



# FCC RADIO TEST REPORT

**FCC ID** : 2AJN7-TP00122AUC  
**Equipment** : Notebook Computer/Foldable PC  
**Brand Name** : Lenovo  
**Model Name** : TP00122A  
**Applicant** : LC Future Center Limited Taiwan Branch  
7F., No. 780, Bei'an Rd., Zhongshan Dist., Taipei City 104, Taiwan  
**Manufacturer** : LCFC (HeFei) Electronics Technology Co., Ltd.  
No. 3188-1, Yungu Road (Hefei Export Processing Zone), Hefei  
Economics & Technology Development Area, Anhui, CHINA  
**Standard** : FCC 47 CFR Part 2, 90(R)

Equipment: Foxconn T99W175 tested inside of Lenovo Notebook Computer/Foldable PC

The product was received on Jul. 21, 2020 and testing was started from Aug. 17, 2020 and completed on Aug. 28, 2020. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI / TIA-603-E and has been in compliance with the applicable technical standards.

The test results in this partial report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

*Louis Wu*

Approved by: Louis Wu

**SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory**

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan



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Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
-	§2.1046	Conducted Output Power	-	See Note
-	§90.542 (a)(7)	Effective Radiated Power	-	See Note
-	-	Peak-to-Average Ratio	-	See Note
-	§2.1049	Occupied Bandwidth	-	See Note
-	§2.1053 §90.543 (e)(2)	Conducted Band Edge Measurement	-	See Note
-	§2.1051 §90.210 (n)	Emission Mask	-	See Note
-	§2.1053 §90.543 (e)(3)	Conducted Spurious Emission	-	See Note
-	§2.1055 §90.539 (e)	Frequency Stability Temperature & Voltage	-	See Note
3.2	§2.1053 §90.543 (e)(3) §90.543 (f)	Radiated Spurious Emission	Pass	Under limit 20.58 dB at 1576.000 MHz

**Note:** The module (Model: T99W175) makes no difference after verifying output power, this report reuses test data from the module report.

**Declaration of Conformity:**

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

**Comments and Explanations:**

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

**Reviewed by: Wii Chang**

**Report Producer: Amy Chen**

# 1 General Description

## 1.1 Product Feature of Equipment Under Test

Product Feature	
<b>Equipment</b>	Notebook Computer/Foldable PC
<b>Brand Name</b>	Lenovo
<b>Model Name</b>	TP00122A
<b>FCC ID</b>	2AJN7-TP00122AUC
<b>EUT supports Radios application</b>	WCDMA/HSPA/LTE/GNSS/5G NR WLAN 11a/b/g/n HT20/HT40 WLAN 11ac VHT20/VHT40/VHT80/VHT160 WLAN 11ax HE20/HE40/HE80/HE160 Bluetooth BR/EDR/LE
<b>EUT Stage</b>	Production Unit

**Remark:**

1. The above EUT's information was declared by manufacturer.
2. Equipment: Foxconn T99W175 tested inside of Lenovo Notebook Computer/Foldable PC

WWAN Antenna Information				
<b>Main Antenna</b>	<b>Manufacturer</b>	Amphenol	<b>Peak gain (dBi)</b>	1.94
	<b>Part number</b>	LXA494-16-000-C	<b>Type</b>	PIFA
<b>MIMO 2 Antenna</b>	<b>Manufacturer</b>	Amphenol	<b>Peak gain (dBi)</b>	1.44
	<b>Part number</b>	LXA493-16-000-C	<b>Type</b>	PIFA

## 1.2 Product Specification of Equipment Under Test

Product Feature	
<b>Tx Frequency</b>	LTE Band 14 :790.5 MHz ~ 795.5 MHz
<b>Rx Frequency</b>	LTE Band 14 :760.5 MHz ~ 765.5 MHz
<b>Bandwidth</b>	5MHz / 10MHz
<b>Type of Modulation</b>	QPSK / 16QAM / 64QAM

## 1.3 Modification of EUT

No modifications are made to the EUT during all test items.



