FCC REPORT

Applicant:	Shenzhen Tuoshi network communicationc co., limited
Address of Applicant:	3 Floor A5 Building, Yinlong Industrial park, 292 Shenshan Road, longgang shenzhen China

Equipment Under Test (EUT)

Product Name:	4G wireless router
Model No.:	LT15F, LT15D, LT15H, LT15, LT10
Trade mark:	tuoshi Dionlink
FCC ID:	2ATBFLT15
Applicable standards:	FCC CFR Title 47 Part 15 Subpart B
Date of sample receipt:	05 May., 2019
Date of Test:	06 May., to 21 May., 2019
Date of report issued:	23 May., 2019
Test Result:	PASS *

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

Bruce Zhang
Laboratory Manager

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the CCIS product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

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2 Version

Version No.	Date	Description
00	*23 May., 2019*	*Original*

Tested by: Carey Chen ***Date:*** *23 May., 2019*

Test Engineer

Reviewed by: Winner Zhang ***Date:*** *23 May., 2019*

Project Engineer

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4 Test Summary

Test Item	Section in CFR 47	Result
Conducted Emission	Part 15.107	Pass
Radiated Emission	Part 15.109	Pass

Remark:
Pass: The EUT complies with the essential requirements in the standard.
N/A: The EUT not applicable of the test item.

5 General Information

5.1 Client Information

Applicant:	Shenzhen Tuoshi network communicationc co., limited
Address:	3 Floor A5 Building, Yinlong Industrial park, 292 Shenshan Road, longgang shenzhen China
Manufacturer/Factory:	Shenzhen Tuoshi network communicationc co., limited
Address:	3 Floor A5 Building, Yinlong Industrial park, 292 Shenshan Road, longgang shenzhen China

5.2 General Description of E.U.T.

Product Name:	4G wireless router
Model No.:	LT15F, LT15D, LT15H, LT15, LT10
Power supply:	AC 120V / 60Hz
AC adapter :	Model: RD120101000-C55-91MG Input: AC100-240V 50/60Hz 0.6A MAX Output: DC 12.0V, 1000mA
Test Sample Condition:	The test samples were provided in good working order with no visible defects.
Remarks:	item No.: LT15F, LT15D, LT15H, LT15, LT10 were identical inside, the electrical circuit design, layout, components used and internal wiring, with only difference being model name.

5.3 Test Mode

Operating mode	Detail description
ON mode	Keep the EUT in LAN link mode
The sample was placed 0.8m above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.	

5.4 Measurement Uncertainty

Parameters	Expanded Uncertainty
Conducted Emission (9kHz ~ 30MHz)	±1.60 dB (k=2)
Radiated Emission (9kHz ~ 30MHz)	±3.12 dB (k=2)
Radiated Emission (30MHz ~ 1000MHz)	±4.54 dB (k=2)
Radiated Emission (1GHz ~ 18GHz)	±5.84 dB (k=2)
Radiated Emission (18GHz ~ 40GHz)	±3.36 dB (k=2)

5.5 Description of Support Units

Manufacturer	Description	Model	Serial Number	FCC ID/DoC
LENOVO	Laptop	SL510	2847A65	DoC

5.6 Related Submittal(s) / Grant (s)

This is an original grant, no related submittals and grants.

5.7 Description of Cable Used

Cable Type	Description	Length	From	To
Detached USB Cable	Unshielded	1.2m	EUT	Adapter
RJ45 cable	Unshielded	1.0m	EUT	LAN

5.8 Laboratory Facility

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

- **FCC - Registration No.: 727551**

Shenzhen Zhongjian Nanfang Testing Co., Ltd. has been accredited as a testing laboratory by FCC (Federal Communications Commission). The Registration No. is 727551.

- **IC - Registration No.: 10106A-1**

The 3m Semi-anechoic chamber of Shenzhen Zhongjian Nanfang Testing Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.

- **CNAS - Registration No.: CNAS L6048**

Shenzhen Zhongjian Nanfang Testing Co., Ltd. is accredited to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L6048.

