Maximum Permissible Exposure

Equipment	:	**AC1350 Wireless Dual Band Router**
Brand Name	:	**TP-LINK**
Model No.	:	**Archer C59**
FCC ID	:	**TE7C59**
Standard	:	**FCC part 2.1091**
Applicant / 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

The product sample received on May 20, 2016 and completely tested on Dec. 28 2016. We, SPORTON, would like to declare that the tested sample has been evaluated in accordance with the procedures given in FCC part 2.1091 and shown compliance with the applicable technical standards.

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

Reviewed by:

Jordon Hsiao / Manager

Testing Laboratory
1190

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Revision History

Report No.	Version	Description	Issued Date
FA651919-04	Rev. 01	Initial issue of report	Jan. 12, 2017

1 Human Exposure Assessment

1.1 Product Details

The difference between the report no. : FA651919	
The Difference	Add Beamforming mode

Evaluated Test Items	All items

1.2 Maximum Permissible Exposure

1.2.1 Limit of Maximum Permissible Exposure

Limits for Occupational / Controlled Exposure				
Frequency Range (MHz)	**Electric Field Strength (E) (V/m)**	**Magnetic Field Strength (H) (A/m)**	**Power Density (S) (mW/ cm²)**	**Averaging Time |E|²,|H|² or S (minutes)**
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 General Population / Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (E) (V/m)**	**Magnetic Field Strength (H) (A/m)**	**Power Density (S) (mW/ cm²)**	**Averaging Time |E|²,|H|² or S (minutes)**
0.3-1.34	614	1.63	(100)*	30
1.34-30	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
Note 1: f = frequency in MHz ; *Plane-wave equivalent power density Note 2: For the applicable limit, see FCC 1.1310				

1.2.2 MPE Calculation Method

$$S = \frac{PG}{4\pi R^2}$$

S = power density (in appropriate units, e.g. mW/cm^2)
P = power input to the antenna (in appropriate units, e.g., mW)
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 (appropriate units, e.g., cm)

1.2.3 Result of Maximum Permissible Exposure (2.4G) - Non-Beamforming

RF General Information					
Frequency Range (MHz)	**IEEE Std. 802.11 Protocol**	**Ch. Frequency (MHz)**	**Channel Number**	**Number of Transmit Chains (N_{TX})**	**RF Output Power (dBm)**
2400-2483.5	b	2412-2462	1-11 [11]	3	29.71
2400-2483.5	g	2412-2462	1-11 [11]	3	28.56
2400-2483.5	n (HT20)	2412-2462	1-11 [11]	3	27.48
2400-2483.5	n (HT40)	2422-2452	3-9 [7]	3	29.10
Note 1: RF output power specifies that Maximum Conducted (Average) Output Power.					

Worst Maximum RF Output Power Result							
Exposure Environment		General Population / Uncontrolled Exposure					
Separation Distance (cm)		22					
Condition		**RF Output Power (dBm)**					
Modulation Mode	**N_{TX}**	**Chain-Port 1**	**Chain-Port 2**	**Sum Chain**	**DG (dBi)**	**EIRP Power**	**PD (S) (mW/cm²)**
11b	3	25.17	24.88	29.71	3.34	33.05	0.33185
Maximum Permissible Exposure Limit (mW/cm²)							1
Note 1: N_{TX} = Number of Transmit Chains							

1.2.4 Result of Maximum Permissible Exposure (5.2G) - Non-Beamforming

RF General Information					
Frequency Range (MHz)	**IEEE Std. 802.11 Protocol**	**Ch. Frequency (MHz)**	**Channel Number**	**Number of Transmit Chains (N_{TX})**	**RF Output Power (dBm)**
5150-5250	a	5180-5240	36-48 [4]	2	26.61
5150-5250	n (HT20)	5180-5240	36-48 [4]	2	26.64
5150-5250	n (HT40)	5190-5230	38-46 [2]	2	27.18
5150-5250	ac (VHT20)	5180-5240	36-48 [4]	2	26.72
5150-5250	ac (VHT40)	5190-5230	38-46 [2]	2	27.23
5150-5250	ac (VHT80)	5210	48 [1]	2	16.13
Note 1: RF output power specifies that Maximum Conducted (Average) Output Power.					

Worst Maximum RF Output Power Result							
Exposure Environment		General Population / Uncontrolled Exposure					
Separation Distance (cm)		22					
Condition		**RF Output Power (dBm)**					
Modulation Mode	**N_{TX}**	**Chain-Port 1**	**Chain-Port 2**	**Sum Chain**	**DG (dBi)**	**EIRP Power**	**PD (S) (mW/cm²)**
ac(VHT40)	2	24.39	24.04	27.23	4.80	32.03	0.26239
Maximum Permissible Exposure Limit (mW/cm²)							1
Note 1: N_{TX} = Number of Transmit Chains							

1.2.5 Result of Maximum Permissible Exposure (5.8G) - Non-Beamforming

RF General Information					
Frequency Range (MHz)	**IEEE Std. 802.11 Protocol**	**Ch. Frequency (MHz)**	**Channel Number**	**Number of Transmit Chains (N_{TX})**	**RF Output Power (dBm) Co-location**
5725-5850	a	5745-5825	149-165 [5]	2	29.92
5725-5850	n (HT20)	5745-5825	149-165 [5]	2	29.89
5725-5850	n (HT40)	5755-5795	151-159 [2]	2	28.52
5725-5850	ac (VHT20)	5745-5825	149-165 [5]	2	29.94
5725-5850	ac (VHT40)	5755-5795	151-159 [2]	2	28.59
5725-5850	ac (VHT80)	5775	155 [1]	2	21.81
Note 1: RF output power specifies that Maximum Conducted (Average) Output Power.					