## 1.4 Testing Site

<b>Test Site</b>	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
<b>Test Site Location</b>	No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City, Taiwan
<b>Test Site No.</b>	<b>Sporton Site No.</b> 03CH12-HY
<b>Test Engineer</b>	Jack Cheng, Lance Chiang and Chuan Chu
<b>Temperature</b>	22.8~26.2°C
<b>Relative Humidity</b>	56.5~68.6%

**Note:** The test site complies with ANSI C63.4 2014 requirement.

FCC Designation No.: TW0007

## 1.5 Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ ANSI C63.26-2015
- ♦ FCC 47 CFR Part 2, Part 90(R)
- ♦ ANSI / TIA-603-E
- ♦ FCC KDB 971168 D01 Power Meas. License Digital Systems v03r01

### Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. The TAF code is not including all the FCC KDB listed without accreditation.

## 2 Test Configuration of Equipment Under Test

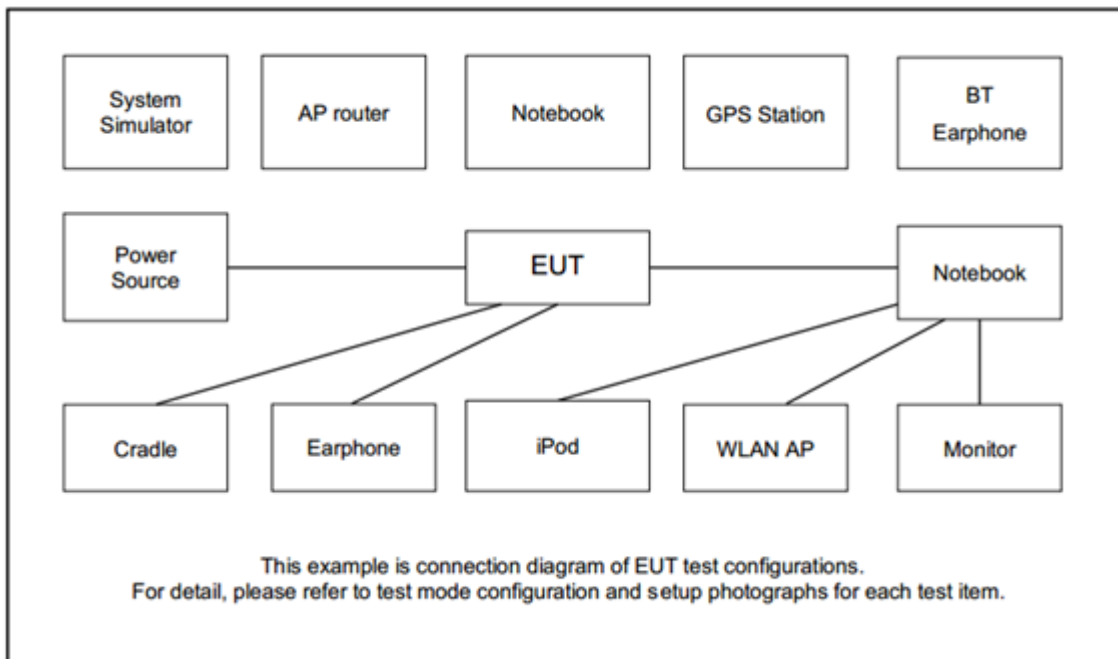
### 2.1 Test Mode

Antenna port conducted and radiated test items listed below are performed according to KDB 971168 D01 Power Meas. License Digital Systems v03r01 with maximum output power.

For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Y plane) were recorded in this report.

Conducted Test Cases	Band	Bandwidth (MHz)						Modulation			RB #			Test Channel		
		1.4	3	5	10	15	20	QPSK	16QAM	64QAM	1	Half	Full	L	M	H
Radiated Spurious Emission	14	-	-	V	V	-	-	V	-	-	V	V	V	V	V	V
Remark	<ol style="list-style-type: none"> <li>The mark "v" means that this configuration is chosen for testing</li> <li>The mark "-" means that this bandwidth is not supported.</li> <li>The device is investigated from 1GHz to 10 times of fundamental signal for radiated spurious emission test under different RB size/offset and modulations in exploratory test. Subsequently, only the worst case emissions are reported.</li> <li>All the radiated test cases were performed with Adapter 1.</li> </ol>															

### 2.2 Connection Diagram of Test System



### 2.3 Support Unit used in test configuration and system

Item	Equipment	Brand Name	Model No.	FCC ID	Data Cable	Power Cord
1.	System Simulator	Anritsu	MT8821C	N/A	N/A	Unshielded, 1.8 m



## 2.4 Frequency List of Low/Middle/High Channels

LTE Band 14 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
10	Channel	-	23330	-
	Frequency	-	793	-
5	Channel	23305	23330	23355
	Frequency	790.5	793	795.5



