A Test Lab Techno Corp.

Changan Lab：N o. 140-1, Changan Street, Bade District, Taoyuan City 33465, Taiwan (R.O.C)
Tel：886-3-271-0188 / Fax：886-3-271-0190

MPE Report

Test Report No.	：	1705FS13
Applicant	：	TP-Link Technologies Co., Ltd.
Product Type	：	AC750 Wi-Fi Range Extender
Trade Name	：	TP-Link
Model Number	：	RE200
Date of Received	：	Apr. 07, 2017
Test Period	：	Apr. 23, 2017
Date of Issued	：	Jul. 25, 2017
Test Specification	：	ANSI / IEEE Std.C95.1-1992 / IEEE Std. 1528-2013
		47 CFR § 2.1091
		47 CFR § 1.1310
Location of Test Lab.	：	Chang-an Lab.

1. The test operations have to be performed with cautious behavior, the test results are as attached.
2. The test results are under chamber environment of A Test Lab Techno Corp. A Test Lab Techno Corp. does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples.
3. The measurement report has to be written approval of A Test Lab Techno Corp. It may only be reproduced or published in full. This report shall not be reproduced except in full, without the written approval of A Test Lab Techno Corp.
4. This document may be altered or revised by A Test Lab Techno. Corp. personnel only, and shall be noted in the revision section of the document.

Approved By ： (Mark Duan)　　Tested By ： (Sky Chou)

Contents

1. Description of Equipment under Test (EUT)

Applicant	TP-Link Technologies Co., Ltd. Building 24 (floors 1,3,4,5) and 28 (floors1-4), Central Science and Technology Park, Nanshan, Shenzhen, China 518057			
Manufacturer	TP-Link Technologies Co., Ltd. Building 24 (floors 1,3,4,5) and 28 (floors1-4) Central Science and Technology Park,Shennan Rd, Nanshan, Shenzhen,China			
Product Type	AC750 Wi-Fi Range Extender			
Trade Name	TP-Link			
Model Number	RE200			
FCC ID	TE7RE200V2			
Frequency Range	Operate Band			Frequency Range (MHz)
	IEEE 802.11b / 802.11g / 802.11n 2.4GHz 20MHz			2412 - 2462
	IEEE 802.11n 2.4GHz 40 MHz			2422 - 2452
	IEEE 802.11a U-NII Band I			5180 - 5240
	IEEE 802.11a U-NII Band III			5745 - 5825
	IEEE 802.1ac / 802.11n 5GHz 20MHz U-NII Band I			5180 - 5240
	IEEE 802.1ac / 802.11n 5GHz 20MHz U-NII Band III			5745 - 5825
	IEEE 802.1ac / 802.11n 5GHz 40MHz U-NII Band I			5190 - 5230
	IEEE 802.1ac / 802.11n 5GHz 40MHz U-NII Band III			5755 - 5795
	IEEE 802.11ac 80MHz U-NII Band I			5210
	IEEE 802.11ac 80MHz U-NII Band III			5775
Antenna information	Antenna	Type	Max. Gain (dBi)	
	2.4GHz ANT-0	Omni-directional Antenna	4.45	
	2.4GHz ANT-1	Omni-directional Antenna	3.41	
	2.4GHz G_{ANT}		3.96	
	2.4GHz Directional Gain (refer to RF report)		3.96	
	5GHz ANT-0	Omni-directional Antenna	Band I	3.50
			Band III	4.08
Antenna Delivery	IEEE 802.11b / 802.11g:2TX + 2RX (CDD) IEEE 802.11n 2.4GHz 20MHz / 40MHz :2TX + 2RX (MIMO) IEEE 802.11a / ac 20 MHz / 40 MHz / 80 MHz :1TX + 1RX			
Temperature Range	0 ~ 40°C			
RF Evaluation	0.358 mW/cm^2			

The above equipment was tested by A Test Lab Techno Corp. For compliance with the requirements set forth in 47 CFR § 2.1091 / 47 CFR § 1.1310. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties

2. Human Exposure Assessment

Due to the design and installation of this product, it is not possible to conduct SAR evaluation. This is because client either manufactures or supplies the antenna(s) that will be used in the installation of this product. Therefore, this product will be evaluated as a mobile device per 47 CFR § 1.1310 titled “Radiofrequency radiation exposure limits”, generally referred to as MPE limits.

In 47 CFR § 2.1091, paragraph (b) defines a mobile device as “a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 cm is normally maintained between the transmitter’s radiating structure(s) and the body of the user or nearby persons. ” This product is intended to be installed into a vehicle such that the unit is physically secured at one location. In the installation guide supplied with the product,

Client has made the following statement: “IMPORTANT: To meet the FCC’s RF Exposure Guidelines, the antenna should be installed so there is at least 20 cm of separation between the body of the user and nearby persons and the antenna”. Based on the installation of the transceiver and the antenna, the transmitters radiating structure is more than 20 cm from the user. Thus, this product is a “mobile device” as defined in section § 2.1091 paragraph (b).

