RF Exposure Evaluation Declaration

FCC ID:	TE7RE450V2
APPLICANT:	TP-Link Technologies Co., Ltd.
Application Type:	Certification
Product:	AC1750 Wi-Fi Range Extender
Model No.:	RE450
Trademark:	TP-Link
FCC Classification:	Digital Transmission System (DTS) Unlicensed National Information Infrastructure (UNII)

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Revision History

Report No.	Version	Description	Issue Date	Note
1706TW0118-U4	Rev. 01	Initial report	06-25-2017	Valid

1. PRODUCT INFORMATION

1.1. Equipment Description

Product Name:	AC1750 Wi-Fi Range Extender
Model No.:	RE450
Brand Name:	TP-Link
Frequency Range:	802.11b/g/n-HT20: 2412 ~ 2462MHz 802.11n-HT40: 2422 ~ 2452MHz 802.11a/n-HT20/ac-VHT20: 5180~5320MHz, 5500~5580, 5660~5700MHz, 5745~5825MHz 802.11n-HT40/ac-VHT40: 5190~5310MHz, 5510~5550MHz, 5670MHz, 5755~5795MHz 802.11ac-VHT80: 5210MHz, 5290MHz, 5530MHz, 5775MHz
Type of Modulation:	802.11b: DSSS 802.11a/g/n/ac: OFDM

1.2. Antenna Description

Antenna Type	Frequency Band (MHz)	TX Paths	Max Antenna Gain (dBi)	CDD Directional Gain (dBi)	
				For Power	For PSD
Omni-Directional	2412 ~ 2462	3	2.0	2.0	6.77
	5150 ~ 5850	3	2.5	2.5	7.27

Note: The EUT supports Cyclic Delay Diversity (CDD) technology for 802.11a/b/g/n/ac mode, and the transmitter output signal is correlated.

For CDD transmissions, directional gain is calculated as follows, $N_{ANT} = 3$, $N_{SS} = 1$.

Three antennas have the same gain, G_{ANT}, Directional gain = G_{ANT} + Array Gain, where Array Gain is as follows.

- For power spectral density (PSD) measurements on all devices,
  Array Gain = 10 log (N_{ANT}/ N_{SS}) dB = 4.77;
- For power measurements on IEEE 802.11 devices,
  Array Gain = 0 dB for $N_{ANT} \leq 4$;

2. RF Exposure Evaluation

2.1. Limits

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Average Time (Minutes)
(A) Limits for Occupational/ Control Exposures				
300-1500	--	--	f/300	6
1500-100,000	--	--	5	6
(B) Limits for General Population/ Uncontrolled Exposures				
300-1500	--	--	f/1500	6
1500-100,000	--	--	1	30

f= Frequency in MHz

Calculation Formula: $Pd = (Pout*G)/(4*pi*r^2)$

Where
Pd = power density in mW/cm^2
Pout = 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

Pd is the limit of MPE, $1mW/cm^2$. 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.

2.2. Test Result of RF Exposure Evaluation

Product	AC1750 Wi-Fi Range Extender
Test Item	RF Exposure Evaluation

Antenna Gain: Refer to clause 1.2.

Test Mode	Frequency Band (MHz)	Maximum Average Output Power (dBm)	Power Density at R = 20 cm (mW/cm^2)	Limit (mW/cm^2)
802.11b/g/n	2412 ~ 2462	26.22	0.1320	1
802.11a/n/ac	5180 ~ 5320	26.07	0.1431	1
	5500 ~ 5580 5660 ~ 5700	23.74	0.0837	1
	5745 ~ 5825	24.03	0.0895	1

CONCULISON:

Both of the WLAN 2.4GHz Band and WLAN 5GHz Band can transmit simultaneously. Therefore, the Max Power Density at R (20 cm) = 0.1320mW/cm^2+ 0.1431mW/cm^2 = 0.2751mW/cm^2 < 1mW/cm^2.

So the EUT complies with the requirement.

The End