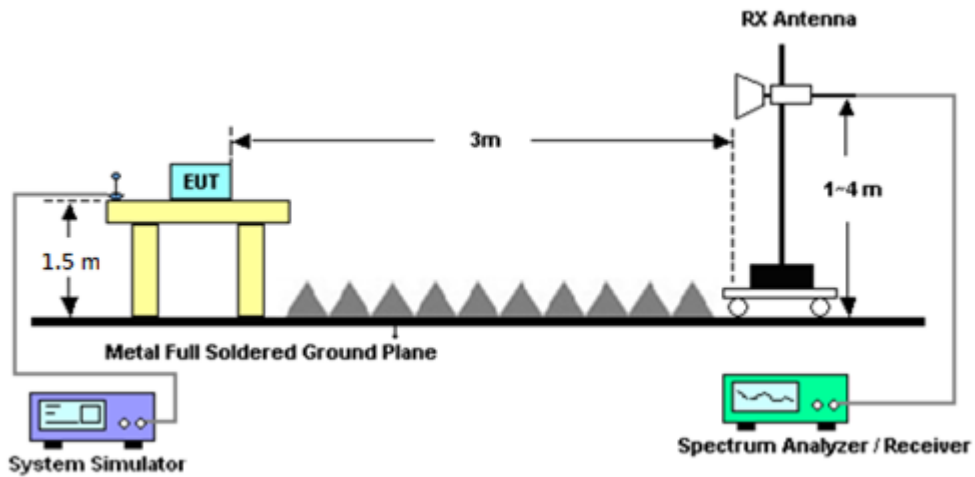
### 3 Radiated Test Items

#### 3.1 Measuring Instruments

See list of measuring instruments of this test report.

##### 3.1.1 Test Setup

For radiated test above 1GHz



##### 3.1.2 Test Result of Radiated Test

Please refer to Appendix A.



## 3.2 Radiated Spurious Emission

### 3.2.1 Description of Radiated Spurious Emission

The radiated spurious emission was measured by substitution method according to ANSI / TIA-603-E. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least  $43 + 10 \log (P)$  dB.

For operations in the 758-775 MHz and 788-805 MHz bands, all emissions including harmonics in the band 1559–1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

### 3.2.2 Test Procedures

The testing follows FCC KDB 971168 D01 v03r01 Section 7 and ANSI / TIA-603-E Section 2.2.12.

1. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving antenna is varied between one meter and four meters to search the maximum spurious emission for both horizontal and vertical polarizations.
5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, Sweep = 500ms, Taking the record of maximum spurious emission.
6. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
7. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
8. Taking the record of output power at antenna port.
9. Repeat step 7 to step 8 for another polarization.
10. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
11. The limit line is derived from  $43 + 10\log(P)$ dB below the transmitter power P(Watts)



## 4 List of Measuring Equipment

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1328	1GHz~18GHz	Nov. 14, 2019	Aug. 17, 2020~ Aug. 28, 2020	Nov. 13, 2020	Radiation (03CH12-HY)
Preamplifier	Agilent	8449B	3008A02375	1GHz~26.5GHz	Mar. 26, 2020	Aug. 17, 2020~ Aug. 28, 2020	Mar. 25, 2021	Radiation (03CH12-HY)
Preamplifier	Jet-Power	JPA0118-55-303K	1710001800054002	1GHz~18GHz	Feb. 07, 2020	Aug. 17, 2020~ Aug. 28, 2020	Feb. 06, 2021	Radiation (03CH12-HY)
Spectrum Analyzer	Rohde & Schwarz	FSV3044	101048	10Hz~44GHz	Apr. 29, 2020	Aug. 17, 2020~ Aug. 28, 2020	Apr. 28, 2021	Radiation (03CH12-HY)
Signal Generator	Rohde & Schwarz	SMB100A	101107	100kHz~40GHz	Aug. 27, 2019	Aug. 17, 2020~ Aug. 28, 2020	Aug. 26, 2020	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 126E	0058/126E	30MHz~18GHz	Dec. 12, 2019	Aug. 17, 2020~ Aug. 28, 2020	Dec. 11, 2020	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	505134/2	30MHz~40GHz	Feb. 25, 2020	Aug. 17, 2020~ Aug. 28, 2020	Feb. 24, 2021	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	800740/2	30MHz~40GHz	Feb. 25, 2020	Aug. 17, 2020~ Aug. 28, 2020	Feb. 24, 2021	Radiation (03CH12-HY)
Hygrometer	TECPEL	DTM-303B	TP140349	N/A	Oct. 25, 2019	Aug. 17, 2020~ Aug. 28, 2020	Oct. 24, 2020	Radiation (03CH12-HY)
Controller	EMEC	EM1000	N/A	Control Turn table & Ant Mast	N/A	Aug. 17, 2020~ Aug. 28, 2020	N/A	Radiation (03CH12-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1m~4m	N/A	Aug. 17, 2020~ Aug. 28, 2020	N/A	Radiation (03CH12-HY)
Turn Table	EMEC	TT2000	N/A	0~360 Degree	N/A	Aug. 17, 2020~ Aug. 28, 2020	N/A	Radiation (03CH12-HY)
Software	Audix	E3 6.2009-8-24	RK-000989	N/A	N/A	Aug. 17, 2020~ Aug. 28, 2020	N/A	Radiation (03CH12-HY)