Worst Maximum RF Output Power Result							
Exposure Environment		General Population / Uncontrolled Exposure					
Separation Distance (cm)		22					
Condition		**RF Output Power (dBm)**					
Modulation Mode	**N_{TX}**	**Chain-Port 1**	**Chain-Port 2**	**Sum Chain**	**DG (dBi)**	**EIRP Power**	**PD (S) (mW/cm²)**
ac (VHT20)	2	27.00	26.86	29.94	4.80	34.74	0.48972
Maximum Permissible Exposure Limit (mW/cm²)							1
Note 1: N_{TX} = Number of Transmit Chains							

1.2.6 Result of Maximum Permissible Exposure (5.2G) -Beamforming

RF General Information					
Frequency Range (MHz)	**IEEE Std. 802.11 Protocol**	**Ch. Frequency (MHz)**	**Channel Number**	**Number of Transmit Chains (N_{TX})**	**RF Output Power (dBm)**
5150-5250	ac (VHT20)	5180-5240	36-48 [4]	2	27.11
5150-5250	ac (VHT40)	5190-5230	38-46 [2]	2	25.12
5150-5250	ac (VHT80)	5210	48 [1]	2	15.96
Note 1: RF output power specifies that Maximum Conducted (Average) Output Power.					

Worst Maximum RF Output Power Result							
Exposure Environment		General Population / Uncontrolled Exposure					
Separation Distance (cm)		22					
Condition		**RF Output Power (dBm)**					
Modulation Mode	**N_{TX}**	**Chain-Port 1**	**Chain-Port 2**	**Sum Chain**	**DG (dBi)**	**EIRP Power**	**PD (S) (mW/cm²)**
ac (VHT20)	2	23.89	24.29	27.11	7.76	34.87	0.50460
Maximum Permissible Exposure Limit (mW/cm²)							1
Note 1: N_{TX} = Number of Transmit Chains							

1.2.7 Result of Maximum Permissible Exposure (5.8G) - Beamforming

RF General Information					
Frequency Range (MHz)	**IEEE Std. 802.11 Protocol**	**Ch. Frequency (MHz)**	**Channel Number**	**Number of Transmit Chains (N_{TX})**	**RF Output Power (dBm) Co-location**
5725-5850	ac (VHT20)	5745-5825	149-165 [5]	2	26.19
5725-5850	ac (VHT40)	5755-5795	151-159 [2]	2	27.77
5725-5850	ac (VHT80)	5775	155 [1]	2	20.72
Note 1: RF output power specifies that Maximum Conducted (Average) Output Power.					

Worst Maximum RF Output Power Result							
Exposure Environment	General Population / Uncontrolled Exposure						
Separation Distance (cm)	22						
Condition	**RF Output Power (dBm)**						
Modulation Mode	**N_{TX}**	**Chain-Port 1**	**Chain-Port 2**	**Sum Chain**	**DG (dBi)**	**EIRP Power**	**PD (S) (mW/cm²)**
ac (VHT40)	2	24.23	25.24	27.77	7.76	35.53	0.58741
Maximum Permissible Exposure Limit (mW/cm²)							1
Note 1: N_{TX} = Number of Transmit Chains							

1.2.8 Result of Maximum Permissible Exposure (Co-location)

Worst Maximum RF Output Power Result							
Exposure Environment		General Population / Uncontrolled Exposure					
Separation Distance (cm)		22					
Condition		**RF Output Power (dBm)**					
Modulation Mode	**N_{TX}**	**RF Output Power (dBm)**	**DG (dBi)**	**EIRP Power**	**PD (S) (mW/cm²)**	**Limit (mW/cm²)**	**Ratio**
11b	3	29.71	3.34	33.05	0.33185	1	0.33185
ac(VHT40)	2	27.77	7.76	35.53	0.58741	1	0.58741
Co-location Total							0.91926
Maximum Permissible Exposure Limit							1

Note 1: NTX = Number of Transmit Chains.

Note.2: Both of the WLAN 2.4GHz Band and WLAN 5GHz Band can transmit simultaneously, the formula of calculated the MPE is:

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

CPD = Calculation power density

LPD = Limit of power density

Note 3: Refer to KDB 865664 D02 RF Exposure Reporting v01r02 for MPE Calculation Colocation.