

FCC RF EXPOSURE REPORT

FCC ID: QISAP4050DN-HD

Project No. : 1605C043A
Equipment : Wireless LAN Access Point
Model : AP4050DN-HD
Applicant : Huawei Technologies Co.,Ltd.
**Address : Administration Building, Headquarters of Huawei
Technologies Co., Ltd., Bantian, Longgang District
Shenzhen China**
According: : FCC Guidelines for Human Exposure IEEE C95.1

B T L I N C .

No.3, Jinshagang 1st Road, Shixia, Dalang Town, Dongguan, China.
TEL: +86-769-8318-3000 FAX: +86-769-8319-6000

MPE CALCULATION METHOD:

Calculation Method of RF Safety Distance:

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

where:

S = power density

P = power input to the antenna

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

R = distance to the center of radiation of the antenna

Table for Filed Antenna

2.4G

For 1TX

Ant.	Brand	Model Name	Antenna Type	Connector	Gain(dBi)
1	ShengLu	SL12006A	Internal	N/A	13.67

Note:

Antenna Gain=13.67 dBi. So, the out power limit is $30-13.67+6=22.33$, the power density limit is $8-13.67+6=0.33$.

For 2TX

Ant.	Brand	Model Name	Antenna Type	Connector	Gain(dBi)
1	ShengLu	SL12006A	Internal	N/A	13.67
2	ShengLu	SL12006A	Internal	N/A	13.67

Note:

(1) The EUT incorporates a MIMO function. Physically, the EUT provides two completed transmitters and receivers (2T2R), all transmit signals are completely uncorrelated, then,

Direction gain = G_{ANT} , that is Directional gain=13.67.

the out power limit is $30-13.67+6=22.33$, the power density limit is $8-13.67+6=0.33$.

Remark:

For 2TX with beamforming

The EUT with beamforming function, then, Direction gain = $G_{ANT} + 10\log(N_{ANT}/N_{SS})$, where N_{SS} = the number of independent spatial streams of data.

Directional gain= $13.67+10\log(2/2)=13.67 - 0 = 13.67$ dBi.

5G

For 1TX

Ant.	Brand	Model Name	Antenna Type	Connector	Gain(dBi)
1	ShengLu	SL12006A	Internal	N/A	11.63

Note:

(1) Antenna Gain=11.63dBi. So,the UNII-2A, UNII-2C out power limit is $24-11.63+6=18.37$, the UNII-1, UNII-3 output power limit is $30-11.63+6=24.37$.

The UNII-1 power density limit is $17-11.63+6=11.37$, the UNII-2A,UNII-2C power density limit is $11-11.63+6=5.37$, the UNII-3 power density limit is $30-11.63+6=24.37$.

For 2TX

Ant.	Brand	Model Name	Antenna Type	Connector	Gain(dBi)
1	ShengLu	SL12006A	Internal	N/A	11.63
2	ShengLu	SL12006A	Internal	N/A	11.63

Note:

(1) The EUT incorporates a MIMO function. Physically, the EUT provides two completed transmitters and receivers (2T2R), all transmit signals are completely uncorrelated, then, Direction gain = G_{ANT} , that is Directional gain=11.63.

So for fixed device, the UNII-2A, UNII-2C out power limit is $24-11.63+6=18.37$, the UNII-1, UNII-3 output power limit is $30-11.63+6=24.37$. The UNII-1 power density limit is $17-11.63+6=11.37$, the UNII-2A,UNII-2C power density limit is $11-11.63+6=5.37$, the UNII-3 power density limit is $30-11.63+6=24.37$.

Remark:

For 2TX with beamforming

The EUTwith beamforming function, then, Direction gain = $G_{ANT} + 10\log(N_{ANT}/N_{SS})$, where N_{SS} = the number of independent spatial streams of data.

Directional gain= $2.7+10\log(2/2)=11.63 - 0 =11.63$ dBi.

