



RF Exposure Evaluation Declaration

FCC ID: HDC17600031F1
Applicant: Adtran Inc.
Application Type: Certification
Product: WiFi 5 Mesh AP
Model No.: 831-t5
FCC Classification: Digital Transmission System (DTS)
Unlicensed National Information Infrastructure (NII)
FCC Rule Part(s) FCC Part 2.1091
Test Procedure(s): KDB 447498 D01v06

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The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standards through the calibration of the equipment and evaluated measurement uncertainty herein.

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Revision History

Report No.	Version	Description	Issue Date	Note
2108RSU047-U6	Rev. 01	Initial Report	11-25-2021	Valid

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1.4. Product Information

Product Name	WiFi 5 Mesh AP
Model No.	831-t5
Serial No.	831t5A0719000001
Wi-Fi Specification	802.11a/b/g/n/ac, VHT
Antenna Information	Refer to section 1.5
Power Supply	AC/DC Adapter
Accessories	
Adapter	MODEL: S36B52-120A300-C4-6 INPUT: 100-240V~50/60Hz 1.0A OUTPUT: 12.0V DC, 3A, 36.0W
Remark: The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer.	

1.5. Antenna Details

Antenna Type	Frequency Band	Tx Paths	Max. Antenna Gain (dBi)	Beamforming Directional Gain (dBi)	CDD Directional Gain (dBi)	
					For Power	For PSD
PCB Antenna	2.4GHz Band	2	3.5	6.51	3.5	6.51
	5GHz Low Band	2	4.9	7.91	4.9	7.91
	5GHz High Band	4	5.5	11.52	5.5	11.52
Remark: <ol style="list-style-type: none"> The EUT supports Cyclic Delay Diversity (CDD) mode, and CDD signals are correlated. If all antennas have the same gain, G_{ANT}, Directional gain = $G_{ANT} + \text{Array Gain}$, where Array Gain is as follows. <ul style="list-style-type: none"> For power spectral density (PSD) measurements on all devices, Array Gain = $10 \log (N_{ANT} / N_{SS})$ dB; For power measurements on IEEE 802.11 devices, Array Gain = 0 dB for $N_{ANT} \leq 4$; The EUT also supports Beam Forming mode, and the Beam Forming support 802.11n/ac and VHT, not include 802.11a/b/g. The conducted output power in the beamforming mode will be reduced below the conducted output power in the CDD mode by the amount in dB that the beamforming gain exceeds the maximum antenna gain. 						

2. RF Exposure Evaluation

2.1. Test 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: $P_d = (P_{out} * G) / (4 * \pi * r^2)$

Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

r = distance between observation point and center of the radiator in cm

P_d is the limit of MPE, 1mW/cm². 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

Product	WiFi 5 Mesh AP
Test Item	RF Exposure Evaluation

Test Mode	Frequency Band (MHz)	Conducted Power (dBm)	Max. Antenna Gain (dBi)	Max. EIRP (dBm)	Compliance Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
802.11b/g/n	2412 ~ 2462	26.51	3.5	30.01	20	0.1994	1
802.11a/n/ac	5180 ~ 5240	28.24	4.9	33.14	20	0.4099	1
802.11a/n/ac	5725 ~ 5825	29.82	5.5	35.32	20	0.6772	1
802.11a/n/ac	5260 ~ 5320	21.55	4.9	26.45	20	0.0878	1
802.11a/n/ac	5500 ~ 5700	18.36	5.5	23.86	20	0.0484	1

CONCLUSION:

WLAN 2.4GHz Band and WLAN 5GHz can transmit simultaneously.

The Max. Power Density at R (20 cm) = $0.1994\text{mW/cm}^2 + 0.6772\text{mW/cm}^2 = 0.8766\text{mW/cm}^2 < 1\text{mW/cm}^2$.

So the compliance distance is 20cm for device installed without any other radio equipment.