FCC Radio Test Report
(RF Power Output)

Report No.	:	BTL-FCCP-17-2112T127
Equipment	:	Notebook Computer
Model Name	:	TP00143AL
Brand Name	:	Lenovo
Applicant	:	LC Future Center
Address	:	7F., No. 780, Beian Rd., Zhongshan Dist., Taipei City 104, Taiwan
Manufacturer	:	Lenovo PC HK Limited
Address	:	23/F, Lincoln House, Taikoo Place 979 King's Road, Quarry Bay, Hong Kong, P.R. China
Equipment	:	Notebook Computer
Radio Function		WCDMA Band I, V and VIII (Power only)
Standard(s)	:	47 CRF FCC Part 2 47 CRF FCC Part 22, Subpart H 47 CRF FCC Part 24, Subpart E FCC KDB 971168 D01 Power Meas License Digital Systems v03r01 ANSI C63.26-2015
Date of Receipt	:	2022/1/13
Date of Test	:	2022/1/13 ~ 2022/3/11
Issued Date	:	2022/3/31

The above equipment has been tested and found in compliance with the requirement of the above standards by BTL Inc.

Prepared by : Eric Lee, Engineer

Approved by : Jerry Chuang, Supervisor

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Declaration

BTL represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with standards traceable to international standard(s) and/or national standard(s).

BTL's reports apply only to the specific samples tested under conditions. It is manufacture's responsibility to ensure that additional production units of this model are manufactured with the identical electrical and mechanical components. **BTL** shall have no liability for any declarations, inferences or generalizations drawn by the client or others from **BTL** issued reports.

This report is the confidential property of the client. As a mutual protection to the clients, the public and ourselves, the test report shall not be reproduced, except in full, without our written approval.

BTL's laboratory quality assurance procedures are in compliance with the **ISO/IEC 17025** requirements, and accredited by the conformity assessment authorities listed in this test report.

BTL is not responsible for the sampling stage, so the results only apply to the sample as received.

The information, data and test plan are provided by manufacturer which may affect the validity of results, so it is manufacturer's responsibility to ensure that the apparatus meets the essential requirements of applied standards and in all the possible configurations as representative of its intended use.

Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

Please note that the measurement uncertainty is provided for informational purpose only and are not use in determining the Pass/Fail results.

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REVISION HISTORY

Report No.	Version	Description	Issued Date	Note
BTL-FCCP-17-2112T127	R00	Original Report.	2022/3/31	Valid

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

Standard(s) Section	Test Item	Judgment	Remark
2.1046 22.913(a)(5)	Effective Radiated Power (ERP)	PASS	------
§2.1046 §24.232(c)	Equivalent Isotropically Radiated Power (EIRP)	PASS	------

Note:

(1) “N/A” denotes test is not applicable in this test report.

(2) The report format version is TP.1.1.1.

1.1 TEST FACILITY

The test facilities used to collect the test data in this report:

No. 68-1, Ln. 169, Sec. 2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan
The test sites and facilities are covered under FCC RN: 674415 and DN: TW0659.

☐ C05 ☐ CB08 ☐ CB11 ☒ CB12 ☐ CB16
☒ SR05

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y** ± **U**, where expanded uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k = 2**, providing a level of confidence of approximately **95 %**. The measurement instrumentation uncertainty considerations contained in CISPR 16-4-2. The BTL measurement uncertainty is less than the CISPR 16-4-2 U_{cispr} requirement.

Test Item	U,(dB)
Output power	1.06

Test Site	Measurement Frequency Range	U,(dB)
CB15	0.03 GHz ~ 0.2 GHz	4.17
	0.2 GHz ~ 1 GHz	4.72
	1 GHz ~ 6 GHz	5.21
	6 GHz ~ 18 GHz	5.51
	18 GHz ~ 26 GHz	3.69
	26 GHz ~ 40 GHz	4.23

NOTE:
Unless specifically mentioned, the uncertainty of measurement has not been taken into account to declare the compliance or non-compliance to the specification.

1.3 TEST ENVIRONMENT CONDITIONS

Test Item	Environment Condition	Test Voltage	Tested By
EIRP/ERP, Conducted	23.5 °C, 58.5 %	AC 120V	William Wei
EIRP/ERP, Radiated	21~23 °C, 54~64 %	AC 120V	Vincent Lee

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	Notebook Computer		
Model Name	TP00143AL		
Brand Name	Lenovo		
Model Difference	N/A		
Power Source	DC voltage supplied from External Power Supply. (Lenovo/ ADL135SLC3A, ADL135SCC2A)		
Power Rating	I/P: 100-240V~ 2.5A 50-60Hz O/P: DC20.0V 6.75A 135.0W		
WWAN Module	Fibocom / L860-GL-16		
Testing Frequency Band	Band	UL Frequency (MHz)	DL Frequency (MHz)
	WCDMA I	1920 ~ 1980	2110 ~ 2170
	WCDMA V	824 ~ 949	869 ~ 894
	WCDMA VIII	880 ~ 915	925 ~ 960
Test Model	TP00143AL		
Sample Status	Engineering Sample		
EUT Modification(s)	N/A		

NOTE:
(1) For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.

