
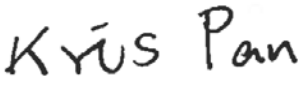


MPE Report

Applicant : Adtran
Product Type : Intellifi AP/Router
Trade Name : ADTRAN
Model Number : SE81ac
Applicable Standard : IEEE Std.C95.1
47 CFR § 2.1091 / 47 CFR § 1.1310
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Issued by

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Taiwan Accreditation Foundation accreditation number: 1330
Test Firm MRA designation number: TW0010

Note:

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Revision History

Rev.	Issued Date	Revisions	Revised By
00	May 18, 2020	Initial Issue	Nicole Chu
01	Jul. 07, 2020	P11 Revised unit	Nicole Chu



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1. *Reference Applicable Standard*

Standard	Description	Version
ANSI/IEEE C95.1	American National Standard safety levels with respect to human exposure to radio frequency electromagnetic fields, 300 KHz to 100 GHz, New York.	1992
47 CFR Part §2.1091	Radiofrequency radiation exposure evaluation: mobile devices.	-
47 CFR Part §1.1310	Radiofrequency radiation exposure limits.	-



2. Description of Equipment under Test (EUT)

Applicant	Adtran 901 Explorer Boulevard, Huntsville, AL 35806-2807, United States			
Manufacturer	Adtran 901 Explorer Boulevard, Huntsville, AL 35806-2807, United States			
Product Type	Intellifi AP/Router			
Trade Name	ADTRAN			
Model Number	SE81ac			
FCC ID	HDC-SE81AC			
Frequency Range	Operate Band			Frequency Range (MHz)
	IEEE 802.11b / 802.11g / 802.11n 2.4 GHz 20 MHz			2412 - 2462
	IEEE 802.11n 2.4 GHz 40 MHz			2422 - 2452
	IEEE 802.11a			5180 - 5240
				5745 - 5825
	IEEE 802.11n 5 GHz / 802.11ac 20 MHz			5180 - 5240
				5745 - 5825
	IEEE 802.11n 5 GHz / 802.11ac 40 MHz			5190 - 5230
			5755 - 5795	
IEEE 802.11n 5 GHz / 802.11ac 80 MHz			5210	
			5775	
Antenna Information	Antenna	Model	Type	Max. Gain (dBi)
	ANT-0	5718A0399300	Metal PIFA Antenna	2412-2462
	ANT-1	5718A0400300		
				3.25
	G_{ANT}			2412-2462
	Directional Gain			3.13
				2412-2462
				6.14
	ANT-0	5718A0401300	Metal PIFA Antenna	5150-5250
	ANT-1	5718A0402300		
			4.97	
			5725-5850	
			4.06	
			4.60	
			4.58	
G_{ANT}			5150-5250	
			4.79	
			5725-5850	
			4.33	
Directional Gain			5150-5250	
			7.80	
			5725-5850	
			7.33	
Antenna Delivery	IEEE 802.11b / 802.11g: 2TX/2RX(CDD) IEEE 802.11n 2.4 GHz 20 MHz / 40 MHz: 2TX/2RX(MIMO/Beamforming on) IEEE 802.11a: 2TX/2RX(CDD) IEEE 802.11n 5 GHz / 802.11ac 20 MHz/ 40 MHz/ 80 MHz : 2TX/2RX(MIMO/Beamforming on)			
RF Evaluation	0.570 mW/cm ²			
Operate Temp. Range	0~40°C			

The above equipment was tested by A Test Lab Techno Corp. For compliance with the requirements set forth in 47 CFR § 2.1091 / 47 CFR § 1.1310. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

3. Human Exposure Assessment

Due to the design and installation of this product, it is not possible to conduct SAR evaluation. This is because client either manufactures or supplies the antenna(s) that will be used in the installation of this product. Therefore, this product will be evaluated as a mobile device per 47 CFR § 1.1310 titled "Radiofrequency radiation exposure limits", generally referred to as MPE limits.

In 47 CFR § 2.1091, paragraph (b) defines a mobile device 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 cm is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons." This product is intended to be installed into a vehicle such that the unit is physically secured at one location. In the installation guide supplied with the product,

Client has made the following statement: "IMPORTANT: To meet the FCC's RF Exposure Guidelines, the antenna should be installed so there is at least 20 cm of separation between the body of the user and nearby persons and the antenna". Based on the installation of the transceiver and the antenna, the transmitters radiating structure is more than 20 cm from the user. Thus, this product is a "mobile device" as defined in section § 2.1091 paragraph (b).

Exposure evaluation

$$S_{eirp} = \frac{EIRP}{4\pi d^2} = \frac{PG}{4\pi d^2} (W / m^2)$$

Where

S: is the input power (W);

G: is the antenna gain;

d : is the distance between antennas and evaluation point (m).



