

FCC RF Exposure Exemption report
for

Embedded Node

Model No.: SN-EB01

FCC ID: 2BAJFSN-EB01

of

Applicant: LEOTEK Electronics Corp.

Address: 1955 Lundy Ave, San Jose, CA 95131 United States

Tested and Prepared

by

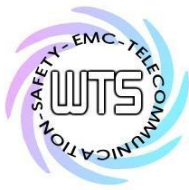
Worldwide Testing Services (Taiwan) Co., Ltd.

FCC Registration No.: TW1072, TW1140, TW1146, TW1477, TW0037

Industry Canada filed test laboratory Reg. No.: 20037, 31634



Report No.: W6M22409-23713-EE

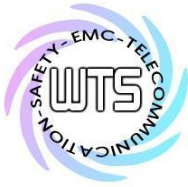


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1 General Information

1.1 Notes

The purpose of conformity testing is to increase the probability of adherence to the essential requirements or conformity specifications, as appropriate.

The complexity of the technical specifications, however, means that full and thorough testing is impractical for both technical and economic reasons.

Furthermore, there is no guarantee that a test sample which has passed all the relevant tests conforms to a specification.

Neither is there any guarantee that such a test sample will interwork with other genuinely open systems.

The existence of the tests nevertheless provides the confidence that the test sample possesses the qualities as maintained and that its performance generally conforms to representative cases of communications equipment.

Laboratory disclaimer-

1. The test results of this test report relate exclusively to the item tested as specified in 1.5.
2. The test report may only be reproduced or published in full.
3. Reproduction or publication of extracts from the report requires the prior written approval of the Worldwide Testing Services(Taiwan) Co., Ltd.
4. Antenna gain is provided by applicant and laboratory issue relevant data and results.

Tester:

October 17, 2024

Rick Chen

Rick Chen.

Date

WTS-Lab.

Name

Signature

Technical responsibility for area of testing:

October 17, 2024

Kevin Wang

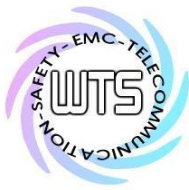
Kevin Wang

Date

WTS

Name

Signature



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1.2 Testing laboratory

1.2.1 Location

10m OATS

No.5-1, Lishui, Shuang Sing Village, Wanli Dist.,
New Taipei City 207, Taiwan (R.O.C.)

3 meter semi-anechoic chamber

No. 99, Sec. 1, Balian Rd., Xizhi Dist.,
New Taipei City 221032, Taiwan (R.O.C.)

Worldwide Testing Services (Taiwan) Co., Ltd.
6F., No. 58, Ln. 188, Ruiguang Rd., Neihu Dist.,
Taipei City 114, Taiwan (R.O.C.)
Tel: 886-2-6606-8877

1.2.2 Details of accreditation status

Accredited testing laboratory

FCC filed test laboratory Reg. No.: TW1072, TW1140, TW1146, TW1477, TW0037

Industry Canada filed test laboratory Reg. No.: 20037, 31634

Test location, where different from Worldwide Testing Services (Taiwan) Co., Ltd. :

Name: ./.
Accredited no.: ./.
Street: ./.
Town: ./.
Country: ./.

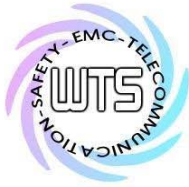
1.3 Application details

Approval holder

Name: LEOTEK Electronics Corp.
Street: 1955 Lundy Ave, San Jose,
Town: CA 95131
Country: United States

Manufacturer: (if applicable)

Name: KO CHANG ELECTRONIC CO., LTD.
Street: No. 395, Section 6, Minzu Road, Xinwu District,
Town: Taoyuan City,
Country: Taiwan



Worldwide Testing Services(Taiwan) Co., Ltd.

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Date of receipt of test item: August 20, 2024

Date of test: from August 21, 2024 to October 17, 2024

1.4 General information of Test item

Type of test item: Embedded Node

Model no.: SN-EB01

Multi-listing model no.: ./.