Exposure evaluation
$$S = \frac{PG}{4\pi R^2}$$ Where S: power density P: power input to the 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.

3. RF Output Power

The conducted power turn-up tolerance reference manufacturer specification.

Band	Date Rate (Mbps)	Frequency (MHz)	Average Conducted power (dBm)		
			ANT-0	ANT-1	ANT-0+1
IEEE 802.11b	1	2412.0	20.16	19.98	23.08
		2417.0	20.55	20.38	23.48
		2422.0	20.56	20.34	23.46
		2437.0	20.52	20.36	23.45
		2452.0	21.03	20.62	23.84
		2457.0	20.97	20.72	23.86
		2462.0	20.98	20.29	23.66
	2	2437.0	20.49	20.33	23.42
	5.5	2437.0	20.46	20.31	23.40
	11	2437.0	20.42	20.27	23.36
IEEE 802.11g	6	2412.0	18.55	18.46	21.52
		2417.0	19.99	19.90	22.96
		2422.0	19.90	19.85	22.89
		2437.0	20.05	19.66	22.87
		2452.0	19.93	19.47	22.72
		2457.0	19.95	19.27	22.63
		2462.0	16.74	16.14	19.46
	9	2437.0	20.03	19.65	22.85
	12	2437.0	20.02	19.63	22.84
	18	2437.0	19.96	19.54	22.77
	24	2437.0	20.01	19.62	22.83
	36	2437.0	19.98	19.56	22.79
	48	2437.0	19.99	19.58	22.80
	54	2437.0	19.94	19.53	22.75

Band	Date Rate (Mbps)	Frequency (MHz)	Average Conducted power (dBm)		
			ANT-0	ANT-1	ANT-0+1
IEEE 802.11n 2.4GHz 20MHz	13	2412.0	17.21	17.13	20.18
		2417.0	20.20	20.14	23.18
		2422.0	20.27	20.00	23.15
		2437.0	20.36	19.97	23.18
		2452.0	20.23	19.76	23.01
		2457.0	19.81	19.37	22.61
		2462.0	16.23	15.54	18.91
	28.8	2437.0	20.35	19.96	23.17
	43.4	2437.0	20.33	19.93	23.14
	57.8	2437.0	20.30	19.88	23.11
	86.6	2437.0	20.32	19.90	23.13
	115.6	2437.0	20.28	19.86	23.09
	130	2437.0	20.26	19.83	23.06
	144.4	2437.0	20.24	19.80	23.04
IEEE 802.11n 2.4GHz 40MHz	27	2422.0	14.48	14.45	17.48
		2427.0	15.60	15.51	18.57
		2437.0	18.35	18.18	21.28
		2447.0	15.45	15.30	18.39
		2452.0	13.88	13.81	16.86
	60	2437.0	18.33	18.15	21.25
	90	2437.0	18.31	18.12	21.23
	120	2437.0	18.22	18.01	21.13
	180	2437.0	18.28	18.10	21.20
	240	2437.0	18.23	18.04	21.15
	270	2437.0	18.25	18.07	21.17
	300	2437.0	18.20	17.99	21.11

Band	Date Rate (Mbps)	Frequency (MHz)	Average Conducted power (dBm)
			ANT-0
IEEE 802.11a	6	5180.0	21.88
		5200.0	21.67
		5220.0	21.66
		5240.0	20.96
		5745.0	19.86
		5765.0	19.96
		5785.0	20.12
		5805.0	20.38
		5825.0	20.21
	54	5180.0	21.79
		5200.0	21.65
		5220.0	21.61
		5240.0	20.89
		5745.0	19.79
		5765.0	19.91
		5785.0	20.08
		5805.0	20.31
		5825.0	20.13
IEEE 802.11ac 20MHz	6.5	5180.0	21.49
		5200.0	21.23
		5220.0	21.07
		5240.0	20.86
		5745.0	19.82
		5765.0	20.02
		5785.0	20.14
		5805.0	20.35
		5825.0	20.28
	86.7	5180.0	21.45
		5200.0	21.17
		5220.0	20.99
		5240.0	20.77
		5745.0	19.75
		5765.0	19.98
		5785.0	20.07
		5805.0	20.26
		5825.0	20.18

Band	Date Rate (Mbps)	Frequency (MHz)	Average Conducted power (dBm)
			ANT-0
IEEE 802.11ac 40MHz	13.5	5190.0	18.28
		5230.0	21.12
		5755.0	20.13
		5795.0	20.31
	200	5190.0	18.19
		5230.0	21.08
		5755.0	20.04
		5795.0	20.23
IEEE 802.11ac 80MHz	29.3	5210.0	17.88
		5775.0	18.73
	433.3	5210.0	17.87
		5775.0	18.67