- **A2LA - Registration No.: 4346.01**

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 General requirements for the competence of testing and calibration laboratories. The test scope can be found as below link: https://portal.a2la.org/scopepdf/4346-01.pdf

5.9 Laboratory Location

Shenzhen Zhongjian Nanfang Testing Co., Ltd.
Address: No. B-C, 1/F., Building 2, Laodong No.2 Industrial Park, Xixiang Road,
Bao'an District, Shenzhen, Guangdong, China
Tel: +86-755-23118282, Fax: +86-755-23116366
Email: info@ccis-cb.com, Website: http://www.ccis-cb.com

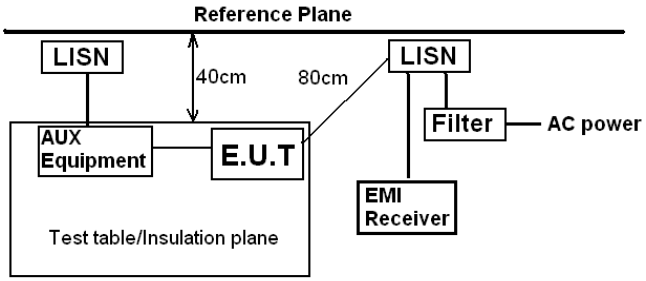
5.10 Test Instruments list

Radiated Emission:					
Test Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Cal. Date (mm-dd-yy)**	**Cal. Due date (mm-dd-yy)**
3m SAC	SAEMC	9m*6m*6m	966	07-22-2017	07-21-2020
Loop Antenna	SCHWARZBECK	FMZB1519B	00044	03-18-2019	03-17-2020
BiConiLog Antenna	SCHWARZBECK	VULB9163	497	03-18-2019	03-17-2020
Horn Antenna	SCHWARZBECK	BBHA9120D	916	03-18-2019	03-17-2020
Horn Antenna	SCHWARZBECK	BBHA9120D	1805	06-22-2017	06-21-2020
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170582	11-21-2018	11-20-2019
EMI Test Software	AUDIX	E3	Version: 6.110919b		
Pre-amplifier	HP	8447D	2944A09358	03-18-2019	03-17-2020
Pre-amplifier	CD	PAP-1G18	11804	03-18-2019	03-17-2020
Spectrum analyzer	Rohde & Schwarz	FSP30	101454	03-18-2019	03-17-2020
Spectrum analyzer	Rohde & Schwarz	FSP40	100363	11-21-2018	11-20-2019
EMI Test Receiver	Rohde & Schwarz	ESRP7	101070	03-18-2019	03-17-2020
Cable	ZDECL	Z108-NJ-NJ-81	1608458	03-18-2019	03-17-2020
Cable	MICRO-COAX	MFR64639	K10742-5	03-18-2019	03-17-2020
Cable	SUHNER	SUCOFLEX100	58193/4PE	03-18-2019	03-17-2020

Conducted Emission:					
Test Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Cal. Date (mm-dd-yy)**	**Cal. Due date (mm-dd-yy)**
EMI Test Receiver	Rohde & Schwarz	ESCI	101189	03-18-2019	03-17-2020
Pulse Limiter	SCHWARZBECK	OSRAM 2306	9731	03-18-2019	03-17-2020
LISN	CHASE	MN2050D	1447	03-18-2019	03-17-2020
LISN	Rohde & Schwarz	ESH3-Z5	8438621/010	07-21-2018	07-20-2019
Cable	HP	10503A	N/A	03-18-2019	03-17-2020
EMI Test Software	AUDIX	E3	Version: 6.110919b		