Brand name: LEOTEK

Power supply: AC 120V

Type of antenna: FPC antenna

Antenna gain: NB-IOT & Cat M1

Band 2: 1.44 dBi 、 Band 4: 1.44 dBi 、 Band 5: 1.34 dBi 、

Band 12: 1.34 dBi 、 Band 13: 1.34 dBi 、 Band 26: 1.34 dBi

Technical data

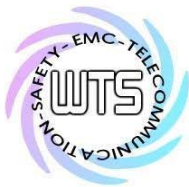
NB-IOT			
Band	Channel/Frequency(MHz)	Conducted Power (dBm)	EIRP/ERP (dBm)
Band 2	19198/1909.8	20.88	22.32
Band 4	19952/1710.2	20.93	22.37
Band 5	20525/836.5	20.94	22.28
Band 12	23095/707.5	20.97	22.31
Band 13	23230/782	20.96	22.30
Band 26	26865/831.5	21.07	22.41

Cat M1			
Band	Channel/Frequency(MHz)	Conducted Power (dBm)	EIRP/ERP (dBm)
Band 2	18900/1880	20.98	22.42
Band 4	20175/1732.5	20.55	21.99
Band 5	20525/836.5	20.87	22.21
Band 12	23095/707.5	20.92	22.26
Band 13	23230/782	21.34	22.68
Band 26	26865/831.5	21.00	22.34

Operation modes: Duplex

Modulation type: BPSK, QPSK, 16QAM

Sample no.: #01



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Classification:

Fixed Device	☐
Mobile Device (Human Body distance > 20cm)	☒
Portable Device (Human Body distance < 20cm)	☐

1.5 Test standards

15 SUBPART C § 15.247 (2023-10)

47CFR Part 22 (2023-10), Part 24 (2023-10), Part 27 (2023-10) and Part 90 (2023-10)



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2 Test configuration

2.1 Test environment

Relative humidity content: 20 ... 75 %

Air pressure: 86 ... 103 kPa

Extreme conditions parameters: ./.

2.2 Measurement uncertainty

Test item Name	Uncertainty
Estimation Result of Uncertainty of Conducted Output Power Measurement (Peak Output Power (transmitter))	Expanded Uncertainty : 1.64 dB

The decision rule is: Measurement uncertainty is not included in the calculation of test results.

2.3 Test Equipment List

Power

Code No.	Test equipment	Mode No.	Serial No.	Brand	Cal. Date	Next Cal. Date
ETSTW-RE 050	Attenuator 10dB	50HF-010-1	None	JFW	2024/2/16	2025/2/15
ETSTW-RE 099	DC Block	50DB-007-1	None	JFW	2024/2/16	2025/2/15
ETSTW-GSM 024	Radio Communication Analyzer	MT8821C	None	Anritsu	2024/4/23	2025/4/22
ETSTW-Cable 030	Microwave Cable	SUCOFLEX 104 (S_Cable 9)	279067	HUBER+SUHNER	2024/8/26	2025/8/25



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3 Equivalent Isotropic Radiated Power (EIRP)

3.1 Exemption Limits for Routine Evaluation

according to 47 CFR FCC Part 2 Subpart J, section 2.1091

FCC OET Bulletin 65 Edition 97.01 determines the equations for predicting RF fields and applicable limits.

The prediction for power density in the far-field but will over-predict power density in the near field, where it could be used for walking a “worst case” or conservative prediction.

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 20 cm normally can be maintained between the user and the device.

MPE Calculation Method

(A) Limits for Occupational/Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
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

(B) Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	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

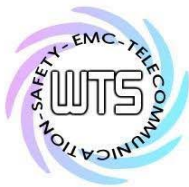
*Plane-wave equivalent power density

E = Electric field (V/m) P = output power (W) G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

$$Pd = \frac{30 \times P \times G}{377 \times d^2} \quad \text{mW/cm}^2.$$



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NB-IOT

Band	Frequency (MHz)	Max output power (dBm)	Antenna Gain (dBi)	Power density (mW/cm ²)	Limit (mW/cm ²)	Ratio
Band 2	1909.8	20.88	1.44	0.034	1	--
Band 4	1710.2	20.93	1.44	0.0343	1	--
Band 5	836.5	20.94	1.34	0.0336	0.5577	--
Band 12	707.5	20.97	1.34	0.0339	0.4717	0.0719
Band 13	782	20.96	1.34	0.0338	0.5213	--
Band 26	831.5	21.07	1.34	0.0346	0.5543	--

Cat M1

Band	Frequency (MHz)	Max output power (dBm)	Antenna Gain (dBi)	Power density (mW/cm ²)	Limit (mW/cm ²)	Ratio
Band 2	1880	20.98	1.44	0.0347	1	--
Band 4	1732.5	20.55	1.44	0.0315	1	--
Band 5	836.5	20.87	1.34	0.0331	0.5577	--
Band 12	707.5	20.92	1.34	0.0335	0.4717	0.0710
Band 13	782	21.34	1.34	0.0369	0.5213	--
Band 26	831.5	21.00	1.34	0.0341	0.5543	--

From the peak EUT RF output power, the minimum mobile separation distance, $d = 20$ cm, as well as the gain of the used antenna, the RF power density can be obtained.