TEST RESULTS

2.4G

EUT :	Wireless LAN Access Point	Model Name :	AP4050DN-HD
Temperature :	25 °C	Relative Humidity:	55 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX B MODE / CH01, CH06, CH11-Ant 1+Ant 2		

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
13.67	23.2809	15.51	35.5631	0.10547034	1	Complies
13.67	23.2809	21.78	150.6607	0.44681767	1	Complies
13.67	23.2809	15.37	34.4350	0.10212459	1	Complies

2.4G 2TX with Beamforming

EUT :	Wireless LAN Access Point	Model Name :	AP4050DN-HD
Temperature:	25 °C	Relative Humidity:	55 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX N40 MODE / CH03, CH06, CH9-Ant 1+Ant 2		

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
13.67	23.2809	13.26	21.1836	0.06282469	1	Complies
13.67	23.2809	20.20	104.7129	0.31054915	1	Complies
13.67	23.2809	13.17	20.7491	0.06153615	1	Complies

UNII-1

EUT :	Wireless LAN Access Point	Model Name :	AP4050DN-HD
Temperature:	22 °C	Relative Humidity:	56 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX 802.11ac Wave2(40MHz) Mode / CH38, CH46-Ant 1+Ant 2		

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
11.63	14.5546	23.08	203.2357	0.37681687	1	Complies
11.63	14.5546	22.97	198.1527	0.36739255	1	Complies

UNII-1 2TX with Beamforming

EUT :	Wireless LAN Access Point	Model Name :	AP4050DN-HD
Temperature:	22 °C	Relative Humidity:	56 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX 802.11ac Wave2(80MHz) / CH42-Ant 1+Ant 2		

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
11.63	14.5546	20.89	122.7439	0.22757804	1	Complies

UNII-2A

EUT :	Wireless LAN Access Point	Model Name :	AP4050DN-HD
Temperature:	22 °C	Relative Humidity:	56 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX 802.11ac Wave2(80MHz) / CH58-Ant 1+Ant 2		

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
11.63	14.5546	18.03	63.5331	0.11779595	1	Complies

UNII-2A 2TX with Beamforming

EUT :	Wireless LAN Access Point	Model Name :	AP4050DN-HD
Temperature:	22 °C	Relative Humidity:	56 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX 802.11ac Wave2(80MHz) / CH58-Ant 2		

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
11.63	14.5546	14.94	31.1889	0.05782696	1	Complies

UNII-2C

EUT :	Wireless LAN Access Point	Model Name :	AP4050DN-HD
Temperature:	22 °C	Relative Humidity:	56 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX 802.11ac Wave2(80MHz) / CH106, CH122		

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
11.63	14.5546	17.88	61.3762	0.11379688	1	Complies
11.63	14.5546	18.01	63.2412	0.11725472	1	Complies

UNII-2C 2TX with Beamforming

EUT :	Wireless LAN Access Point	Model Name :	AP4050DN-HD
Temperature:	22 °C	Relative Humidity:	56 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX 802.11ac Wave2(80MHz) / CH106, CH122 - Ant 2		

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
11.63	14.5546	14.81	30.2691	0.05612164	1	Complies
11.63	14.5546	14.96	31.3329	0.05809387	1	Complies

UNII-3

EUT :	Wireless LAN Access Point	Model Name :	AP4050DN-HD
Temperature:	22 °C	Relative Humidity:	56 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX 802.11n(20MHz) Mode / CH149, CH157, CH165-Ant 1+Ant 2		

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
11.63	14.5546	23.33	215.2782	0.39914468	1	Complies
11.63	14.5546	23.39	218.2730	0.40469733	1	Complies
11.63	14.5546	23.33	215.2782	0.39914468	1	Complies

UNII-3 2TX with beamforming

EUT :	Wireless LAN Access Point	Model Name :	AP4050DN-HD
Temperature:	22 °C	Relative Humidity:	56 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX 802.11ac Wave2(80MHz) / CH155-Ant 1+Ant 2		

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
11.63	14.5546	20.99	125.6030	0.23287901	1	Complies

For 2.4G+5G simultaneous transmission MPE:

$$0.4468/1+0.4047/1=0.8515<1$$

Note: the calculated distance is 25 cm.