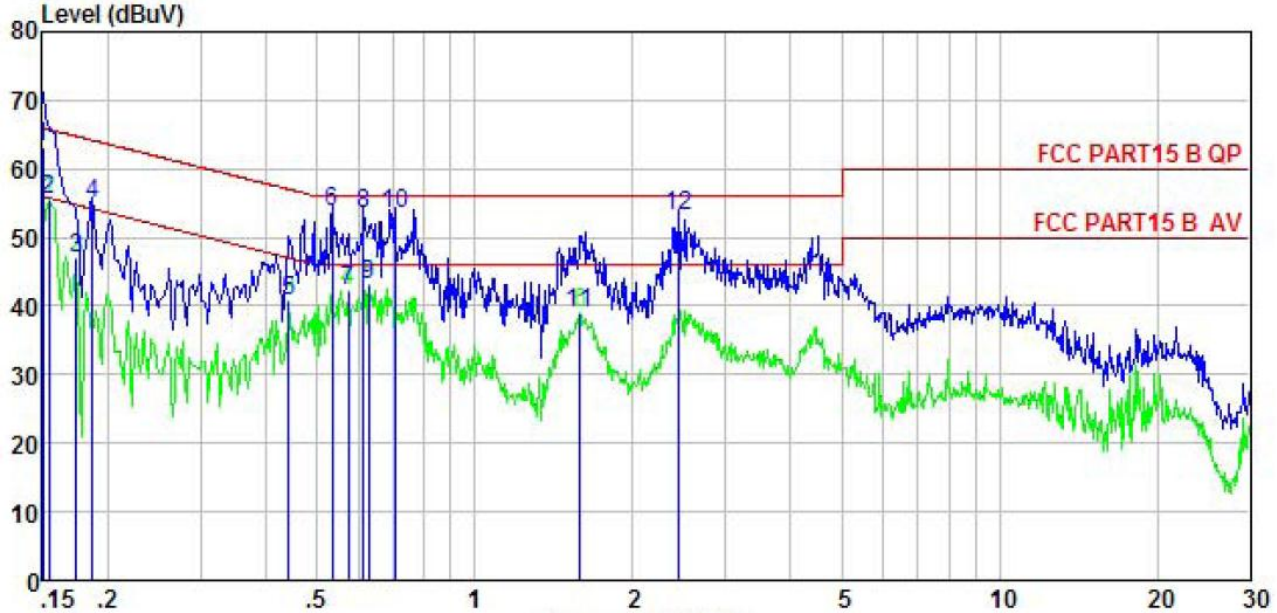
6 Test results and Measurement Data

6.1 Conducted Emission

Test Requirement:	FCC Part 15 B Section 15.107		
Test Method:	ANSI C63.4:2014		
Test Frequency Range:	150kHz to 30MHz		
Class / Severity:	Class B		
Receiver setup:	RBW=9kHz, VBW=30kHz		
Limit:	Frequency range (MHz)	Limit (dBµV)	
		Quasi-peak	Average
	0.15-0.5	66 to 56*	56 to 46*
	0.5-5	56	46
	0.5-30	60	50
	* Decreases with the logarithm of the frequency.		
Test setup:	 *Remark:* *E.U.T: Equipment Under Test* *LISN: Line Impedence Stabilization Network* *Test table height=0.8m*		
Test procedure	1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network(L.I.S.N.). The provide a 50ohm/50uH coupling impedance for the measuring equipment. 2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs). 3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2014 on conducted measurement.		
Test Instruments:	Refer to section 5.9 for details		
Test mode:	Refer to section 5.3 for details		
Test results:	Pass		

Measurement data:

Product name:	4G wireless router	**Product model:**	LT15F
Test by:	Carey	**Test mode:**	ON mode
Test frequency:	150 kHz ~ 30 MHz	**Phase:**	Line
Test voltage:	AC 120 V/60 Hz	**Environment:**	Temp: 22.5℃ Huni: 55%

