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检测
TESTING
CNAS L3163

CE RF Exposure Report

Project No.	:	2310G131
Equipment	:	AX3000 Ceiling Mount Wi-Fi 6 Access Point with 2.5G Port
Brand Name	:	Cudy
Test Model	:	AP3000
Series Model	:	AP3000_P, AP3000P
Applicant	:	Shenzhen Cudy Technology Co., Ltd.
Address	:	Room A606, Gaoxinqi Industrial Park, Liuxianyi Road, Baoan District, Shenzhen, China
Manufacturer	:	Shenzhen Cudy Technology Co., Ltd.
Address	:	Room A606, Gaoxinqi Industrial Park, Liuxianyi Road, Baoan District, Shenzhen, China
Factory	:	Shenzhen Cudy Technology Co., Ltd.
Address	:	Room A606, Gaoxinqi Industrial Park, Liuxianyi Road, Baoan District, Shenzhen, China
Date of Receipt	:	Oct. 26, 2023
Date of Test	:	Oct. 26, 2023 ~ Dec. 19, 2023
Issued Date	:	Dec. 27, 2023
Report Version	:	R00
Test Sample	:	Engineering Sample No.: SSL2023102616
Standard(s)	:	EN 50385:2017 EN IEC 62311:2020 EN 62232:2017

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.(Dongguan).

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REPORT ISSUED HISTORY

Report No.	Version	Description	Issued Date	Note
BTL-ETSP-5-2310G131	R00	Original Report.	Dec. 27, 2023	Valid

1. GENERAL INFORMATION

1.1 GENERAL DESCRIPTION OF EUT

Equipment	AX3000 Ceiling Mount Wi-Fi 6 Access Point with 2.5G Port	
Brand Name	Cudy	
Test Model	AP3000	
Series Model	AP3000_P, AP3000P	
Model Difference(s)	Only differ in model name. Model AP3000 with AC adapter. Model AP3000_P and AP3000P with PoE adapter.	
Hardware Version	V1	
Software Version	FW1.16.4	
Power Source	1# DC voltage supplied from AC adapter. Model: TPA259-18120-EU 2# DC voltage supplied from PoE adapter. Model: RP023-4800320ZG	
Power Rating	1# I/P: 100-240V~50/60Hz 0.6A O/P: 12V ⎓ 1.5A 2# I/P: 100-240V~50/60Hz 0.5A Max O/P: 48V ⎓ 0.32A	
Product Description _2.4GHz	Operation Frequency	2412 MHz ~ 2472 MHz
	Modulation Technology	IEEE 802.11b: DSSS IEEE 802.11g: OFDM IEEE 802.11n: OFDM IEEE 802.11ax: OFDMA
	Bit Rate of Transmitter	IEEE 802.11b: 11/5.5/2/1 Mbps IEEE 802.11g: 54/48/36/24/18/12/9/6 Mbps IEEE 802.11n: up to 300 Mbps IEEE 802.11ax: up to 573.6 Mbps
	Max. e.i.r.p. _Non Beamforming	IEEE 802.11b: 17.58 dBm (57.28 mW) IEEE 802.11g: 19.65 dBm (92.26 mW) IEEE 802.11n(HT20): 19.61 dBm (91.41 mW) IEEE 802.11n(HT40): 19.65 dBm (92.26 mW) IEEE 802.11ax(HE20): 19.71 dBm (93.54 mW) IEEE 802.11ax(HE40): 19.79 dBm (95.28 mW)
	Max. e.i.r.p. _Beamforming	IEEE 802.11n(HT20): 19.60 dBm (91.20 mW) IEEE 802.11n(HT40): 19.23 dBm (83.75 mW) IEEE 802.11ax(HE20): 19.25 dBm (84.14 mW) IEEE 802.11ax(HE40): 19.51 dBm (89.33 mW)

