

# **FCC RF EXPOSURE REPORT**

**FCC ID: QISAP5030DN**

**Project No. : 1505C259C**  
**Equipment : Wireless LAN Access Point**  
**Model : AP5030DN**  
**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 .**

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## 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

Ant.	Manufacturer	Model Name	Antenna Type	Connector	Gain (dBi)	Note
A	Nippon Antenna (China) Co.,LTD.	C15N13Z100BB	Internal Antenna	U.FL	4.5	2.4G
B	Nippon Antenna (China) Co.,LTD.	C15N13Z100BB	Internal Antenna	U.FL	4.5	2.4G
C	Nippon Antenna (China) Co.,LTD.	C15N13Z100BB	Internal Antenna	U.FL	4.5	2.4G

Note:

1. The EUT incorporates a MIMO function. Physically, the EUT provides three completed transmitters and receivers (3T3R).

2. ANT A for 1TX was found to be the worst case and recorded.

Operating Mode TX Mode	1TX	2TX	3TX
802.11b	V (ANT A)	V (ANT A + ANT B)	V (ANT A + ANT B + ANT C)
802.11g	V (ANT A)	V (ANT A + ANT B)	V (ANT A + ANT B + ANT C)
802.11n(20MHz)	V (ANT A)	V (ANT A + ANT B)	V (ANT A + ANT B + ANT C)
802.11n(40MHz)	V (ANT A)	V (ANT A + ANT B)	V (ANT A + ANT B + ANT C)

Remark:

For 2TX with beamforming

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

Directional gain =  $4.5 + 10\log(3/2) = 4.5 + 1.76 = 6.26$ .

For 3TX with beamforming

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

Directional gain =  $4.5 + 10\log(3/3) = 4.5 + 0 = 4.5$ .

## 5G

Ant.	Manufacturer	Model Name	Antenna Type	Connector	Gain (dBi)	Note
A	Nippon Antenna (China) Co.,LTD.	C15N13Z100BB	Internal Antenna	U.FL	5.5	5G
B	Nippon Antenna (China) Co.,LTD.	C15N13Z100BB	Internal Antenna	U.FL	5.5	5G
C	Nippon Antenna (China) Co.,LTD.	C15N13Z100BB	Internal Antenna	U.FL	5.5	5G

**Note:**

1. The EUT incorporates a MIMO function. Physically, the EUT provides three completed transmitters and receivers (3T3R).
2. ANT A for 1TX was found to be the worst case and recorded.

Operating Mode / TX Mode	1TX	2TX	3TX
802.11b	V (ANT A)	V (ANT A + ANT B)	V (ANT A + ANT B + ANT C)
802.11g	V (ANT A)	V (ANT A + ANT B)	V (ANT A + ANT B + ANT C)
802.11n(20MHz)	V (ANT A)	V (ANT A + ANT B)	V (ANT A + ANT B + ANT C)
802.11n(40MHz)	V (ANT A)	V (ANT A + ANT B)	V (ANT A + ANT B + ANT C)

**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 =  $5.5 + 10\log(3/2) = 5.5 + 1.76 = 7.26$ .

For 3TX 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 =  $5.5 + 10\log(3/3) = 5.5 + 0 = 5.5$ .

# TEST RESULTS

## 2.4G

EUT :	Wireless LAN Access Point	Model Name :	AP5030DN
Temperature:	25 °C	Relative Humidity:	55 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX N-40M MODE_Total /CH03, CH06, CH09		

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm <sup>2</sup> )	Limit of Power Density (S) (mW/cm <sup>2</sup> )	Test Result
4.5	2.8184	20.40	109.6478	0.06151066	1	Complies
4.5	2.8184	22.53	179.0606	0.10045010	1	Complies
4.5	2.8184	20.25	105.9254	0.05942242	1	Complies

## 2.4G 2TX with beamforming

EUT :	Wireless LAN Access Point	Model Name :	AP5030DN
Temperature:	25 °C	Relative Humidity:	55 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX N-40M MODE_Ant A+Ant B /CH03, CH06, CH09		

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm <sup>2</sup> )	Limit of Power Density (S) (mW/cm <sup>2</sup> )	Test Result
6.26	4.2267	17.15	51.8800	0.04364660	1	Complies
6.26	4.2267	18.58	72.1107	0.06066670	1	Complies
6.26	4.2267	17.27	53.3335	0.04486941	1	Complies

## 2.4G 3TX with beamforming

EUT :	Wireless LAN Access Point	Model Name :	AP5030DN
Temperature:	25 °C	Relative Humidity:	55 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX N-40M MODE_Total /CH03, CH06, CH09		

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm <sup>2</sup> )	Limit of Power Density (S) (mW/cm <sup>2</sup> )	Test Result
4.5	2.8184	17.15	51.8800	0.02910385	1	Complies
4.5	2.8184	19.38	86.6962	0.04863516	1	Complies
4.5	2.8184	17.30	53.7032	0.03012662	1	Complies

## UNII-1

EUT :	Wireless LAN Access Point	Model Name :	AP5030DN
Temperature:	25 °C	Relative Humidity:	55 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX AC40 MODE_ Ant A+Ant B / CH38, CH46		

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm <sup>2</sup> )	Limit of Power Density (S) (mW/cm <sup>2</sup> )	Test Result
5.5	3.5481	12.89	19.4536	0.01373885	1	Complies
5.5	3.5481	15.93	39.1742	0.02766625	1	Complies

## UNII-1 2TX with beamforming

EUT :	Wireless LAN Access Point	Model Name :	AP5030DN
Temperature:	25 °C	Relative Humidity:	55 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX AC40 MODE_ Ant A+Ant B / CH38, CH46		

