# RF Exposure Report

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|---|---|
| **Report No.:** | SA160819C08 |
| **FCC ID:** | UDX-60057010 |
| **Test Model:** | MR74-HW |
| **Received Date:** | Aug. 19, 2016 |
| **Test Date:** | Aug. 31 ~ Nov. 25, 2016 |
| **Issued Date:** | Dec. 05, 2016 |
| **Applicant:** | Cisco Systems, Inc. |
| **Address:** | 170 West Tasman Drive, San Jose, CA 95134 |
| **Issued By:** | Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch |
| **Lab Address:** | No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan, R.O.C. |
| **Test Location:** | No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN (R.O.C.) |

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## Release Control Record

| Issue No. | Description | Date Issued |
|---|---|---|
| SA160819C08 | Original release. | Dec. 05, 2016 |

## 1 Certificate of Conformity

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|---|---|
| **Product:** | AP Outdoor |
| **Brand:** | Cisco |
| **Test Model:** | MR74-HW |
| **Sample Status:** | Engineering sample |
| **Applicant:** | Cisco Systems, Inc. |
| **Test Date:** | Aug. 31 ~ Nov. 25, 2016 |
| **Standards:** | FCC Part 2 (Section 2.1091)<br>KDB 447498 D01 General RF Exposure Guidance v06<br>IEEE C95.1 |

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

**Prepared by :** _____ , **Date:** Dec. 05, 2016

Suntee Liu / Specialist

**Approved by :** _____ , **Date:** Dec. 05, 2016

Ken Liu / Senior Manager

## 2 RF Exposure

### 2.1 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) |
|---|---|---|---|---|
| