

FCC RF EXPOSURE REPORT

FCC ID: QISAP6050DN6150DN

Project No. : 1604C201B
Equipment : Wireless LAN Access Point
Model : AP6050DN
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:

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

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)
1	上海旌泓通信技术有限公司	N/A	Internal	U.FL	6.53
2	上海旌泓通信技术有限公司	N/A	Internal	U.FL	6.53
3	上海旌泓通信技术有限公司	N/A	Internal	U.FL	6.53
4	上海旌泓通信技术有限公司	N/A	Internal	U.FL	6.53

Note:

- (1) The EUT incorporates a MIMO function. Physically, the EUT provides four completed transmitters and receivers (4T4R), all transmit signals are completely uncorrelated, then, **Direction gain = G_{ANT}**, that is Directional gain=6.53.
The out power limit is 30-6.53+6=29.47, the power density limit is 8-6.53+6=7.47.
- (2) **For 2TX with beamforming:**
The EUT with beamforming function, then, Direction gain = G_{ANT}+10log(N_{ANT}/N_{SS}), where N_{SS} = the number of independent spatial streams of data.
For 2TX with beamforming: Directional gain=6.53+10log(2/2)=6.53+0=6.53 dBi.
The out power limit is 30-6.53+6=29.47, the power density limit is 8-6.53+6=7.47.
- (3) **For 3TX with beamforming:**
The EUT with beamforming function, then, Direction gain = G_{ANT}+10log(N_{ANT}/N_{SS}), where N_{SS} = the number of independent spatial streams of data.
For 3TX with beamforming: Directional gain=6.53+10log(3/3)=6.53 +0=6.53 dBi.
The out power limit is 30-6.53+6=29.47, the power density limit is 8-6.53+6=7.47.
- (4) **For 4TX with beamforming:**
The EUT with beamforming function, then, Direction gain = G_{ANT}+10log(N_{ANT}/N_{SS}), where N_{SS} = the number of independent spatial streams of data.
For 4TX with beamforming: Directional gain=6.53+10log(4/4)=6.53 + 0=6.53 dBi.
The out power limit is 30-6.53+6=29.47, the power density limit is 8-6.53+6=7.47.

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

Operating Mode TX Mode	3TX	4TX
802.11b	V (ANT 1+ANT 2+ANT 3)	V (ANT 1+ANT 2+ ANT 3+ANT 4)
802.11g	V (ANT 1+ANT 2+ANT 3)	V (ANT 1+ANT 2+ ANT 3+ANT 4)
802.11n(20MHz)	V (ANT 1+ANT 2+ANT 3)	V (ANT 1+ANT 2+ ANT 3+ANT 4)
802.11n(40MHz)	V (ANT 1+ANT 2+ANT 3)	V (ANT 1+ANT 2+ ANT 3+ANT 4)

5G

Ant.	Manufacturer	Model Name	Antenna Type	Connector	Gain (dBi)
1	上海旌泓通信技术有限公司	N/A	Internal	U.FL	6.58
2	上海旌泓通信技术有限公司	N/A	Internal	U.FL	6.58
3	上海旌泓通信技术有限公司	N/A	Internal	U.FL	6.58
4	上海旌泓通信技术有限公司	N/A	Internal	U.FL	6.58

Note:

(1) The EUT incorporates a MIMO function. Physically, the EUT provides three completed transmitters and receivers (4T4R), all transmit signals are completely uncorrelated, then, Direction gain = G_{ANT} , that is Directional gain=6.58. So for fixed device, the UNII-1,UNII-3 output power limit is $30-6.58+6=29.42$.

The UNII-1 power density limit is $17-6.58+6=16.42$, the UNII-3 power density limit is $30-6.58+6=29.42$.

(2) 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.

For 2TX with beamforming: Directional gain= $6.58+10\log(2/2)=6.58+0=6.58$ dBi.

So for fixed device, the UNII-1,UNII-3 output power limit is $30-6.58+6=29.42$. The UNII-1 power density limit is $17-6.58+6=16.42$, the UNII-3 power density limit is $30-6.58+6=29.42$.

(3) 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.

For 3TX with beamforming: Directional gain= $6.58+10\log(3/3)=6.58+0=6.58$ dBi.

