

MPE TEST REPORT

For

Shenzhen Toplink Technology Development Co.,Ltd

WIFI Module

Model No.: TOP-AP01

Prepared for
Address

: Shenzhen Toplink Technology Development Co.,Ltd
: Room 321, 3/F, Jindu Building .No,1-4. Banxuegang Avenue.
Bantian Street. Longgang District. Shenzhen, Guangdong,China

Prepared by
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Date of receipt of test sample : April 02, 2015

Number of tested samples : 1

Date of Test : April 02, 2015- April 17, 2015

Date of Report : April 17, 2015

MPE TEST REPORT
FCC Per 47 CFR 2.1091(b)

Report Reference No. : **LCS1503090287M**

Date of Issue..... : April 17, 2015

Testing Laboratory Name : **Shenzhen LCS Compliance Testing Laboratory Ltd.**

Address..... : 1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China

Testing Location/ Procedure : Full application of Harmonised standards Partial application of Harmonised standards Other standard testing method

Applicant's Name : **Shenzhen Toplink Technology Development Co.,Ltd**

Address..... : Room 321, 3/F, Jindu Building .No,1-4. Banxuegang Avenue. Bantian Street. Longgang District. Shenzhen, Guangdong,China

Test Specification

Standard..... : FCC Per 47 CFR 2.1091(b)
KDB447498 v05r02

Test Report Form No...... : LCSEMC-1.0

TRF Originator..... : Shenzhen LCS Compliance Testing Laboratory Ltd.

Master TRF : Dated 2011-03

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Test Item Description..... : **WIFI Module**

Trade Mark..... : N/A

Model/ Type reference : TOP-AP01

Ratings..... : DC 3.3V 1.5A&1.8V 1.5A

Device Type : Mobile Device

Exposure category : General population/uncontrolled environment

EUT Type..... : Production Unit

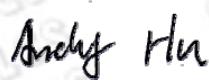
Result : **Positive**

Compiled by:



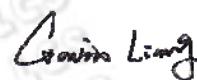
Dick Su / File administrators

Supervised by:



Andy Hu / Technique principal

Approved by:



Gavin Liang/ Manager

MPE -- TEST REPORT

Test Report No. : LCS1503090287MApril 17, 2015

Date of issue

Type / Model..... : WIFI Module

EUT..... : TOP-AP01

Applicant..... : Shenzhen Toplink Technology Development Co.,Ltd

Address..... : Room 321, 3/F, Jindu Building .No,1-4. Banxuegang Avenue. Bantian Street. Longgang District. Shenzhen, Guangdong,China

Telephone..... : /

Fax..... : /

Manufacturer..... : Shenzhen Toplink Technology Development Co.,Ltd

Address..... : Room 321, 3/F, Jindu Building .No,1-4. Banxuegang Avenue. Bantian Street. Longgang District. Shenzhen, Guangdong,China

Telephone..... : /

Fax..... : /

Factory..... : Shenzhen Toplink Technology Development Co.,Ltd

Address..... : Room 321, 3/F, Jindu Building .No,1-4. Banxuegang Avenue. Bantian Street. Longgang District. Shenzhen, Guangdong,China

Telephone..... : /

Fax..... : /

Test Result**Positive**

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT : WIFI Module
Model Number : TOP-AP01
Power Supply : DC 3.3V 1.5A&1.8V 1.5A
WIFI
Frequency Range : 2412.00-2462.00MHz
Channel Spacing : 5MHz
Channel Number : 11 Channels for 20MHz Bandwidth
: 7 Channels for 40MHz Bandwidth
Modulation Technology : IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK)
: IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK)
IEEE 802.11n: OFDM (64QAM, 16QAM,QPSK,BPSK)
Data Rates : IEEE 802.11b: 1-11Mbps
: IEEE 802.11g: 6-54Mbps
IEEE 802.11n: MCS0-MCS7
Antenna Description : PIFA antenna, 2.0dBi

1.2. Support equipment List

Manufacturer	Description	Model	Serial Number	Certificate
Lenovo	Notebook	B470	WB05067151	CE

1.3. External I/O Cable

I/O Port Description	Quantity	Cable
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1.4. Description of Test Facility

Site Description

EMC Lab.

: CNAS Registration Number. is L4595.
 FCC Registration Number. is 899208.
 Industry Canada Registration Number. is 9642A-1.
 VCCI Registration Number. is C-4260 and R-3804.
 ESMD Registration Number. is ARCB0108.
 UL Registration Number. is 100571-492.
 TUV SUD Registration Number. is SCN1081.
 TUV RH Registration Number. is UA 50296516-001

Name of Firm

: Shenzhen LCS Compliance Testing Laboratory Ltd.

Site Location

: 1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China

1.5. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15-35 ° C
Humidity:	30-60 %
Atmospheric pressure:	950-1050mbar

1.6. Statement of The Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16 – 4 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements” and is documented in the LCS quality system acc. To DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

1.7. Measurement Uncertainty

Test Item	Frequency Range	Uncertainty	Note
Radiation Uncertainty	9KHz~30MHz	3.10dB	(1)
	30MHz~200MHz	2.96dB	(1)
	200MHz~1000MHz	3.10dB	(1)
	1GHz~26.5GHz	3.80dB	(1)
	26.5GHz~40GHz	3.90dB	(1)
Conduction Uncertainty	150kHz~30MHz	1.63dB	(1)
Power disturbance	30MHz~300MHz	1.60dB	(1)

(1). This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

2. DESCRIPTION OF TEST MODES

2.1. Applicable Standard

According to §1.1307(b)(1), 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 level in excess of the Commission's guidelines.