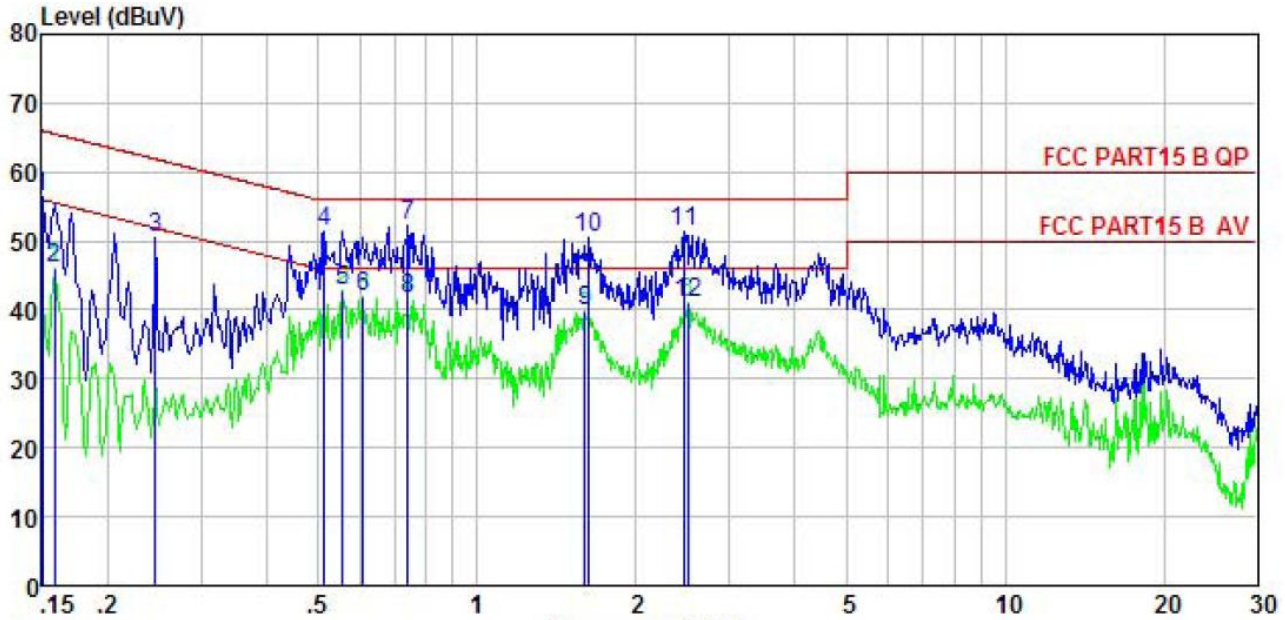


	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.150	52.86	-0.45	10.78	63.19	66.00	-2.81	QP
2	0.154	45.16	-0.45	10.78	55.49	55.78	-0.29	Average
3	0.174	36.63	-0.43	10.77	46.97	54.77	-7.80	Average
4	0.186	44.55	-0.42	10.76	54.89	64.20	-9.31	QP
5	0.442	30.39	-0.38	10.74	40.75	47.02	-6.27	Average
6	0.535	43.27	-0.39	10.76	53.64	56.00	-2.36	QP
7	0.573	31.98	-0.39	10.76	42.35	46.00	-3.65	Average
8	0.614	42.97	-0.38	10.77	53.36	56.00	-2.64	QP
9	0.627	32.74	-0.38	10.77	43.13	46.00	-2.87	Average
10	0.705	42.91	-0.38	10.77	53.30	56.00	-2.70	QP
11	1.585	28.54	-0.40	10.93	39.07	46.00	-6.93	Average
12	2.435	42.63	-0.42	10.94	53.15	56.00	-2.85	QP

Notes:

1. *An initial pre-scan was performed on the line and neutral lines with peak detector.*
2. *Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.*
3. *Final Level =Receiver Read level + LISN Factor + Cable Loss.*

Product name:	4G wireless router	**Product model:**	LT15F
Test by:	Carey	**Test mode:**	ON mode
Test frequency:	150 kHz ~ 30 MHz	**Phase:**	Neutral
Test voltage:	AC 120 V/60 Hz	**Environment:**	Temp: 22.5℃ Huni: 55%



	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.150	46.21	-0.68	10.78	56.31	66.00	-9.69	QP
2	0.158	35.82	-0.68	10.77	45.91	55.56	-9.65	Average
3	0.246	40.43	-0.66	10.75	50.52	61.91	-11.39	QP
4	0.513	41.36	-0.65	10.76	51.47	56.00	-4.53	QP
5	0.555	32.64	-0.65	10.76	42.75	46.00	-3.25	Average
6	0.608	31.84	-0.64	10.77	41.97	46.00	-4.03	Average
7	0.739	42.20	-0.64	10.79	52.35	56.00	-3.65	QP
8	0.739	31.36	-0.64	10.79	41.51	46.00	-4.49	Average
9	1.602	29.45	-0.66	10.93	39.72	46.00	-6.28	Average
10	1.628	40.18	-0.66	10.93	50.45	56.00	-5.55	QP
11	2.461	41.12	-0.67	10.94	51.39	56.00	-4.61	QP
12	2.500	30.84	-0.67	10.94	41.11	46.00	-4.89	Average

Notes:

1. *An initial pre-scan was performed on the line and neutral lines with peak detector.*
2. *Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.*
3. *Final Level =Receiver Read level + LISN Factor + Cable Loss.*

