RF Exposure Evaluation For FCC ID: TE7EAP245; IC: 8853A-EAP245

Refer user manual this device is a AC1750 Wireless Daul Band Gigabit Ceiling Mount Access Point, and this device was designed used in Mobile devices that the minimum distance between human's body is **30cm.** Based on the 47CFR 2.1091, this device belongs to Mobile device. The definition of the category as following:

Mobile Derives:
CFR Title 47 §2.1091(b)
(b) For purposes of this section, a mobile device is defined 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 centimeters is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons.
FCC KDB 447498 D01 General RF Exposure Guidance v06 Limit

Devices operating in standalone mobile exposure conditions may contain a single transmitter or multiple transmitters that do not transmit simultaneously. A minimum test separation distance ≥ 20 cm is required between the antenna and radiating structures of the device and nearby persons to apply mobile device exposure limits. The distance must be fully supported by the operating and installation configurations of the transmitter and its antenna(s), according to the source-based time-averaged maximum power requirements of § 2.1091(d)(2). In cases where cable losses or other attenuations are applied to determine compliance, the most conservative operating configurations and exposure conditions must be evaluated. The minimum test separation distance required for a device to comply with mobile exposure conditions must be clearly identified in the installation and operating instructions, for all installation and exposure conditions, to enable users and installers to comply with RF exposure requirements. For mobile devices that have the potential to operate in portable device exposure conditions, similar to the configurations described in § 2.1091(d)(4), a KDB inquiry is required to determine the SAR test requirements for demonstrating compliance.

When the categorical exclusion provision of § 2.1091(c) applies, the minimum test separation distance may be estimated, when applicable, by simple calculations according to plane-wave equivalent conditions, to ensure the transmitter and its antenna(s) can operate in manners that meet or exceed the estimated distance. The source-based time-averaged maximum radiated power, according to the maximum antenna gain, must be applied to calculate the field strength and power density required to establish the minimum test separation distance. When the estimated test separation distance becomes overly conservative and does not support compliance, MPE measurement or computational modeling may be used to determine the required minimum separation distance.

According to FCC Part 1.1307, systems operating under the provisions of this section shall be operated in a manner the ensures that the public is not exposed to radio frequency energy level in excess of the commission's guidelines.

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/cm^2)
0.3-1.34	614	1.63	(100)*
1.34-30	824/f	2.19/f	(180/f2)*
30-300	27.5	0.073	0.2
300-1500			f/1500
1500-100,000			1.0

MPE calculation formula

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

Where:

S = power density

P = output power (mW)

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

R = Separation distance between radiator and human body (cm)

Output Peak Power Test Data

2.4G WIFI								
Mode	802.11 b				802.11 g			
	ANT0	ANT1	ANT2	Total output power	ANT0	ANT1	ANT2	Total output power
peak output power (dBm)	25.65	25.06	24.66	**29.91**	25.25	24.73	24.92	29.74
Mode	802.11 n HT20				802.11 n HT40			
	ANT0	ANT1	ANT2	Total output power	ANT0	ANT1	ANT2	Total output power
peak output power (dBm)	25.31	24.49	24.32	29.50	19.22	18.62	18.09	23.44
Note: This report listed the worst case peak output power value, please refer to RF test report for more details.								

5.2G WIFI								
Mode	802.11 a				802.11 ac HT80			
	ANT0	ANT1	ANT2	Total output power	ANT0	ANT1	ANT2	Total power
Conductor power (dBm)	20.32	20.46	20.02	25.04	17.56	18.21	17.43	22.52
Mode	802.11 n HT20				802.11 n HT40			
	ANT0	ANT1	ANT2	Total output power	ANT0	ANT1	ANT2	Total output power r
Conductor	20.32	21.08	19.44	25.10	23.39	23.59	23.11	**28.14**

power (dBm)								

Note: This report listed the worst case conductor power value, please refer to RF test report for more details.

