0.57	1.1402	0.0090	1.0000
IEEE 802.11ac VHT20	17.0	50.1187	0.57	1.1402	0.0114	1.0000
IEEE 802.11ac VHT40	15.0	31.6228	0.57	1.1402	0.0072	1.0000
IEEE 802.11ac VHT80	14.0	25.1189	0.57	1.1402	0.0057	1.0000





[5.8G WIFI]

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW				
IEEE 802.11a	16.0	39.8107	0.57	1.1402	0.0090	1.0000
IEEE 802.11n HT20	16.0	39.8107	0.57	1.1402	0.0090	1.0000
IEEE 802.11n HT40	15.0	31.6228	0.57	1.1402	0.0072	1.0000
IEEE 802.11ac VHT20	16.0	39.8107	0.57	1.1402	0.0090	1.0000
IEEE 802.11ac VHT40	15.0	31.6228	0.57	1.1402	0.0072	1.0000
IEEE 802.11ac VHT80	14.0	25.1189	0.57	1.1402	0.0057	1.0000

Remark:

1. Output power including tune-up tolerance;
2. Output power was adjusted to duty cycle at 100% if measured duty cycle less than 98%;
3. MPE evaluate distance is 20cm from user manual provide by manufacturer.





8.2 Simultaneous Transmission MPE Evaluation

The EUT equipped with one Bluetooth/2.4GWIFI antenna, one 5GWIFI antenna. so need consider simultaneous transmission;
According to KDB447498 for Transmitters used in mobile exposure conditions for simultaneous transmission operations;

Simultaneous Transmission				
Bluetooth/2.4GWIFI Antenna Max MPE ratios	5GWIFI Antenna Max MPE ratios	Σ MPE ratios	Limit	Results
0.0105	0.0114	0.0219	1.0	Pass

9. Conclusion

The measurement results comply with the FCC Limit per 47 CFR 2.1091 for the uncontrolled RF Exposure of mobile device.

10. Description of Test Facility

NVLAP Accreditation Code is 600167-0.

FCC Designation Number is CN5024.

CAB identifier is CN0071.

CNAS Registration Number is L4595.

Test Firm Registration Number: 254912.

11. Measurement Uncertainty

BT/BLE/2.4GWIFI/5GWIFI:

Test Item	Frequency Range	Uncertainty	Note
Output power	1GHz-40GHz	$\pm 0.57\text{dB}$	(1)

(1). This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

-----THE END OF REPORT-----