So for fixed device, the UNII-1,UNII-3 output power limit is $30-6.58+6=29.42$. The UNII-1 power density limit is $17-6.58+6=16.42$, the UNII-3 power density limit is $30-6.58+6=29.42$.

(4) For 4TX 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.

For 4TX with beamforming: Directional gain= $6.58+10\log(4/4)=6.58 + 0=6.58$ dBi.

So for fixed device, the UNII-1,UNII-3 output power limit is $30-6.58+6=29.42$. The UNII-1 power density limit is $17-6.58+6=16.42$, the UNII-3 power density limit is $30-6.58+6=29.42$.

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

Operating Mode	TX Mode	
	3TX	4TX
802.11b	V (ANT 1+ANT 2+ANT 3)	V (ANT 1+ANT 2+ ANT 3+ANT 4)
802.11g	V (ANT 1+ANT 2+ANT 3)	V (ANT 1+ANT 2+ ANT 3+ANT 4)
802.11n(20MHz)	V (ANT 1+ANT 2+ANT 3)	V (ANT 1+ANT 2+ ANT 3+ANT 4)
802.11n(40MHz)	V (ANT 1+ANT 2+ANT 3)	V (ANT 1+ANT 2+ ANT 3+ANT 4)

TEST RESULTS

2.4G

EUT :	Wireless LAN Access Point	Model Name :	AP6050DN
Temperature :	25 °C	Relative Humidity:	55 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX B MODE / CH01, CH06, CH11-Ant 1+Ant 2+Ant 3+Ant 4		

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
6.53	4.4978	25.82	381.9443	0.21884183	1	Complies
6.53	4.4978	25.83	382.8247	0.21934632	1	Complies
6.53	4.4978	25.81	381.0658	0.21833851	1	Complies

2.4G 2TX with Beamforming

EUT :	Wireless LAN Access Point	Model Name :	AP6050DN
Temperature:	25 °C	Relative Humidity:	55 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX N20 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
6.53	4.4978	16.10	40.7380	0.02334158	1	Complies
6.53	4.4978	20.94	124.1652	0.07114270	1	Complies
6.53	4.4978	15.12	32.5087	0.01862646	1	Complies

UNII-1

EUT :	Wireless LAN Access Point	Model Name :	AP6050DN
Temperature:	25 °C	Relative Humidity:	60 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX A MODE / CH36, CH40, CH48-Ant 1+Ant 2+Ant 3+Ant 4		

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
6.58	4.5499	21.01	126.1828	0.07313586	1	Complies
6.58	4.5499	25.07	321.3661	0.18626461	1	Complies
6.58	4.5499	25.01	316.9567	0.18370896	1	Complies

UNII-1 4TX with Beamforming

EUT :	Wireless LAN Access Point	Model Name :	AP6050DN
Temperature:	25 °C	Relative Humidity:	60 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX N40 MODE / CH38, CH46-Ant 1+Ant 2+Ant 3+Ant 4		

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
6.58	4.5499	15.97	39.5367	0.02291555	1	Complies
6.58	4.5499	19.99	99.7700	0.05782696	1	Complies

UNII-3

EUT :	Wireless LAN Access Point	Model Name :	AP6050DN
Temperature:	25 °C	Relative Humidity:	60 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX A MODE / CH149, CH157, CH165-Ant 1+Ant 2+Ant 3+Ant 4		

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
6.58	4.5499	24.90	309.0295	0.17911433	1	Complies
6.58	4.5499	25.02	317.6874	0.18413245	1	Complies
6.58	4.5499	25.05	319.8895	0.18540880	1	Complies

UNII-3 4TX with beamforming

EUT :	Wireless LAN Access Point	Model Name :	AP6050DN
Temperature:	25 °C	Relative Humidity:	60 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX AC Wave2(80 MHz) MODE / CH155-Ant 1+Ant 2+Ant 3+Ant 4		

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
6.58	4.5499	20.13	103.0386	0.05972145	1	Complies

For 2.4G+5G simultaneous transmission MPE:

$$0.2193/1+0.1863/1=0.4056<1$$

Note: the calculated distance is 25 cm.