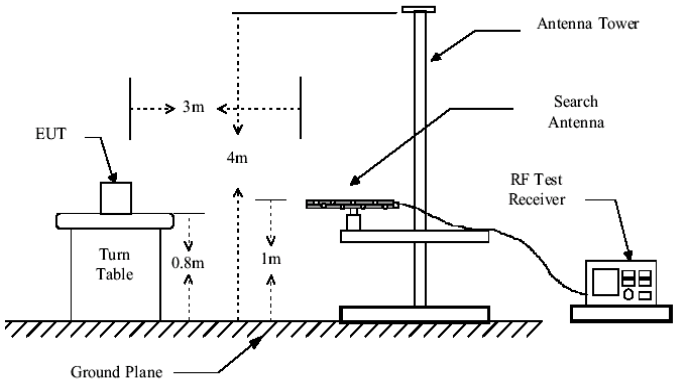
6.2 Radiated Emission

Test Requirement:	FCC Part 15 B Section 15.109				
Test Method:	ANSI C63.4:2014				
Test Frequency Range:	30MHz to 6000MHz				
Test site:	Measurement Distance: 3m (Semi-Anechoic Chamber)				
Receiver setup:	Frequency	Detector	RBW	VBW	Remark
	30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
		RMS	1MHz	3MHz	Average Value

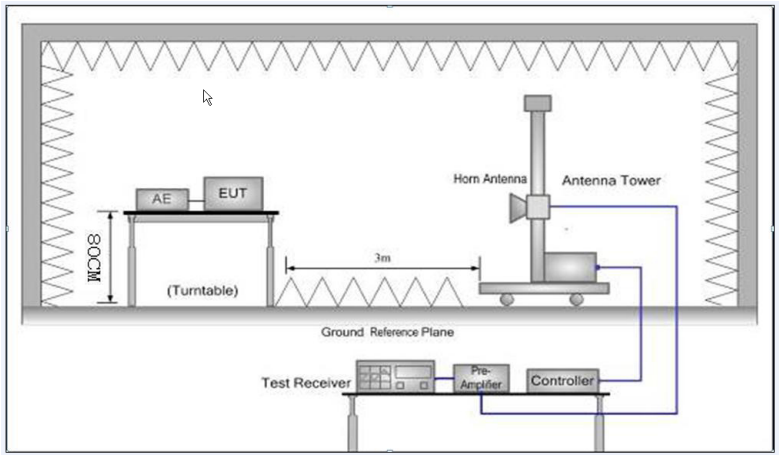
Limit:	Frequency	Limit (dBuV/m @3m)	Remark
	30MHz-88MHz	40.0	Quasi-peak Value
	88MHz-216MHz	43.5	Quasi-peak Value
	216MHz-960MHz	46.0	Quasi-peak Value
	960MHz-1GHz	54.0	Quasi-peak Value
	Above 1GHz	54.0	Average Value
		74.0	Peak Value

Test setup:

Below 1GHz



Above 1GHz

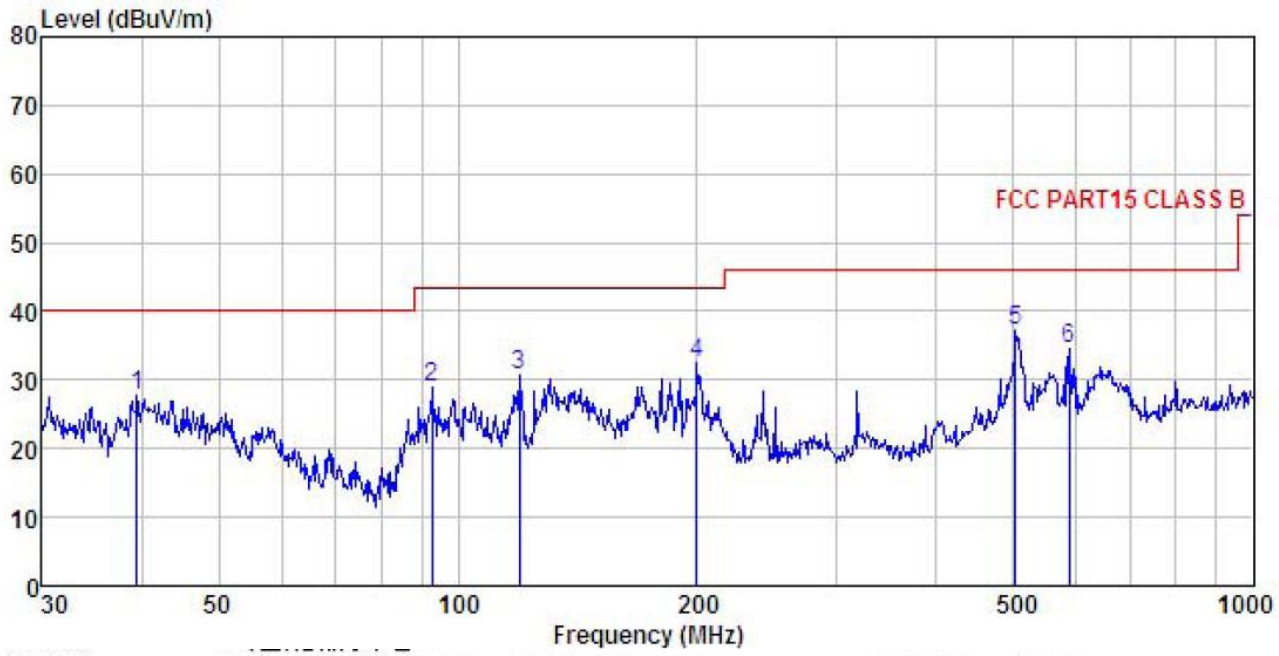


Test Procedure:	1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. 4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
Test Instruments:	Refer to section 5.9 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed
Remark:	All of the observed value above 6GHz ware the niose floor , which were no recorded

Measurement Data:

Below 1GHz:

Product Name:	4G wireless router	**Product model:**	LT15F
Test By:	Carey	**Test mode:**	ON mode
Test Frequency:	30 MHz ~ 1 GHz	**Polarization:**	Vertical
Test Voltage:	AC 120/60Hz	**Environment:**	Temp: 24℃ Huni: 57%

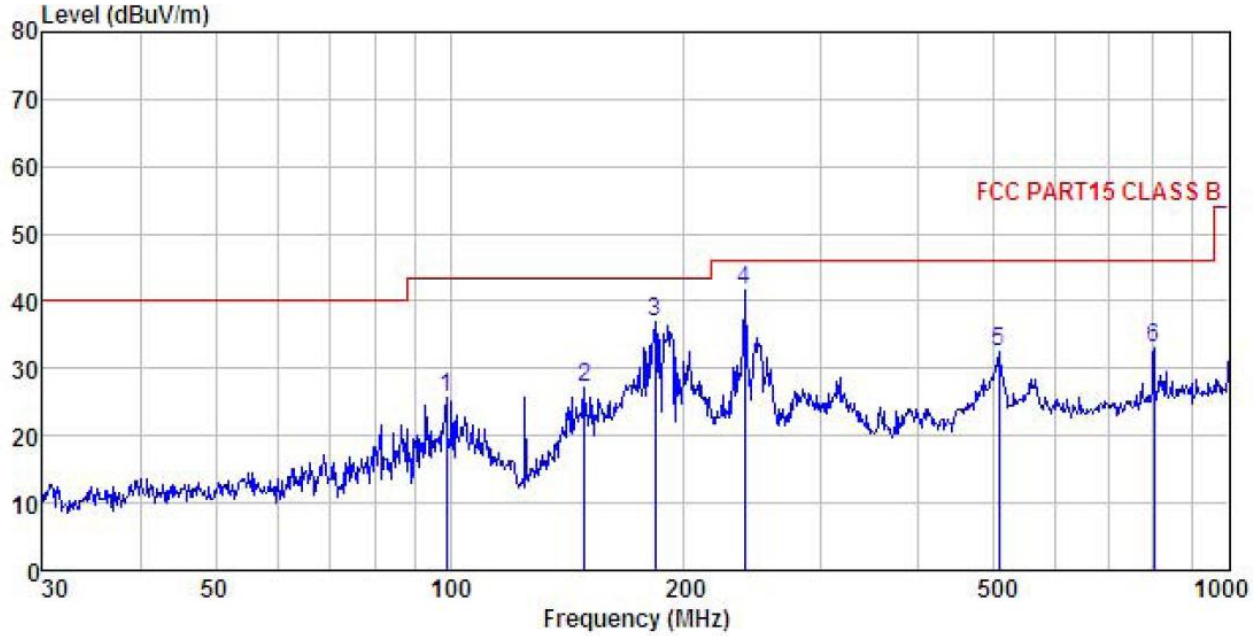


	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	39.437	44.26	12.25	1.21	29.91	27.81	40.00	-12.19	QP
2	92.787	45.60	10.76	2.03	29.56	28.83	43.50	-14.67	QP
3	119.436	46.97	10.93	2.16	29.39	30.67	43.50	-12.83	QP
4	199.986	47.79	10.60	2.87	28.83	32.43	43.50	-11.07	QP
5	502.940	44.21	18.21	3.64	28.96	37.10	46.00	-8.90	QP
6	586.844	40.45	19.23	3.93	28.98	34.63	46.00	-11.37	QP