Product Description _5GHz B1-3	Operation Frequency Band(s)	5150 MHz ~ 5250 MHz 5250 MHz ~ 5350 MHz 5470 MHz ~ 5725 MHz
	Modulation Type	IEEE 802.11a/n/ac: OFDM IEEE 802.11ax: OFDMA
	Bit Rate of Transmitter	IEEE 802.11a: 54/48/36/24/18/12/9/6 Mbps IEEE 802.11n: up to 300 Mbps IEEE 802.11ac: up to 1733.4 Mbps IEEE 802.11ax: up to 2402 Mbps
	Max. e.i.r.p. _Non Beamforming	IEEE 802.11a: 29.20 dBm (831.76 mW) IEEE 802.11ac(VHT20): 29.60 dBm (912.01 mW) IEEE 802.11ac(VHT40): 29.92 dBm (981.75 mW) IEEE 802.11ac(VHT80): 29.73 dBm (939.72 mW) IEEE 802.11ac(VHT160): 29.70 dBm (933.25 mW) IEEE 802.11ax(HE20): 29.90 dBm (977.24 mW) IEEE 802.11ax(HE40): 29.77 dBm (948.42 mW) IEEE 802.11ax(HE80): 29.73 dBm (939.72 mW) IEEE 802.11ax(HE160): 29.75 dBm (944.06 mW)
	Max. e.i.r.p. _Beamforming	IEEE 802.11ac(VHT20): 28.98 dBm (790.68 mW) IEEE 802.11ac(VHT40): 29.07 dBm (807.24 mW) IEEE 802.11ac(VHT80): 29.38 dBm (866.96 mW) IEEE 802.11ac(VHT160): 29.38 dBm (866.96 mW) IEEE 802.11ax(HE20): 29.41 dBm (872.97 mW) IEEE 802.11ax(HE40): 29.71 dBm (935.41 mW) IEEE 802.11ax(HE80): 29.48 dBm (887.16 mW) IEEE 802.11ax(HE160): 28.83 dBm (763.84 mW)
Product Description _5GHz B4	Operation Frequency Band	5725 MHz ~ 5850 MHz
	Modulation Type	IEEE 802.11a/n/ac: OFDM IEEE 802.11ax: OFDMA
	Bit Rate of Transmitter	IEEE 802.11a: 54/48/36/24/18/12/9/6 Mbps IEEE 802.11n: up to 300 Mbps IEEE 802.11ac: up to 866.7 Mbps IEEE 802.11ax: up to 1201 Mbps
	Max. e.i.r.p. _Non Beamforming	IEEE 802.11a: 13.96 dBm (24.89 mW) IEEE 802.11ac(VHT20): 13.89 dBm (24.49 mW) IEEE 802.11ac(VHT40): 13.61 dBm (22.96 mW) IEEE 802.11ac(VHT80): 13.97 dBm (24.95 mW) IEEE 802.11ax(HE20): 13.96 dBm (24.89 mW) IEEE 802.11ax(HE40): 13.96 dBm (24.89 mW) IEEE 802.11ax(HE80): 13.84 dBm (24.21 mW)
	Max. e.i.r.p. _Beamforming	IEEE 802.11ac(VHT20): 13.67 dBm (23.28 mW) IEEE 802.11ac(VHT40): 13.49 dBm (22.34 mW) IEEE 802.11ac(VHT80): 13.44 dBm (22.08 mW) IEEE 802.11ax(HE20): 13.75 dBm (23.71 mW) IEEE 802.11ax(HE40): 13.71 dBm (23.50 mW) IEEE 802.11ax(HE80): 13.28 dBm (21.28 mW)

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.

2. Channel List:

For 2.4GHz:

CH01 - CH13 for IEEE 802.11b, IEEE 802.11g, IEEE 802.11n(HT20), IEEE 802.11ax(HE20) CH03 - CH11 for IEEE 802.11n(HT40), IEEE 802.11ax(HE40)					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2412	06	2437	11	2462
02	2417	07	2442	12	2467
03	2422	08	2447	13	2472
04	2427	09	2452		
05	2432	10	2457		

For 5GHz:

IEEE 802.11a IEEE 802.11n(HT20) IEEE 802.11ac(VHT20) IEEE 802.11ax(HE20)		IEEE 802.11n(HT40) IEEE 802.11ac(VHT40) IEEE 802.11ax(HE40)		IEEE 802.11ac(VHT80) IEEE 802.11ax(HE80)	
Band 1		Band 1		Band 1	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	38	5190	42	5210
40	5200	46	5230		
44	5220				
48	5240				