5.8G WIFI								
Mode	802.11 a				802.11 ac HT80			
	ANT0	ANT1	ANT2	Total output power	ANT0	ANT1	ANT2	Total output power
Conductor power (dBm)	24.85	24.85	24.22	**29.42**	24.76	24.61	24.44	29.38
Mode	802.11 n HT20				802.11 n HT40			
	ANT0	ANT1	ANT2	Total output power	ANT0	ANT1	ANT2	Total output power
Conductor power (dBm)	24.98	24.23	24.02	29.20	24.85	24.16	24.32	29.22

Note: This report listed the worst case conductor power value, please refer to RF test report for more details.

Assessment result

Evolution mode	Maximum peak output power （dBm）	Directional Gain (dBi)	Total Power (mw)	Distance (cm)	Power Density (mW/cm²)	Limit of Power Density (mW/cm²)	Verdict
2.4G WIFI	29.91	4.86	2999.16	26	0.353	1	Pass
5.2G WIFI	28.14	5.11	2113.49	26	0.249	1	Pass
5.8G WIFI	29.42	4.50	2466.04	26	0.290	1	Pass

Collocated Power Density Calculation

Evolution mode	Frequency(MHz)	Power Density/Limit	Σ(Power Density / Limit) of WIFI 2.4GHz+WIFI 5.8GHz	Verdict
2.4G WIFI	2412MHz ~ 2462MHz	0.353		Pass
5.2G WIFI	5150MHz ~ 5250MHz	0.249	0.644	Pass
5.8G WIFI	5725MHz ~ 5850MHz	0.290		Pass

Note:

1. Σ(Power Density / Limit): This is a summation of [(power density for each transmitter/ antenna included in the simultaneous transmission)/ (corresponding MPE limit)], for WLAN 2.4GHz+WLAN 5GHz.

2. Both of the 2.4GHz/5GHz 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
3. Both of the 5.2GHz WIFI and 5.8GHz WIFI can't transmit simultaneously at same time.
4. The worst-case situation is 0.644, which is less than "1". This confirmed that the device comply with FCC 1.1310 MPE limit.
5. The AC1750 Wireless Daul Band Gigabit Ceiling Mount Access Point Module work frequency range used is 2400 MHz ~ 2483.5 MHz, 5150 MHz~ 5250 MHz and 5725 MHz ~ 5850 MHz the result close to the limit by the above formula so, we select worst case power to calculate the exclusion power threshold.
6. More power list please refer to RF test report.

IC RSS-102 2.5.2 and Safety Code 6

RF exposure evaluation is required if the separation distance between the user and the device's radiating element is greater than **30 cm**, According to IC RSS-102 Table 4 , systems operating under the provisions of this section shall be operated in a manner the ensures that the public is not exposed to radio frequency energy level in excess of the commission's guidelines.

Table 4: RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m²)	Reference Period (minutes)
$0.003\text{-}10^{21}$	83	90	-	Instantaneous*
0.1-10	-	$0.73/f$	-	6**
1.1-10	$87/f^{0.5}$	-	-	6**
10-20	27.46	0.0728	2	6
20-48	$58.07/f^{0.25}$	$0.1540/f^{0.25}$	$8.944/f^{0.5}$	6
48-300	22.06	0.05852	1.291	6
300-6000	$3.142\,f^{0.3417}$	$0.008335\,f^{0.3417}$	$0.02619 f^{0.6834}$	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	$616000/f^{1.2}$
150000-300000	$0.158\,f^{0.5}$	$4.21 \times 10^{-4} f^{0.5}$	$6.67 \times 10^{-5} f$	$616000/f^{1.2}$

Note: f is frequency in MHz.
*Based on nerve stimulation (NS).
** Based on specific absorption rate (SAR).