Remark:

1. *Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*

Product Name:	4G wireless router	**Product model:**	LT15F
Test By:	Carey	**Test mode:**	ON mode
Test Frequency:	30 MHz ~ 1 GHz	**Polarization:**	Horizontal
Test Voltage:	AC 120/60Hz	**Environment:**	Temp: 24℃ Huni: 57%



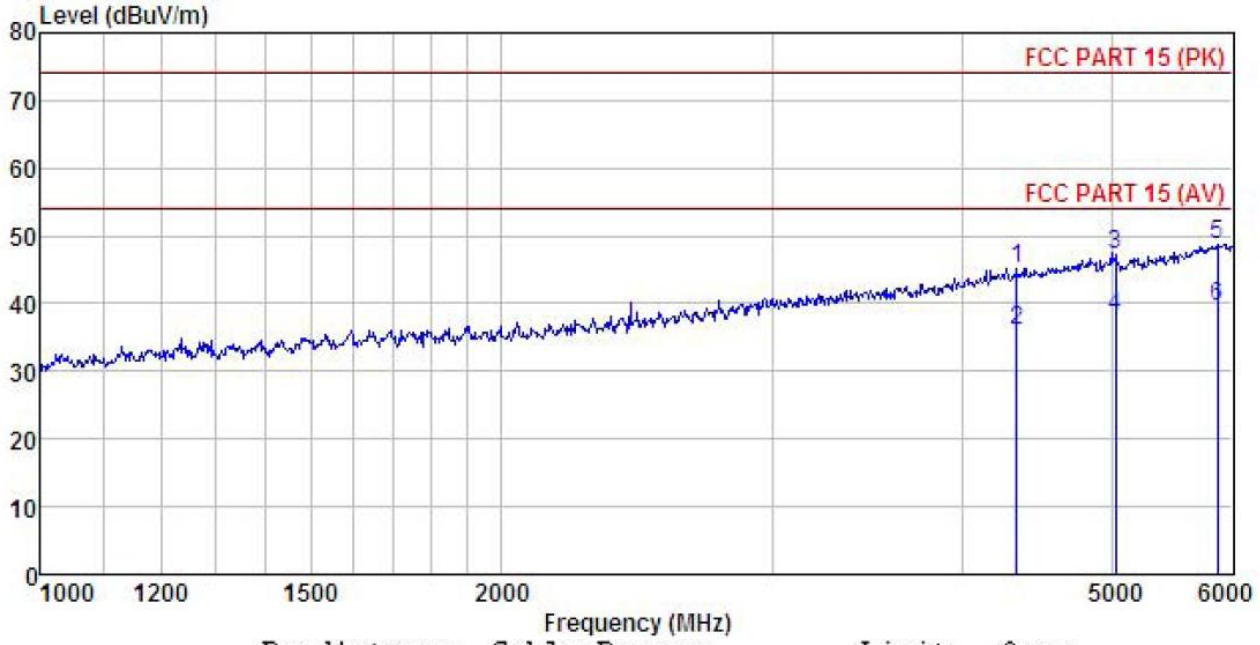
	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	98.833	41.13	12.22	1.97	29.53	25.79	43.50	-17.71	QP
2	148.963	44.86	8.94	2.51	29.23	27.08	43.50	-16.42	QP
3	183.201	53.05	10.08	2.75	28.95	36.93	43.50	-6.57	QP
4	239.147	55.09	12.26	2.82	28.60	41.57	46.00	-4.43	QP
5	506.479	39.49	18.23	3.65	28.97	32.40	46.00	-13.60	QP
6	801.786	35.34	21.50	4.34	28.19	32.99	46.00	-13.01	QP

Remark:

1. *Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*

Above 1GHz:

Product Name:	4G wireless router	**Product model:**	LT15F
Test By:	Carey	**Test mode:**	ON mode
Test Frequency:	1 GHz ~ 6 GHz	**Polarization:**	Vertical
Test Voltage:	AC 120/60Hz	**Environment:**	Temp: 24℃ Huni: 57%