IEEE 802.11a IEEE 802.11n(HT20) IEEE 802.11ac(VHT20) IEEE 802.11ax(HE20)		IEEE 802.11n(HT40) IEEE 802.11ac(VHT40) IEEE 802.11ax(HE40)		IEEE 802.11ac(VHT80) IEEE 802.11ax(HE80)	
Band 2		Band 2		Band 2	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
52	5260	54	5270	58	5290
56	5280	62	5310		
60	5300				
64	5320				

IEEE 802.11a IEEE 802.11n(HT20) IEEE 802.11ac(VHT20) IEEE 802.11ax(HE20)		IEEE 802.11n(HT40) IEEE 802.11ac(VHT40) IEEE 802.11ax(HE40)		IEEE 802.11ac(VHT80) IEEE 802.11ax(HE80)	
Band 3		Band 3		Band 3	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
100	5500	102	5510	106	5530
104	5520	110	5550	122	5610
108	5540	118	5590		
112	5560	126	5630		
116	5580	134	5670		
120	5600				
124	5620				
128	5640				
132	5660				
136	5680				
140	5700				

IEEE 802.11ac(VHT160) IEEE 802.11ax(HE160)	
Channel	Frequency (MHz)
50	5250
114	5570

IEEE 802.11a IEEE 802.11n(HT20) IEEE 802.11ac(VHT20) IEEE 802.11ax(HE20)		IEEE 802.11n(HT40) IEEE 802.11ac(VHT40) IEEE 802.11ax(HE40)		IEEE 802.11ac(VHT80) IEEE 802.11ax(HE80)	
Band 4		Band 4		Band 4	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	151	5755	155	5775
153	5765	159	5795		
157	5785				
161	5805				
165	5825				

3. Table for Filed Antenna:
For 2.4GHz:

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	N/A	N/A	PCB	N/A	4.32
2	N/A	N/A	PCB	N/A	4.89

Note:
1) The EUT supports MIMO. Physically, the EUT provides two completed transmitters and receivers (2T2R).
2) Beamforming Gain: 3 dBi.
3) The antenna gain and beamforming gain are provided by the manufacturer.

For 5GHz Band 1-4:

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	N/A	N/A	PCB	N/A	5.27
2	N/A	N/A	PCB	N/A	5.69
3	N/A	N/A	PCB	N/A	4.68

Note:

1) The EUT supports MIMO. Physically, the EUT provides three completed transmitters and receivers (3T3R).
2) Beamforming Gain: 3 dBi.
3) The antenna gain and beamforming gain are provided by the manufacturer.
4) Any one of the three antennas is used as an intelligent switching antenna, and the antenna data stream is NSS2 when used.

4. The worst case for 2TX/3TX as follow:

For 2.4GHz:

Non Beamforming:

Operating Mode / TX Mode	2TX
IEEE 802.11b	V (Ant. 1+Ant. 2)
IEEE 802.11g	V (Ant. 1+Ant. 2)
IEEE 802.11n(HT20)	V (Ant. 1+Ant. 2)
IEEE 802.11n(HT40)	V (Ant. 1+Ant. 2)
IEEE 802.11ax(HE20)	V (Ant. 1+Ant. 2)
IEEE 802.11ax(HE40)	V (Ant. 1+Ant. 2)

Beamforming:

Operating Mode / TX Mode	2TX
IEEE 802.11n(HT20)	V (Ant. 1+Ant. 2)
IEEE 802.11n(HT40)	V (Ant. 1+Ant. 2)
IEEE 802.11ax(HE20)	V (Ant. 1+Ant. 2)
IEEE 802.11ax(HE40)	V (Ant. 1+Ant. 2)

For 5GHz:
Non Beamforming:

Operating Mode / TX Mode	3TX
IEEE 802.11a	V (Ant. 1+Ant. 2+Ant. 3)
IEEE 802.11n(HT20)	V (Ant. 1+Ant. 2+Ant. 3)
IEEE 802.11n(HT40)	V (Ant. 1+Ant. 2+Ant. 3)
IEEE 802.11ac(VHT20)	V (Ant. 1+Ant. 2+Ant. 3)
IEEE 802.11ac(VHT40)	V (Ant. 1+Ant. 2+Ant. 3)
IEEE 802.11ac(VHT80)	V (Ant. 1+Ant. 2+Ant. 3)
IEEE 802.11ac(VHT160)	V (Ant. 1+Ant. 2+Ant. 3)
IEEE 802.11ax(HE20)	V (Ant. 1+Ant. 2+Ant. 3)
IEEE 802.11ax(HE40)	V (Ant. 1+Ant. 2+Ant. 3)
IEEE 802.11ax(HE80)	V (Ant. 1+Ant. 2+Ant. 3)
IEEE 802.11ax(HE160)	V (Ant. 1+Ant. 2+Ant. 3)

Beamforming:

Operating Mode / TX Mode	3TX
IEEE 802.11n(HT20)	V (Ant. 1+Ant. 2+Ant. 3)
IEEE 802.11n(HT40)	V (Ant. 1+Ant. 2+Ant. 3)
IEEE 802.11ac(VHT20)	V (Ant. 1+Ant. 2+Ant. 3)
IEEE 802.11ac(VHT40)	V (Ant. 1+Ant. 2+Ant. 3)
IEEE 802.11ac(VHT80)	V (Ant. 1+Ant. 2+Ant. 3)
IEEE 802.11ac(VHT160)	V (Ant. 1+Ant. 2+Ant. 3)
IEEE 802.11ax(HE20)	V (Ant. 1+Ant. 2+Ant. 3)
IEEE 802.11ax(HE40)	V (Ant. 1+Ant. 2+Ant. 3)
IEEE 802.11ax(HE80)	V (Ant. 1+Ant. 2+Ant. 3)
IEEE 802.11ax(HE160)	V (Ant. 1+Ant. 2+Ant. 3)

For 5GHz B4:
Non Beamforming:

Operating Mode / TX Mode	3TX
IEEE 802.11a	V (Ant. 1+Ant. 2+Ant. 3)
IEEE 802.11n(HT20)	V (Ant. 1+Ant. 2+Ant. 3)
IEEE 802.11n(HT40)	V (Ant. 1+Ant. 2+Ant. 3)
IEEE 802.11ac(VHT20)	V (Ant. 1+Ant. 2+Ant. 3)
IEEE 802.11ac(VHT40)	V (Ant. 1+Ant. 2+Ant. 3)
IEEE 802.11ac(VHT80)	V (Ant. 1+Ant. 2+Ant. 3)
IEEE 802.11ax(HE20)	V (Ant. 1+Ant. 2+Ant. 3)
IEEE 802.11ax(HE40)	V (Ant. 1+Ant. 2+Ant. 3)
IEEE 802.11ax(HE80)	V (Ant. 1+Ant. 2+Ant. 3)

Beamforming:

Operating Mode / TX Mode	3TX
IEEE 802.11n(HT20)	V (Ant. 1+Ant. 2+Ant. 3)
IEEE 802.11n(HT40)	V (Ant. 1+Ant. 2+Ant. 3)
IEEE 802.11ac(VHT20)	V (Ant. 1+Ant. 2+Ant. 3)
IEEE 802.11ac(VHT40)	V (Ant. 1+Ant. 2+Ant. 3)
IEEE 802.11ac(VHT80)	V (Ant. 1+Ant. 2+Ant. 3)
IEEE 802.11ax(HE20)	V (Ant. 1+Ant. 2+Ant. 3)
IEEE 802.11ax(HE40)	V (Ant. 1+Ant. 2+Ant. 3)
IEEE 802.11ax(HE80)	V (Ant. 1+Ant. 2+Ant. 3)

2. MAXIMUM PERMISSIBLE EXPOSURE

2.1 APPLICABLE STANDARD

According to its specifications, the EUT must comply with the requirements of the following standards:

EN 50385 - Product standard to demonstrate the compliance of base station equipment with radiofrequency electromagnetic field exposure limits (110 MHz - 100 GHz), when placed on the market

EN IEC 62311 - Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz to 300 GHz)

EN 62232 - Determination of RF field strength, power density and SAR in the vicinity of radio communication base stations for the purpose of evaluating human exposure