According to §1.1310 and §2.1091 RF exposure is calculated.

KDB447498 v05r02: Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies

2.2. Limit

Limits for Maximum Permissible Exposure (MPE)/Controlled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
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

Limits for Maximum Permissible Exposure (MPE)/Uncontrolled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
0.3 – 3.0	614	1.63	(100) *	30
3.0 – 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

2.3. Conducted Power Results

WLAN

Mode	Channel	Frequency (MHz)	Worst case Data rate of worst case	Conducted Output Power (dBm)	
				Peak	Average
802.11b	1	2412	1Mbps	15.27	12.11
	6	2437	1Mbps	15.48	12.03
	11	2462	1Mbps	15.29	12.12
802.11g	1	2412	6Mbps	13.89	6.13
	6	2437	6Mbps	13.76	6.24
	11	2462	6Mbps	13.64	6.13
802.11n(20MHz)	1	2412	6.5 Mbps	11.80	4.26
	6	2437	6.5 Mbps	11.73	4.17
	11	2462	6.5 Mbps	11.83	4.52
802.11n(40MHz)	3	2422	13.5 Mbps	10.21	2.42
	6	2437	13.5 Mbps	10.43	2.34
	9	2452	13.5 Mbps	10.54	2.15

Manufacturing tolerance

WLAN			
802.11b (Average)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	12.0	12.0	12.0
Tolerance \pm (dB)	1.0	1.0	1.0
802.11g (Average)			
Channel	Channel 810	Channel 661	Channel 512
Target (dBm)	6.0	6.0	6.0
Tolerance \pm (dB)	1.0	1.0	1.0
802.11n HT20 (Average)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	4.0	4.0	4.0
Tolerance \pm (dB)	1.0	1.0	1.0
802.11n HT40 (Average)			
Channel	Channel 3	Channel 6	Channel 9
Target (dBm)	2.0	2.0	2.0
Tolerance \pm (dB)	1.0	1.0	1.0

2.4. MPE Calculation Method

Predication of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

Where: S=power density

P=power input to antenna

G=power gain of the antenna in the direction of interest relative to an isotropic radiator

R=distance to the center of radiation of the antenna

As declared by the Applicant, the EUT transmits with the maximum source-based Duty Cycle of 100%-see the User manual, and the EUT is a wireless device used in a mobile application, at least 20 cm from any body part of the user or nearby persons; from the maximum EUT RF output power, the minimum mobile separation distance, $r = 20\text{cm}$, as well as the gain of the used antenna is 2.0dBi for WLAN, and the power drift from Turn-up Procedure provide by manufacturer as following states, the RF power density can be obtained.

2.5. TEST RESULTS

Standalone MPE

For 802.11b

Test Frequency (MHz)	Minimum Separation Distance (cm)	Output Power (Turn-up Procedure)		Antenna Gain (Numeric)	Power Density At 20 cm (mW/cm ²)	Power Density Limit (mW/cm ²)	Test Results
		dBm	mW				
2412	20.00	13.00	19.9526	1.9953	0.0079	1.0000	PASS
2437	20.00	13.00	19.9526	1.9953	0.0079	1.0000	PASS
2462	20.00	13.00	19.9526	1.9953	0.0079	1.0000	PASS

For 802.11g

Test Frequency (MHz)	Minimum Separation Distance (cm)	Output Power (Turn-up Procedure)		Antenna Gain (Numeric)	Power Density At 20 cm (mW/cm ²)	Power Density Limit (mW/cm ²)	Test Results
		dBm	mW				
2412	20.00	7.00	5.0119	1.5849	0.0016	1.0000	PASS
2437	20.00	7.00	5.0119	1.5849	0.0016	1.0000	PASS
2462	20.00	7.00	5.0119	1.5849	0.0016	1.0000	PASS

For 802.11n HT20

Test Frequency (MHz)	Minimum Separation Distance (cm)	Output Power (Turn-up Procedure)		Antenna Gain (Numeric)	Power Density At 20 cm (mW/cm ²)	Power Density Limit (mW/cm ²)	Test Results
		dBm	mW				
2412	20.00	5.00	3.1626	1.5849	0.0010	1.0000	PASS
2437	20.00	5.00	3.1626	1.5849	0.0010	1.0000	PASS
2462	20.00	5.00	3.1626	1.5849	0.0010	1.0000	PASS

For 802.11n HT40

Test Frequency (MHz)	Minimum Separation Distance (cm)	Output Power (Turn-up Procedure)		Antenna Gain (Numeric)	Power Density At 20 cm (mW/cm ²)	Power Density Limit (mW/cm ²)	Test Results
		dBm	mW				
2422	20.00	3.00	1.9953	1.5849	0.0006	1.0000	PASS
2437	20.00	3.00	1.9953	1.5849	0.0006	1.0000	PASS
2452	20.00	3.00	1.9953	1.5849	0.0006	1.0000	PASS

2.6. Simultaneous transmission MPE Considerations

According to KDB447498 :For mobile exposure host platform to qualify for simultaneous transmission MPE test exclusion, all transmitters and antennas in the host must be either evaluated for MPE compliance, by measurement or computational modeling, or qualify for the standalone MPE test exclusion in section 7.1.

Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modeled or measured field strengths or power density, is ≤ 1.0 .

This means that:

$$\sum \text{of MPE ratios} \leq 1.0$$

The WiFi modular only with WiFi modular, without any simultaneous transmission with other transmitter in this modular, so not need consider simultaneous transmission for this WiFi modular.

3. CONCLUSION

The measurement results comply with the FCC Limit per 47 CFR 2.1091(b) for the uncontrolled RF Exposure.

-----THE END OF TEST REPORT-----