## 5 Uncertainty of Evaluation

### Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	3.21
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### Appendix A. Test Results of Radiated Test

### LTE Band 14

LTE Band 14 / 5MHz / QPSK									
Channel	Frequency ( MHz )	ERP ( dBm )	Limit ( dBm )	Over Limit ( dB )	SPA Reading (dBm)	S.G. Power ( dBm )	TX Cable loss ( dB )	TX Antenna Gain (dBi)	Polarization (H/V)
Lowest	1584	-63.09	-42.15	-20.94	-71.49	-68.46	0.90	8.42	H
	2368	-39.61	-13	-26.61	-53.17	-46.85	1.12	10.52	H
	3160	-56.55	-13	-43.55	-72.02	-64.79	1.30	11.68	H
									H
									H
	1584	-63.88	-42.15	-21.73	-71.81	-69.25	0.90	8.42	V
	2368	-41.92	-13	-28.92	-55.25	-49.16	1.12	10.52	V
	3160	-57.13	-13	-44.13	-73.04	-65.37	1.30	11.68	V
									V
									V
Middle	1584	-62.88	-42.15	-20.73	-71.27	-68.25	0.90	8.42	H
	2379	-42.24	-13	-29.24	-55.75	-49.50	1.12	10.53	H
	3172	-57.33	-13	-44.33	-72.84	-65.59	1.30	11.71	H
	3952	-53.49	-13	-40.49	-71.79	-62.63	1.48	12.77	H
									H
									H
	1584	-63.81	-42.15	-21.66	-71.74	-69.18	0.90	8.42	V
	2379	-46.36	-13	-33.36	-59.68	-53.62	1.12	10.53	V
	3172	-57.19	-13	-44.19	-73.16	-65.45	1.30	11.71	V
	3952	-55.90	-13	-42.90	-74.19	-65.04	1.48	12.77	V
									V
									V



Highest	1592	-63.45	-42.15	-21.30	-71.79	-68.85	0.90	8.45	H
	2384	-38.55	-13	-25.55	-52.01	-45.81	1.12	10.54	H
	3184	-57.47	-13	-44.47	-72.98	-65.76	1.30	11.74	H
									H
									H
	1592	-63.49	-42.15	-21.34	-71.42	-68.89	0.90	8.45	V
	2384	-39.73	-13	-26.73	-53.06	-46.99	1.12	10.54	V
	3184	-56.98	-13	-43.98	-72.97	-65.27	1.30	11.74	V
									V
									V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.



LTE Band 14 / 10MHz / QPSK									
Channel	Frequency ( MHz )	ERP ( dBm )	Limit ( dBm )	Over Limit ( dB )	SPA Reading (dBm)	S.G. Power ( dBm )	TX Cable loss ( dB )	TX Antenna Gain (dBi)	Polarization (H/V)
Middle	1576	-62.73	-42.15	-20.58	-71.19	-68.07	0.90	8.39	H
	2368	-39.70	-13	-26.70	-53.26	-46.94	1.12	10.52	H
	3152	-56.80	-13	-43.80	-72.26	-65.02	1.30	11.66	H
									H
									H
	1576	-63.07	-42.15	-20.92	-71	-68.41	0.90	8.39	V
	2368	-43.19	-13	-30.19	-56.52	-50.43	1.12	10.52	V
	3152	-56.88	-13	-43.88	-72.76	-65.10	1.30	11.66	V
									V
									V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.