(2) Table for Filed Antenna:

Antenna	Manufacture	Parts Number	Type	Connector	Gain (dBi)	Note
Main	AWAN	DC33001WF00	PIFA	I-PEX	0.16	WCDMA Band I
					-2.16	WCDMA Band V
					-0.45	WCDMA Band VIII
Aux	AWAN	DC33001WF10	PIFA	I-PEX	-	RX only

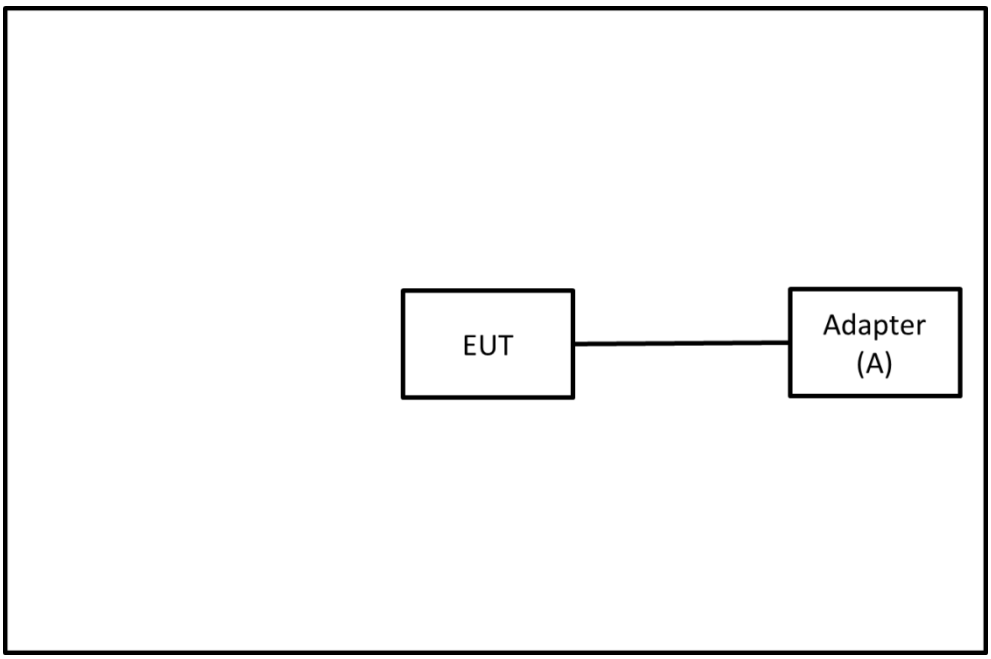
2.2 DESCRIPTION OF TEST MODES

Following mode(s) is (were) found to be the worst case(s) and selected for the final test.

Test Item	Available Channel	Tested Channel	Mode
EIRP	10562 to 10838	10562, 10700, 10838	WCDMA Band I
ERP	4357 to 4458	4357, 4407, 4458	WCDMA Band V
ERP	2937 to 3088	2937, 3013, 3088	WCDMA Band VIII

NOTE:
(1) All X, Y and Z axes are evaluated, but only the worst case (Y axis) is recorded.

2.3 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



2.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Brand	Model No.	Series No.	Remarks
A	Adapter	Lenovo	ADL135SLC3A	N/A	Supplied by test requester.

Item	Shielded	Ferrite Core	Length	Cable Type	Remarks
-	-	-	-	-	-

2.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

3. EIRP/ERP TEST

3.1 LIMIT

The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

3.2 TEST PROCEDURES

EIRP / ERP Power Measurement:

a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 5 MHz.

b. Substitution method is used for EIRP measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m height of turn table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1 m to 4 m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.

c. The substitution antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the turn table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G. to get a value of spectrum reading equal to “Read Value” of step b. Record the power level of S.G.

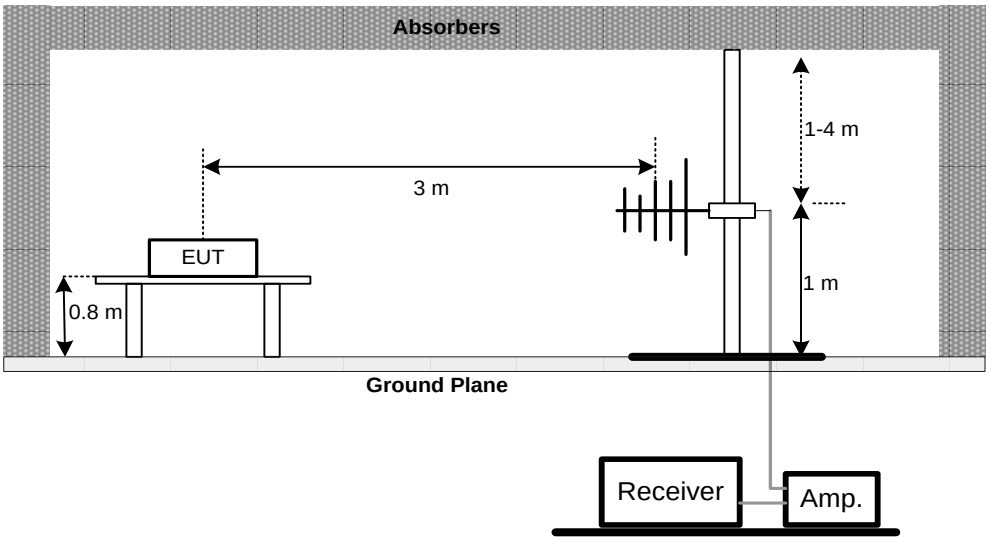
d. EIRP = Output power level of S.G. - TX cable loss + Antenna gain of substitution antenna.
ERP power = EIPR power - 2.15 dBi.

