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Report No.: 2108RSU047-U3 Report Version: V01 Issue Date: 11-20-2021

# **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

Approved By:

Reviewed By:

Vincent Yu

Robin Wu

Robin Wu

Reviewed By:

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.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.





# **Revision History**

Report No.	Version	Description	Issue Date	Note
2108RSU047-U3	Rev. 01	Initial Report	11-20-2021	Valid



# CONTENTS

Des	cription		Page
1.	Gene	ral Information	4
	1.1.	Applicant	4
	1.2.	Manufacturer	4
	1.3.	Testing Facility	4
	1.4.	Product Information	5
	1.5.	Antenna Details	5
2.	RF Ex	posure Evaluation	6
	2.1.	Test Limits	6
	2.2.	Test Result	7
Арр	endix -	EUT Photograph	8





### 1. General Information

## 1.1. Applicant

Adtran Inc.

901 Explorer Blvd NW Huntsville, AL 35806, USA

#### 1.2. Manufacturer

Adtran Inc.

901 Explorer Blvd NW Huntsville, AL 35806, USA

## 1.3. Testing Facility

	Test Site – MRT Suzhou Laboratory								
	Laboratory Location (Suzhou - Wuzhong)								
	D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China								
	Laboratory Location (Suzhou - SIP)								
	4b Building, Liando U Valley, No.200 Xingpu Rd., Shengpu Town, Suzhou Industrial Park, China								
	Laboratory Accre	editations							
	A2LA: 3628.01		CNAS	S: L10551					
	FCC: CN1166		ISED:	CN0001					
	VCCI	□R-20025	□G-20034	□C-20020	□T-20020				
	VCCI:	□R-20141	□G-20134	□C-20103	□T-20104				
$\boxtimes$	Test Site - MRT	Shenzhen Laborat	ory						
	Laboratory Loca	tion (Shenzhen)							
	1G, Building A, Junxiangda Building, Zhongshanyuan Road West, Nanshan District, Shenzhen, China								
	Laboratory Accreditations								
	A2LA: 3628.02		CNAS	: L10551					
	FCC: CN1284		ISED:	CN0105					
	Test Site – MRT Taiwan Laboratory								
	Laboratory Location (Taiwan)								
	No. 38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)								
	Laboratory Accre	editations							
	TAF: L3261-1907	25							
	FCC: 291082, TW3261 ISED: TW3261								



#### 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	Frequency Band	Tx	Max.	Beamforming	CDD Directional Gain	
Туре	(MHz)	Paths	Antenna	Directional Gain	(dBi)	
			Gain (dBi)	(dBi)	For Power	For PSD
PCB	2.4GHz Band	2	3.5	6.51	3.5	6.51
Antenna	5GHz Low Band	2	4.9	7.91	4.9	7.91
Antenna	5GHz High Band	4	5.5	11.52	5.5	11.52

#### Remark:

- The EUT supports Cyclic Delay Diversity (CDD) mode, and CDD signals are correlated.
   If all antennas have the same gain, G<sub>ANT</sub>, Directional gain = G<sub>ANT</sub> + Array Gain, where Array Gain is as follows.
  - For power spectral density (PSD) measurements on all devices,
     Array Gain = 10 log (N<sub>ANT</sub>/ N<sub>SS</sub>) dB;
  - For power measurements on IEEE 802.11 devices,
     Array Gain = 0 dB for N<sub>ANT</sub> ≤ 4;
- 2. 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	quency Range Electric Field		Power Density	Average Time			
(MHz)	Strength (V/m)	Strength (A/m)	(mW/cm <sup>2</sup> )	(Minutes)			
(A) Limits for Occupational/ Control Exposures							
300-1500			f/300	6			
1500-100,000	0-100,000		5				
(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<sup>2</sup>

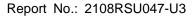
Pout = output power to antenna in mW

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<sup>2</sup>. 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	Conducted	Max. Antenna	Max.	Compliance	Power Density	Limit
	Band (MHz)	Power	Gain	EIRP	Distance	(mW/cm <sup>2</sup> )	(mW/cm <sup>2</sup> )
		(dBm)	(dBi)	(dBm)	(cm)		
802.11b/g/n	2412 ~ 2462	26.51	3.5	30.01	20	0.1994	1
802.11a/n/ac	5180 ~ 5240 (Low Band)	28.24	4.9	33.14	20	0.4099	1
802.11a/n/ac	5725 ~ 5825 (High Band)	29.82	5.5	35.32	20	0.6772	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.



# Appendix - EUT Photograph

Refer to "2108RSU047-UE" file.

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