



MRT Technology (Suzhou) Co., Ltd
Phone: +86-512-66308358
Fax: +86-512-66308368
Web: www.mrt-cert.com

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Report Version: V01
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RF Exposure Evaluation Declaration

FCC ID: QISAP4030DN

APPLICANT: HUAWEI TECHNOLOGIES CO., LTD

Application Type: Certification

Product: Wireless LAN Access Point

Model No.: AP4030DN, AP3030DN

Brand Name: Huawei

FCC Classification: Digital Transmission System (DTS)
Unlicensed National Information Infrastructure (UNII)

Reviewed By : Robin Wu
(Robin Wu)

Approved By : Marlin Chen
(Marlin Chen)



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standards through the calibration of the equipment and evaluated measurement uncertainty herein.

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Revision History

| Report No. | Version | Description | Issue Date |
|--------------|---------|----------------|------------|
| 1501RSU02610 | Rev. 01 | Initial report | 04-09-2015 |
| | | | |

1. PRODUCT INFORMATION

1.1. Equipment Description

| | |
|--------------------|---|
| Product Name | Wireless LAN Access Point |
| Model No. | AP4030DN, AP3030DN |
| Frequency Range | <p><u>2.4GHz Band:</u></p> <p>For 802.11b/g/n-HT20: 2412 ~ 2462 MHz</p> <p>For 802.11n-HT40: 2422 ~ 2452 MHz</p> <p><u>5.0GHz Band:</u></p> <p>For 802.11a/n-HT20: 5180~5320MHz, 5500~5700MHz, 5745~5825MHz</p> <p>For 802.11ac-VHT20: 5180~5320MHz, 5500~5720MHz, 5745~5825MHz</p> <p>For 802.11n-HT40: 5190~5310MHz, 5510~5670MHz, 5755~5795MHz</p> <p>For 802.11ac-VHT40: 5190~5310MHz, 5510~5710MHz, 5755~5795MHz</p> <p>For 802.11ac-VHT80: 5210MHz, 5290MHz, 5530MHz, 5610MHz, 5690MHz, 5775MHz</p> |
| Type of Modulation | <p>802.11b: DSSS</p> <p>802.11a/n/ac: OFDM</p> |

1.2. Antenna Description

| Antenna Type | Frequency Band (GHz) | Max Peak Gain (dBi) | Beam-forming Gain (dBi) | CDD Directional Gain (dBi) | |
|---------------------------------|----------------------|------------------------|-------------------------|----------------------------|---------|
| | | | | For Power | For PSD |
| Internal Antenna (PIFA Antenna) | 2.4 | Ant 1: 4.2, Ant 2: 4.4 | 7.31 | 7.31 | 7.31 |
| | 5 | Ant 1: 6.3, Ant 2: 6.4 | 9.36 | 9.36 | 9.36 |

Note:

- The EUT supports Cyclic Delay Diversity (CDD) mode, and CDD signals are correlated. For CDD transmissions, directional gain is calculated as follows, $N_{ANT} = 2$, $N_{SS} = 1$.
 - If all antennas have the same gain, G_{ANT} , Directional gain = $G_{ANT} + \text{Array Gain}$, where Array Gain is as follows.
 - For power spectral density (PSD) measurements on all devices, Array Gain = $10 \log (N_{ANT} / N_{SS})$ dB = 3.01;
 - For power measurements on IEEE 802.11 devices, Array Gain = 0 dB for $N_{ANT} \leq 4$;
 - If antenna gains are not equal, the user may use either of the following methods to calculate directional gain, provided that each transmit antenna is driven by only one spatial stream:
 - Directional gain may be calculated by using the formulas applicable to equal gain antennas with G_{ANT} set equal to the gain of the antenna having the highest gain;

$$\bullet \quad \text{DirectionalGain} = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$$

$g_{j,k} = 10^{G_k/20}$ if the kth antenna is being fed by spatial stream j, or zero if it is not;

G_k is the gain in dBi of the kth antenna.

- The EUT also supports Beam Forming mode, and the Beam Forming support 802.11n, not include 802.11a/ac.

Correlated signals include, but are not limited to, signals transmitted in any of the following modes:

- Any transmit Beam Forming mode, whether fixed or adaptive (e.g., phased array modes, closed loop MIMO modes, Transmitter Adaptive Antenna modes, Maximum Ratio

Transmission (MRT) modes, and Statistical Eigen Beam Forming (EBF) modes).

Unequal antenna gains, with equal transmit powers. For antenna gains given by G_1, G_2, \dots, G_N dBi.

- transmit signals are correlated, then
- Directional gain = $10 \cdot \log[(10^{G_1/20} + 10^{G_2/20} + \dots + 10^{G_N/20})^2 / N_{\text{ANT}}]$ dBi [Note the “20”s in the denominator of each exponent and the square of the sum of terms; the object is to combine the signal levels coherently.]

2. RF Exposure Evaluation

2.1. Limits

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

| Frequency Range (MHz) | Electric Field Strength (V/m) | Magnetic Field Strength (A/m) | Power Density (mW/cm ²) | Average Time (Minutes) |
|---|----------------------------------|----------------------------------|--|---------------------------|
| (A) Limits for Occupational/ Control Exposures | | | | |
| 300-1500 | -- | -- | f/300 | 6 |
| 1500-100,000 | -- | -- | 5 | 6 |
| (B) Limits for General Population/ Uncontrolled Exposures | | | | |
| 300-1500 | -- | -- | f/1500 | 6 |
| 1500-100,000 | -- | -- | 1 | 30 |

f= Frequency in MHz

Calculation Formula: $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot r^2)$

Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

r = distance between observation point and center of the radiator in cm

P_d is the limit of MPE, 1mW/cm². If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

2.2. Test Result of RF Exposure Evaluation

| | |
|-----------|---------------------------|
| Product | Wireless LAN Access Point |
| Test Item | RF Exposure Evaluation |

Antenna Gain: Refer to Clause 1.2 of antenna description.

For 2.4G ISM Band:

| Test Mode | Frequency Band (MHz) | Maximum Average Output Power (dBm) | Power Density at R = 20 cm (mW/cm ²) | Limit (mW/cm ²) |
|-------------|----------------------|------------------------------------|--|-----------------------------|
| 802.11b/g/n | 2412 ~ 2462 | 20.85 | 0.1302 | 1 |

For 5G UNII Band:

| Test Mode | Frequency Band (MHz) | Maximum Average Output Power (dBm) | Power Density at R = 20 cm (mW/cm ²) | Limit (mW/cm ²) |
|--------------|----------------------|------------------------------------|--|-----------------------------|
| 802.11a/ac/n | 5180 ~ 5320 | 23.81 | 0.4128 | 1 |
| | 5500 ~ 5700 | 20.82 | 0.2074 | 1 |
| | 5745 ~ 5825 | 22.49 | 0.3046 | 1 |

CONCLUSION:

Therefore, the Max Power Density at R (20 cm) = 0.4128mW/cm² < 1mW/cm².

So the EUT complies with the requirement.

_____ The End _____