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm <sup>2</sup> )	Limit of Power Density (S) (mW/cm <sup>2</sup> )	Test Result
7.26	5.3211	9.69	9.3111	0.00986167	1	Complies
7.26	5.3211	12.90	19.4984	0.02065144	1	Complies

## UNII-1 3TX with beamforming

EUT :	Wireless LAN Access Point	Model Name :	AP5030DN
Temperature:	25 °C	Relative Humidity:	55 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX N-40M MODE_Total / CH38, CH46		

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm <sup>2</sup> )	Limit of Power Density (S) (mW/cm <sup>2</sup> )	Test Result
7.26	5.3211	9.44	8.7902	0.00931001	1	Complies
7.26	5.3211	12.62	18.2810	0.01936201	1	Complies

## UNII-2A

EUT :	Wireless LAN Access Point	Model Name :	AP5030DN
Temperature:	25 °C	Relative Humidity:	55 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX AC40 MODE_Ant A/ CH54, CH62		

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm <sup>2</sup> )	Limit of Power Density (S) (mW/cm <sup>2</sup> )	Test Result
5.5	3.5481	15.65	36.7282	0.02593883	1	Complies
5.5	3.5481	12.50	17.7828	0.01255886	1	Complies

## UNII-2A 2TX with beamforming

EUT :	Wireless LAN Access Point	Model Name :	AP5030DN
Temperature:	25 °C	Relative Humidity:	55 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX AC40 MODE_Ant A+Ant B/ CH54, CH62		

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm <sup>2</sup> )	Limit of Power Density (S) (mW/cm <sup>2</sup> )	Test Result
7.26	5.3211	12.84	19.2309	0.02036809	1	Complies
7.26	5.3211	9.73	9.3972	0.00995292	1	Complies

## UNII-2A 3TX with beamforming

EUT :	Wireless LAN Access Point	Model Name :	AP5030DN
Temperature:	25 °C	Relative Humidity:	55 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX AC40 MODE_Ant A+Ant B/ CH54, CH62		

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm <sup>2</sup> )	Limit of Power Density (S) (mW/cm <sup>2</sup> )	Test Result
5.5	3.5481	12.57	18.0717	0.01276293	1	Complies
5.5	3.5481	9.56	9.0365	0.00638191	1	Complies

## UNII-2C

EUT :	Wireless LAN Access Point	Model Name :	AP5030DN
Temperature:	25 °C	Relative Humidity:	55 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX AC40 MODE_ Ant A+Ant B// CH102, CH110, CH134		

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm <sup>2</sup> )	Limit of Power Density (S) (mW/cm <sup>2</sup> )	Test Result
5.5	3.5481	15.44	34.9945	0.02471442	1	Complies
5.5	3.5481	15.54	35.8096	0.02529009	1	Complies
5.5	3.5481	15.88	38.7258	0.02734956	1	Complies

## UNII-2C 2TX with beamforming

EUT :	Wireless LAN Access Point	Model Name :	AP5030DN
Temperature:	25 °C	Relative Humidity:	55 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX AC40 MODE_ Ant A+Ant B/ CH102, CH110, CH134		

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm <sup>2</sup> )	Limit of Power Density (S) (mW/cm <sup>2</sup> )	Test Result
7.26	5.3211	12.82	19.1426	0.02027451	1	Complies
7.26	5.3211	12.70	18.6209	0.01972197	1	Complies
7.26	5.3211	12.76	18.8799	0.01999633	1	Complies

## UNII-2C 3TX with beamforming

EUT :	Wireless LAN Access Point	Model Name :	AP5030DN
Temperature:	25 °C	Relative Humidity:	55 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX AC40 MODE_ Total/ CH102, CH110, CH134		

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm <sup>2</sup> )	Limit of Power Density (S) (mW/cm <sup>2</sup> )	Test Result
5.5	3.5481	12.41	17.4181	0.01230128	1	Complies
5.5	3.5481	12.50	17.7828	0.01255886	1	Complies
5.5	3.5481	12.52	17.8649	0.01261683	1	Complies

### UNII-3

EUT :	Wireless LAN Access Point	Model Name :	AP5030DN
Temperature:	25 °C	Relative Humidity:	55 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX AC40 MODE_Ant A/ CH151, CH159		

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm <sup>2</sup> )	Limit of Power Density (S) (mW/cm <sup>2</sup> )	Test Result
5.5	3.5481	15.54	35.8096	0.02529009	1	Complies
5.5	3.5481	15.89	38.8150	0.02741261	1	Complies

### UNII-3 2TX with beamforming

EUT :	Wireless LAN Access Point	Model Name :	AP5030DN
Temperature:	25 °C	Relative Humidity:	55 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX AC40 MODE_Ant A+Ant B/ CH151, CH159		

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm <sup>2</sup> )	Limit of Power Density (S) (mW/cm <sup>2</sup> )	Test Result
7.26	5.3211	12.7	18.6209	0.01972197	1	Complies
7.26	5.3211	12.76	18.8799	0.01999633	1	Complies

### UNII-3 3TX with beamforming

EUT :	Wireless LAN Access Point	Model Name :	AP5030DN
Temperature:	25 °C	Relative Humidity:	55 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX AC40 MODE_Total / CH151, CH159		

Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm <sup>2</sup> )	Limit of Power Density (S) (mW/cm <sup>2</sup> )	Test Result
5.5	3.5481	12.44	17.5388	0.01238655	1	Complies
5.5	3.5481	12.46	17.6198	0.01244372	1	Complies

**For 2.4G+5G simultaneous transmission MPE:**

$$0.1005/1+0.0277/1=0.1282 < 1$$

Note: the calculated distance is 20 cm.