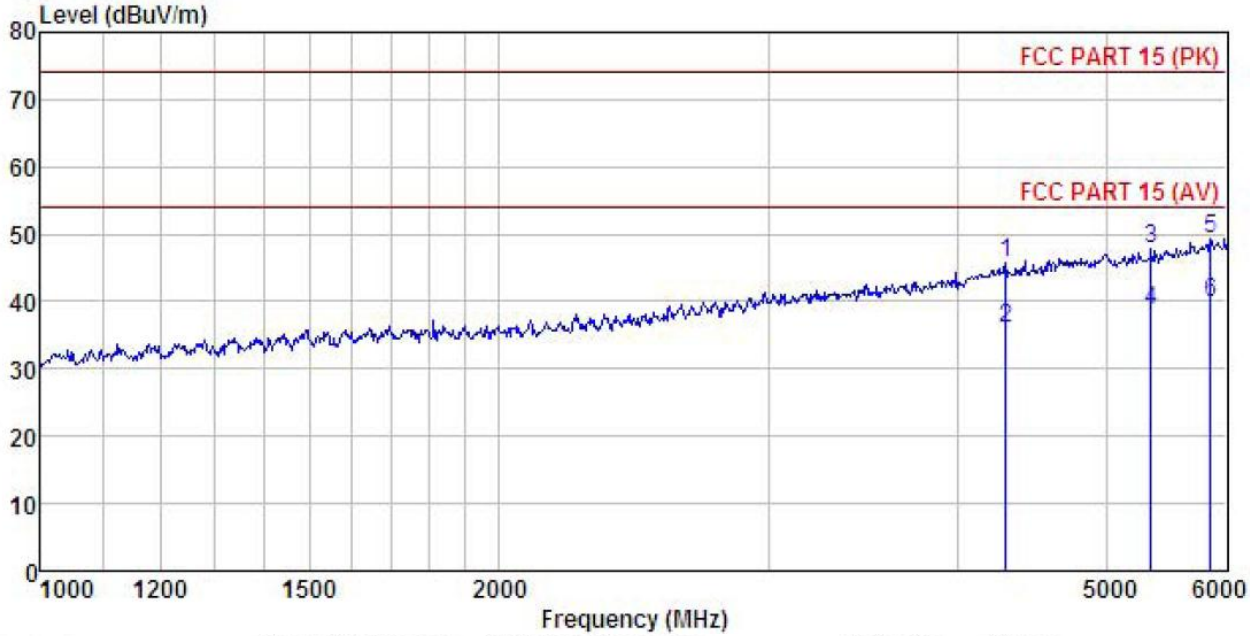


	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	4337.145	47.74	30.37	6.62	41.92	45.12	74.00	-28.88	Peak
2	4337.145	38.56	30.37	6.62	41.92	35.94	54.00	-18.06	Average
3	5028.418	48.21	31.47	6.96	41.89	47.25	74.00	-26.75	Peak
4	5028.418	38.95	31.47	6.96	41.89	37.99	54.00	-16.01	Average
5	5864.002	47.38	32.67	7.90	42.03	48.68	74.00	-25.32	Peak
6	5864.002	38.35	32.67	7.90	42.03	39.65	54.00	-14.35	Average

Remark:

1. *Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*

Product Name:	4G wireless router	**Product model:**	LT15F
Test By:	Carey	**Test mode:**	ON mode
Test Frequency:	1 GHz ~ 6 GHz	**Polarization:**	Horizontal
Test Voltage:	AC 120/60Hz	**Environment:**	Temp: 24℃ Huni: 57%



	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	4295.151	48.32	30.36	6.54	41.88	45.64	74.00	-28.36	Peak
2	4295.151	38.78	30.36	6.54	41.88	36.10	54.00	-17.90	Average
3	5351.487	47.73	32.26	7.11	41.89	47.82	74.00	-26.18	Peak
4	5351.487	38.62	32.26	7.11	41.89	38.71	54.00	-15.29	Average
5	5852.603	48.04	32.67	7.90	42.03	49.34	74.00	-24.66	Peak
6	5852.603	38.56	32.67	7.90	42.03	39.86	54.00	-14.14	Average

Remark:

1. *Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*