4. Test Result

Band	Data Rate (Mbps)	Frequency (MHz)	Limit (mw)	Distance [R] (cm)	Max tune-up Power (upper limit) [P] (dBm)	ANT Gain (dBi)	Numeric Gain [G]	Duty Cycle	[P] x [G] with Duty cycle [TP] (mW)	Power Density [S] (mw/cm^2)
IEEE 802.11b CDD	1	2412.0	1	20	23.70	3.96	3.96	1	928.31	0.184681
		2437.0	1	20	23.70	3.96	3.96	1	928.31	0.184681
		2462.0	1	20	23.70	3.96	3.96	1	928.31	0.184681
IEEE 802.11g CDD	6	2412.0	1	20	21.60	3.96	3.96	1	572.39	0.113873
		2437.0	1	20	22.90	3.96	3.96	1	772.14	0.153612
		2462.0	1	20	19.50	3.96	3.96	1	352.94	0.070215
IEEE 802.11n 2.4GHz 20MHz MIMO	13	2412.0	1	20	20.20	3.96	6.96	1	728.8	0.144990
		2437.0	1	20	23.20	3.96	6.96	1	1454.15	0.289294
		2462.0	1	20	19.00	3.96	6.96	1	552.85	0.109986
IEEE 802.11n 2.4GHz 40MHz MIMO	27	2422.0	1	20	17.50	3.96	6.96	1	391.39	0.077865
		2437.0	1	20	21.30	3.96	6.96	1	938.88	0.186784
		2452.0	1	20	16.90	3.96	6.96	1	340.89	0.067818

Band	Data Rate (Mbps)	Frequency (MHz)	Limit (mw)	Distance [R] (cm)	Max tune-up Power (upper limit) [P] (dBm)	ANT Gain (dBi)	Numeric Gain [G]	Duty Cycle	[P] x [G] with Duty cycle [TP] (mW)	Power Density [S] (mw/cm^2)
IEEE 802.11a	6	5180.0	1	20	21.9	3.5	2.24	1	346.93	0.069020
		5200.0	1	20	21.9	3.5	2.24	1	346.93	0.069020
		5220.0	1	20	21.9	3.5	2.24	1	346.93	0.069020
		5240.0	1	20	21.9	3.5	2.24	1	346.93	0.069020
		5745.0	1	20	20.4	4.08	2.56	1	280.7	0.055843
		5765.0	1	20	20.4	4.08	2.56	1	280.7	0.055843
		5785.0	1	20	20.4	4.08	2.56	1	280.7	0.055843
		5805.0	1	20	20.4	4.08	2.56	1	280.7	0.055843
		5825.0	1	20	20.4	4.08	2.56	1	280.7	0.055843
IEEE 802.11ac 20MHz	6.5	5180.0	1	20	21.5	3.5	2.24	1	316.41	0.062948
		5200.0	1	20	21.5	3.5	2.24	1	316.41	0.062948
		5220.0	1	20	21.5	3.5	2.24	1	316.41	0.062948
		5240.0	1	20	21.5	3.5	2.24	1	316.41	0.062948
		5745.0	1	20	20.4	4.08	2.56	1	280.7	0.055843
		5765.0	1	20	20.4	4.08	2.56	1	280.7	0.055843
		5785.0	1	20	20.4	4.08	2.56	1	280.7	0.055843
		5805.0	1	20	20.4	4.08	2.56	1	280.7	0.055843
		5825.0	1	20	20.4	4.08	2.56	1	280.7	0.055843
IEEE 802.11ac 40MHz	13.5.	5190.0	1	20	18.3	3.5	2.24	1	151.44	0.030128
		5230.0	1	20	21.2	3.5	2.24	1	295.29	0.058746
		5755.0	1	20	20.4	4.08	2.56	1	280.7	0.055843
		5795.0	1	20	20.4	4.08	2.56	1	280.7	0.055843
IEEE 802.11ac 80MHz	29.3	5210.0	1	20	17.9	3.5	2.24	1	138.12	0.027478
		5775.0	1	20	18.8	4.08	2.56	1	194.2	0.038635

Note: 1. The Numeric Gain calculated by 10^(ant. Gain(dBi) /10).

2. Each band max power which perform MPE of any configurations.
3. The MPE results are evaluated by lowest data rate for WLAN.
4. The device operating IEEE 802.11 b/g mode is 2TX (CDD).
5. The device operating IEEE 802.11 n mode is 2TX (MIMO).
6. The device operating IEEE 802.11 a/ac mode is 1TX only.

Simultaneous MPE：

Total MPE = 2.4GHz MPE + 5GHz MPE = 0.289+0.069=0.358 mW/cm^2 < $1mW/cm^2$