4. Power Density Limit – RF Exposure Evaluation

Thv In 47 CFR § 1.1310, use of the device as based upon the user's awareness and ability to exercise control over human exposure. The two categories defined are Occupational / Controlled Exposure and General Population / Uncontrolled. These two categories are defined as follow:

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)	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 / 1,500	30
1,500-100,000	-	-	1.0	30
Limits for Occupational / Controlled Exposure				
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1,842 / f	4.89 / f	(900 / f ²)*	6
30-300	61.4	0.163	1.0	6
300-1,500	-	-	F / 300	6
1,500-100,000	-	-	5	6



4.1 Conducted Power

Band	Data Rate (Mbps)	Frequency (MHz)	Average Conducted power (dBm)		
			ANT-0	ANT-1	ANT-0+1
IEEE 802.11b	1	2412.0	20.65	20.85	23.76
	6	2437.0	20.63	20.75	23.70
	11	2462.0	20.87	21.21	24.05
IEEE 802.11g	1	2412.0	16.37	16.51	19.45
	6	2437.0	20.25	20.56	23.42
	11	2462.0	16.60	16.92	19.77
IEEE 802.11n 2.4 GHz 20 MHz	3	2422.0	16.73	16.87	19.81
	6	2437.0	20.23	20.60	23.43
	9	2452.0	16.56	16.68	19.63
IEEE 802.11n 2.4 GHz 40 MHz	1	2412.0	15.80	16.06	18.94
	6	2437.0	17.82	18.20	21.02
	11	2462.0	15.26	15.70	18.50

Beamforming on

Band	Data Rate (Mbps)	Frequency (MHz)	Average Conducted power (dBm)		
			ANT-0	ANT-1	ANT-0+1
IEEE 802.11n 2.4 GHz 20 MHz	1	2412.0	13.65	13.80	16.74
	6	2437.0	17.20	17.48	20.35
	11	2462.0	13.48	13.60	16.55
IEEE 802.11n 2.4 GHz 40 MHz	3	2422.0	12.77	12.94	15.87
	6	2437.0	14.76	14.96	17.87
	9	2452.0	11.87	12.04	14.97



Band	Data Rate (Mbps)	Frequency (MHz)	Average Power (dBm)		
			ANT-0	ANT-1	ANT-0+1
IEEE 802.11a	6	5180	19.10	19.16	22.14
		5200	20.06	19.99	23.04
		5220	19.99	19.95	22.98
		5240	19.93	19.91	22.93
		5745	20.81	21.38	24.11
		5765	20.91	21.09	24.01
		5785	20.85	21.41	24.15
		5805	20.71	21.13	23.94
		5825	20.81	21.00	23.92
IEEE 802.11ac 20 MHz	13	5180	18.81	18.51	21.67
		5200	20.18	19.94	23.07
		5220	20.42	19.95	23.20
		5240	20.36	19.85	23.12
		5745	21.10	21.39	24.26
		5765	21.05	21.29	24.18
		5785	21.07	21.25	24.17
		5805	20.99	20.94	23.98
IEEE 802.11ac 40 MHz	27	5190	17.12	17.05	20.10
		5230	21.04	20.72	23.89
		5755	21.45	21.95	24.72
		5795	21.54	21.86	24.71
IEEE 802.11ac 80 MHz	58.6	5210	16.51	16.44	19.49
		5775	21.28	21.57	24.44



Beamforming on

Band	Data Rate (Mbps)	Frequency (MHz)	Average Power (dBm)		
			ANT-0	ANT-1	ANT-0+1
IEEE 802.11ac 20 MHz	13	5180	15.69	15.41	18.56
		5200	16.83	16.68	19.77
		5220	17.09	16.75	19.93
		5240	17.00	16.61	19.82
		5745	17.68	17.82	20.76
		5765	17.52	17.78	20.66
		5785	17.58	17.91	20.76
		5805	17.63	17.86	20.76
IEEE 802.11ac 40 MHz	27	5190	13.81	13.71	16.77
		5230	17.47	17.35	20.42
		5755	17.84	18.29	21.08
		5795	17.90	18.13	21.03
IEEE 802.11ac 80 MHz	58.6	5210	13.19	14.59	16.96
		5775	17.77	18.23	21.02

5. Test Result

Antenna	Band	Frequency (MHz)	Limit (w)/m ²	Distance (m) [d]	Max Tune-up Power [P] (dBm)	ANT Gain (dBi)	Numeric Gain [G]	Duty Cycle	Power with Duty cycle [TP] (mW)	Power Density [S] (w)/m ²
Wi-Fi Antenna	2.4 GHz	2412-2462	10	20	24.50	6.14	4.11	1	1158.36	0.230
	5 GHz	5150-5250	10	20	24.00	7.80	6.03	1	1514.67	0.301
		5725-5850	10	20	25.00	7.33	5.41	1	1710.79	0.340
Wi-Fi Antenna (Beamforming)	2.4 GHz	2412-2462	10	20	20.50	6.14	4.11	1	461.15	0.092
	5 GHz	5150-5250	10	20	20.50	7.80	6.03	1	676.58	0.135
		5725-5850	10	20	21.50	7.33	5.41	1	764.18	0.152

Note:

1. Mobile or fixed location transmitters, minimum separation distance is 20 cm, even if calculations indicate MPE distance is less.
2. We used the maximum power and gain to provide MPE results.
3. The Numeric Gain calculated by $10^{(\text{ant. Gain(dBi)} / 10)}$.
4. The MPE results are evaluated by lowest data rate for WLAN.

Simultaneous Transmitting :

$$\text{Total MPE} = 2.4 \text{ GHz MPE} + 5 \text{ GHz MPE} = 0.230 + 0.340 = 0.57 \text{ (mw)/cm}^2 < 1 \text{ (mw)/cm}^2$$

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