1 LIMIT

Council Recommendation 1999/519/EC Annex III
Reference levels for electric, magnetic and electromagnetic fields (0Hz to 300GHz)

Frequency range	E-field strength (V/m)	H-field strength (A/m)	B-field (μT)	Equivalent plane wave power density S_{eq} (W/m^2)
0-1 Hz	—	$3,2 \times 10^4$	4×10^4	—
1-8 Hz	10 000	$3,2 \times 10^4/f^2$	$4 \times 10^4/f^2$	—
8-25 Hz	10 000	4 000/f	5 000/f	—
0,025-0,8 kHz	250/f	4/f	5/f	—
0,8-3 kHz	250/f	5	6,25	—
3-150 kHz	87	5	6,25	—
0,15-1 MHz	87	0,73/f	0,92/f	—
1-10 MHz	$87/f^{1/2}$	0,73/f	0,92/f	—
10-400 MHz	28	0,073	0,092	2
400-2 000 MHz	$1,375\ f^{1/2}$	$0,0037\ f^{1/2}$	$0,0046\ f^{1/2}$	f/200
2-300 GHz	61	0,16	0,20	10

2 MPE Calculation Method

If a reflecting ground plane is present (e.g. see Figure B.14), use Equation (B.18):

$$S = (1+|\Gamma|)^2 \frac{\overline{P}_{net} G_{\theta,\phi}}{4\pi r^2} \quad \text{(B.18)}$$

with reflection coefficient $|\Gamma| = 1$ for the theoretical highest field strength scenario of a perfectly conducting ground plane (e.g. flat metallic roof) or with reflection coefficient $|\Gamma| = 0{,}6$ for typical [15] ground reflection conditions. Use of the far-field spherical formulas in the near-field region will overestimate the field strength levels.

| Γ | = 0.6

$\overline{P}_{net}$ = Output Power (W)

$G_{\theta,\phi}$ = EUT Antenna gain (Linear ratio)

e.i.r.p. (W) = $\overline{P}_{net} * G_{\theta,\phi}$

r=0.20m, as the calculated distance.

3. TEST RESULTS

For 2.4GHz_Non Beamforming:

Max. e.i.r.p. (dBm)	Max. e.i.r.p. (W)	Power density (W/m²)	Limit (W/m²)	Result
19.79	0.0953	0.4855	10	Pass

For 2.4GHz_Beamforming:

Max. e.i.r.p. (dBm)	Max. e.i.r.p. (W)	Power density (W/m²)	Limit (W/m²)	Result
19.60	0.0912	0.4647	10	Pass

For 5GHz Band 1-3_Non Beamforming:

Max. e.i.r.p. (dBm)	Max. e.i.r.p. (W)	Power density (W/m²)	Limit (W/m²)	Result
29.92	0.9817	5.0025	10	Pass

For 5GHz Band 1-3_ Beamforming:

Max. e.i.r.p. (dBm)	Max. e.i.r.p. (W)	Power density (W/m²)	Limit (W/m²)	Result
29.71	0.9354	4.7664	10	Pass

For 5GHz Band 4_Non Beamforming:

Max. e.i.r.p. (dBm)	Max. e.i.r.p. (W)	Power density (W/m²)	Limit (W/m²)	Result
13.97	0.0249	0.1271	10	Pass

For 5GHz Band 4_Beamforming:

Max. e.i.r.p. (dBm)	Max. e.i.r.p. (W)	Power density (W/m²)	Limit (W/m²)	Result
13.75	0.0237	0.1208	10	Pass

Conclusion:

Both of the 2.4GHz, 5GHz device can transmit simultaneously, the formula of calculated the exposure is:

(CPD 1 / LPD1) + (CPD2 / LPD2) + ……etc. < 1
CPD = Calculation Power Density
LPD = Limit of Power Density

Therefore, the calculation of this situation is (0.4855 / 10) + (5.0025 / 10) =0.55, which is less than the “1” limit.

RF exposure assessment has been performed above to prove that this unit will not generate the harmful EM emission above the reference level as specified in EC Council Recommendation (1999/519/EC).

End of Test Report