

FCC RF EXPOSURE REPORT

FCC ID: QISAP6050DN6150DN

Project No. : 1604C201C
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

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 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:

The EUT incorporates a MIMO function. Physically, the EUT provides three completed transmitters and receivers (4T4R), all transmit signals are completely correlated, then, Direction gain = G_{ANT}, that is Directional gain=6.58. So for fixed device, the UNII-2A, UNII-2C output power limit is 24-6.58+6=23.42.

The UNII-2A power density limit is 11-6.58+6=10.42, the UNII-2C power density limit is 11-6.58+6=10.42.

Remark: When antenna gain is larger than 6dBi, for every 1 dBi increase in gain, the power limit is reduced by 1 dBm.

(1) For 2TX without beamforming:

The EUT with beamforming function, then, Direction gain = G_{ANT}+10log(N_{ANT}/N_{SS}).

For 2TX without beamforming: Directional gain=6.58+10log(2/2)=6.58+0=6.58 dBi.

So for fixed device, the UNII-2A, UNII-2C output power limit is 24-6.58+6=23.42. The UNII-2A power density limit is 11-6.58+6=10.42, the UNII-2C power density limit is 11-6.58+6=10.42.

(2) For 3TX without beamforming:

The EUT with beamforming function, then, Direction gain = G_{ANT}+10log(N_{ANT}/N_{SS}).

For 3TX without beamforming: Directional gain=6.58+10log(3/3)=6.58+0=6.58 dBi.

So for fixed device, the UNII-2A, UNII-2C output power limit is 24-6.58+6=23.42. The UNII-2A power density limit is 11-6.58+6=10.42, the UNII-2C power density limit is 11-6.58+6=10.42.

(3) For 4TX without beamforming:

The EUT with beamforming function, then, Direction gain = G_{ANT}+10log(N_{ANT}/N_{SS}).

For 4TX without beamforming: Directional gain=6.58+10log(4/4)=6.58+0=6.58 dBi.

So for fixed device, the UNII-2A, UNII-2C output power limit is 24-6.58+6=23.42. The UNII-2A power density limit is 11-6.58+6=10.42, the UNII-2C power density limit is 11-6.58+6=10.42.

(1) For 2TX with beamforming:

The EUT with beamforming function, then, Direction gain = $G_{ANT} + 10\log(N_{ANT})$.

For 2TX with beamforming: Directional gain = $6.58 + 10\log(2) = 6.58 + 3 = 9.58$ dBi.

So for fixed device, the UNII-2A, UNII-2C output power limit is $24 - (9.58 - 6) = 20.42$. The UNII-2A power density limit is $11 - (9.58 - 6) = 7.42$, the UNII-2C power density limit is $11 - (9.58 - 6) = 7.42$.

(2) For 3TX with beamforming:

The EUT with beamforming function, then, Direction gain = $G_{ANT} + 10\log(N_{ANT})$.

For 3TX with beamforming: Directional gain = $6.58 + 10\log(3) = 6.58 + 4.77 = 11.35$ dBi.

So for fixed device, the UNII-2A, UNII-2C output power limit is $24 - (11.35 - 6) = 18.65$.

The UNII-2A power density limit is $11 - (11.35 - 6) = 5.65$, the UNII-2C power density limit is $11 - (11.35 - 6) = 5.65$.

(3) For 4TX with beamforming:

The EUT with beamforming function, then, Direction gain = $G_{ANT} + 10\log(N_{ANT})$. For 4TX with beamforming: Directional gain = $6.58 + 10\log(4) = 6.58 + 6 = 12.58$ dBi.

So for fixed device, the UNII-2A, UNII-2C output power limit is $24 - (12.58 - 6) = 17.42$. The UNII-2A power density limit is $11 - (12.58 - 6) = 4.42$, the UNII-2C power density limit is $11 - (12.58 - 6) = 4.42$.

Operating Mode TX Mode	1TX	2TX
802.11a	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)
802.11ac Wave2(20MHz)	V (Ant 1)	V (Ant 1+Ant 2)
802.11ac Wave2(40MHz)	V (Ant 1)	V (Ant 1+Ant 2)
802.11ac Wave2(80MHz)	V (Ant 1)	V (Ant 1+Ant 2)
802.11ac Wave2(160MHz)	V (Ant 1+Ant 2)	V (Ant 1+Ant 2+ Ant 3+Ant 4)

Operating Mode TX Mode	3TX	4TX
802.11a	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)
802.11ac Wave2(20MHz)	V (Ant 1+Ant 2+Ant 3)	V (Ant 1+Ant 2+ Ant 3+Ant 4)
802.11ac Wave2(40MHz)	V (Ant 1+Ant 2+Ant 3)	V (Ant 1+Ant 2+ Ant 3+Ant 4)
802.11ac Wave2(80MHz)	V (Ant 1+Ant 2+Ant 3)	V (Ant 1+Ant 2+ Ant 3+Ant 4)

Note: 1TX means Nss=1, 2TX means Nss=2, 3TX means Nss=3, 4TX means Nss=4.

TEST RESULTS

UNII-2A 4TX

EUT :	Wireless LAN Access Point	Model Name :	AP6050DN
Temperature:	25 °C	Relative Humidity:	60 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX A MODE / CH52, CH60, CH64-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	22.68	185.3532	0.16786	1	Complies
6.58	4.5499	22.67	184.9269	0.16748	1	Complies
6.58	4.5499	21.58	143.8799	0.13030	1	Complies

UNII-2A 2TX 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 / CH54, CH62-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
9.58	9.0782	18.56	71.7794	0.12970310	1	Complies
9.58	9.0782	13.56	22.6986	0.04101572	1	Complies

UNII-2C 4TX

EUT :	Wireless LAN Access Point	Model Name :	AP6050DN
Temperature:	25 °C	Relative Humidity:	60 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	TX A MODE / CH100, CH116, CH140-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	20.54	113.2400	0.10255	1	Complies
6.58	4.5499	22.75	188.3649	0.17059	1	Complies
6.58	4.5499	20.56	113.7627	0.10303	1	Complies

UNII-2C 2TX 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(40 MHz) MODE / CH102, CH110, CH134-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
9.58	9.0782	13.56	22.6986	0.04101572	1	Complies
9.58	9.0782	18.61	72.6106	0.13120500	1	Complies
9.58	9.0782	14.58	28.7078	0.05187408	1	Complies

Note: the calculated distance is 25 cm.