MPE calculation formula

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

Where:
S = power density
P = output power (W)
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = Separation distance between radiator and human body (m)

2.4G WIFI								
	802.11 b				802.11 g			
Mode	ANT0	ANT1	ANT2	Total output power	ANT0	ANT1	ANT2	Total output power
peak output power (dBm)	25.65	25.06	24.66	**29.91**	25.25	24.73	24.92	29.74
	802.11 n HT20				802.11 n HT40			
Mode	ANT0	ANT1	ANT2	Total output power	ANT0	ANT1	ANT2	Total output power
peak output power (dBm)	25.31	24.49	24.32	29.50	19.22	18.62	18.09	23.44
Note: This report listed the worst case peak output power value, please refer to RF test report for more details.								

5.2G WIFI								
Mode	802.11 a				802.11 ac HT80			
	ANT0	ANT1	ANT2	Total EIRP power	ANT0	ANT1	ANT2	Total EIRP power
EIRP (dBm)	11.23	11.21	10.62	17.26	14.95	14.91	14.65	**22.42**
Mode	802.11 n HT20				802.11 n HT40			
	ANT0	ANT1	ANT2	Total EIRP power	ANT0	ANT1	ANT2	Total EIRP power
EIRP (dBm)	11.38	11.42	10.89	17.74	14.65	14.84	14.55	22.14
Note: This report listed the worst case EIRP value, please refer to RF test report for more details.								

5.8G WIFI								
Mode	802.11 a				802.11 ac HT80			
	ANT0	ANT1	ANT2	Total power	ANT0	ANT1	ANT2	Total power
Conductor power (dBm)	24.85	24.85	24.22	**29.42**	18.71	19.10	18.63	23.59
Mode	802.11 n HT20				802.11 n HT40			
	ANT0	ANT1	ANT2	Total power	ANT0	ANT1	ANT2	Total power
Conductor power (dBm)	24.86	24.16	24.16	29.18	23.51	23.71	23.25	28.27
Note: This report listed the worst case conductor power value, please refer to RF test report for more details.								

IC (Worst case)

Evolution mode	Maximum peak output power （dBm）	Directional Gain (dBi)	Total Power (mw)	Distance (m)	Power Density (W/m²)	Limit of Power Density (W/m²)	Verdict
2.4G WIFI	29.91	4.86	2999.16	0.26	3.532	5.404	Pass

Evolution mode	Maximum EIRP power （dBm）	Directional Gain (dBi)	Total Power (mw)	Distance (m)	Power Density (W/m²)	Limit of Power Density (W/m²)	Verdict
5.2G WIFI	22.24	5.11	167.49	0.26	0.197	9.083	Pass

Evolution mode	Maximum peak output power（dBm）	Directional Gain (dBi)	Total Power (mw)	Distance (m)	Power Density (W/m²)	Limit of Power Density (W/m²)	Verdict
5.8G WIFI	29.42	4.50	2466.04	0.26	2.904	9.756	Pass

Collocated Power Density Calculation

Evolution mode	Frequency(MHz)	Power Density/Limit	Σ(Power Density / Limit) of WIFI 2.4GHz+WIFI 5.8GHz	Verdict
2.4G WIFI	2412MHz ~ 2462MHz	0.654		Pass
5.2G WIFI	5150MHz ~ 5250MHz	0.022	0.951	Pass
5.8G WIFI	5725MHz ~ 5850MHz	0.298		Pass

Note:

1. Σ(Power Density / Limit): This is a summation of [(power density for each transmitter/ antenna included in the simultaneous transmission)/ (corresponding MPE limit)], for WLAN 2.4GHz+WLAN 5GHz.
2. Both of the 2.4GHz/5GHz 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
3. Both of the 5.2GHz WIFI and 5.8GHz WIFI can't transmit simultaneously at same time.
4. The worst-case situation is 0.951, which is less than "1". This confirmed that the device comply with RSS‑102 MPE limit.
5. The AC1750 Wireless Daul Band Gigabit Ceiling Mount Access Point Module work frequency range used is 2400 MHz ~ 2483.5 MHz, 5150 MHz~ 5250 MHz and 5725 MHz ~ 5850 MHz the result close to the limit by the above formula so, we select worst case power to calculate the exclusion power threshold.
6. More power list please refer to RF test report.