



## RF Exposure Evaluation Report

**Application No.:** ZR/2020/10013  
**Applicant:** Lenovo(Shanghai) Electronics Technology Co., Ltd.  
**Address of Applicant:** Section 304-305, Building No. 4, # 222, Meiyue Road, China (Shanghai) Pilot Free Trade Zone  
**Manufacturer:** Lenovo PC HK Limited  
**Address of Manufacturer:** 23/F, Lincoln House, Taikoo Place 979 King's Road, Quarry Bay, Hong Kong P.R.China  
**EUT Description:** Portable Tablet Computer  
**Model No.:** Lenovo TB-X606FA  
**Trade Mark:** Lenovo  
**FCC ID:** O57TBX606F  
**Standards:** 47 CFR Part 2.1091  
 FCC KDB 447498 D01 v06  
**Date of Receipt:** 2019/11/9  
**Date of Test:** 2019/11/10 to 2019/11/21  
**Date of Issue:** 2020/3/17

<b>Test Result:</b>	<b>PASS*</b>
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\* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

Derek Yang  
Wireless Laboratory Manager



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# 1 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
00		2020/3/17		Original

Authorized for issue by:			
		 <hr/> Mike Hu /Project Engineer	2020/3/17
		 <hr/> David Chen /Reviewer	2020/3/17



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## 2 General Information

### 2.1 Client Information

Applicant:	Lenovo(Shanghai) Electronics Technology Co., Ltd.
Address of Applicant:	Section 304-305, Building No. 4, # 222, Meiyue Road, China (Shanghai) Pilot Free Trade Zone
Manufacturer:	Lenovo PC HK Limited
Address of Manufacturer:	23/F, Lincoln House, Taikoo Place 979 King's Road, Quarry Bay, Hong Kong P.R.China

### 2.2 Test Location

Company:	SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch
Address:	No. 1 Workshop, M-10, Middle section, Science & Technology Park, Shenzhen, Guangdong, China
Post code:	518057
Telephone:	+86 (0) 755 2601 2053
Fax:	+86 (0) 755 2671 0594
E-mail:	<a href="mailto:ee.shenzhen@sgs.com">ee.shenzhen@sgs.com</a>

### 2.3 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

• **CNAS (No. CNAS L2929)**

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

• **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

• **VCCI**

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

• **FCC –Designation Number: CN1178**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

• **Industry Canada (IC)**

Two 3m Semi-anechoic chambers and the 10m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1, 4620C-2, 4620C-3.



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## 2.4 General Description of EUT

EUT Description:	Portable Tablet Computer
Model No.:	Lenovo TB-X606FA
Trade Mark:	Lenovo
Hardware Version:	Lenovo Tablet TB-X606FA
Software Version:	TB-X606F_RF01_200115
Antenna Gain:	Bluetooth: 0.43dBi; 2.4G WiFi: 0.43dBi; 5G WiFi: -2.51dBi; Smart Dock: 2.0dBi;

## 3 RF Exposure Evaluation

### 3.1 RF Exposure Compliance Requirement

#### 3.1.1 Limits

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm <sup>2</sup> )	Averaging time (minutes)
<b>(A) Limits for Occupational/Controlled Exposures</b>				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f <sup>2</sup> )	6
30-300	61.4	0.163	1.0	6
300-1500	/	/	f/300	6
1500-100,000	/	/	5	6
<b>(B) Limits for General Population/Uncontrolled Exposure</b>				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f <sup>2</sup> )	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

RF exposure compliance will need to be determined with respect to 1.1307(c) and (d) of the FCC rules. The emissions should be within the limits at 300kHz in Table 1 of 1.1310(use the 300kHz limits for 150kHz:614V/m,1.63A/m).



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Friis Formula

Friis transmission formula:  $P_d = (P_{out} * G) / (4 * \pi * R^2)$

Where

$P_d$  = power density in mW/cm<sup>2</sup>

$P_{out}$  = output power to antenna in mW

$G$  = gain of antenna in linear scale

$\pi$  = 3.1416

$R$  = distance between observation point and center of the radiator in cm

$P_d$  is the limit of MPE, 1 mW/cm<sup>2</sup>. If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance  $r$  where the MPE limit is reached.

### 3.1.2 Test Procedure

Software provided by client enabled the EUT to transmit data at lowest, middle and highest channel individually.

### 3.1.3 EUT RF Exposure Evaluation

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.0 / 2.0 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Operating Band	Frequency (MHz)	Antenna Gain (dBi)	Max Conducted Average Output Power (dBm)	Output Power to Antenna (dBm)	Output Power to Antenna (mw)	Power Density at R = 20 cm (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	conclusion
Bluetooth	2402	0.43	10.00	10.43	10.0000	0.0022	1.0000	Pass
BLE	2412	0.43	-1.00	-0.57	0.7943	0.0002	1.0000	Pass
2.4G WiFi	2412	0.43	18.00	18.43	63.0957	0.0139	1.0000	Pass
5G WiFi	5180	-2.51	16.50	13.99	44.6684	0.0050	1.0000	Pass
Smart Dock	2402	2.00	8.00	10.00	6.3096	0.0020	1.0000	Pass

Both of the WLAN and Bluetooth can transmit simultaneously, the formula of the calculated the MPE is:

**CPD1/ LPD1+ CPD2/ LPD2+.....etc.<1**

**CPD=Calculation power density**

**LPD= Limit of power density**

Therefore, the worst-case situation is  $0.0139/1+0.0022/1=0.0161$ , which is less than "1", this confirmed that the device comply with MPE limit.



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