Conducted Power Measurement:

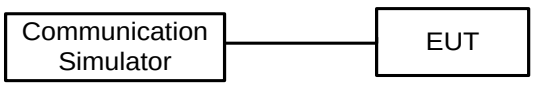
The EUT was set up for the maximum power with WCDMA link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

3.3 TEST SETUP LAYOUT

EIRP / ERP Power Measurement:



Conducted Power Measurement:



3.4 TEST DEVIATION

No deviation

3.5 TEST RESULTS

Please refer to the APPENDIX A.

4. MEASUREMENT INSTRUMENTS LIST

Radiated Emissions (UE)						
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until
1	Preamplifier	EMCI	EMC02325	980217	2021/4/8	2022/4/7
2	Preamplifier	EMCI	EMC012645B	980222	2021/4/8	2022/4/7
3	Test Cable	EMCI	EMC104-SM-1000	180809	2021/4/8	2022/4/7
4	Test Cable	EMCI	EMC104-SM-SM-3000	151205	2021/4/8	2022/4/7
5	Test Cable	EMCI	EMC-SM-SM-7000	180408	2021/4/8	2022/4/7
6	MXE EMI Receiver	Agilent	N9038A	MY56400087	2021/5/27	2022/5/26
7	Signal Analyzer	Agilent	N9010A	MY56480554	2021/8/25	2022/8/24
8	Horn Ant	SCHWARZBECK	BBHA 9120D	9120D-1342	2021/6/2	2022/6/1
9	Horn Ant	Schwarzbeck	BBHA 9170	340	2021/7/9	2022/7/8
10	Trilog-Broadband Antenna	Schwarzbeck	VULB 9168	9168-352	2021/8/11	2022/8/10
11	5dB Attenuator	EMCI	EMCI-N-6-05	AT-N0625	2021/8/11	2022/8/10
12	Measurement Software	EZ	EZ_EMC (Version NB-03A1-01)	N/A	N/A	N/A
13	8960 Series 10 Wireless Com Test Set	Agilent	E5515C	GB47390193	2021/7/23	2022/7/22
14	Radio Communication Analyzer (LTE)	Anritsu	MT8821C	6262044728	2021/11/28	2022/11/27

Conducted Emissions						
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until
1	8960 Series 10 Wireless Com Test Set	Agilent	E5515C	GB47390193	2021/7/23	2022/7/22

Remark: "N/A" denotes no model name, serial no. or calibration specified.
All calibration period of equipment list is one year.

5. EUT TEST PHOTOS

Please refer to document Appendix No.: TP-2112T127-FCCP-1 (APPENDIX-TEST PHOTOS).

6. EUT PHOTOS

Please refer to document Appendix No.: EP-2112T127-1 (APPENDIX-EUT PHOTOS).

APPENDIX A - EIRP/ERP

Test Date	2022/1/13 ~ 3/11

WCDMA Band I						
Channel (Tx/Rx)	9612/10562		9750/10700		9888/10838	
Frequency (MHz)	1922.4/2112.4		1950.0/2140.0		1977.6/2167.6	
Polarization	V	H	V	H	V	H
Peak EIRP (dBm)	15.03	15.75	11.65	17.13	15.73	17.57
Conducted Power (dBm)	24.32		24.39		24.36	

WCDMA Band V						
Channel (Tx/Rx)	4132/4357		4183/4407		4233/4458	
Frequency (MHz)	826.4/871.4		837.4/882.4		846.6/891.6	
Polarization	V	H	V	H	V	H
Peak ERP (dBm)	7.69	12.81	6.47	11.89	6.21	10.70
Conducted Power (dBm)	24.35		24.40		24.39	

WCDMA Band VIII						
Channel (Tx/Rx)	2712/2937		2788/3013		2863/3088	
Frequency (MHz)	882.4/927.4		897.6/942.6		912.6/957.6	
Polarization	V	H	V	H	V	H
Peak ERP (dBm)	8.73	11.61	7.93	11.53	6.72	11.94
Conducted Power (dBm)	24.35		24.42		24.38	

End of Test Report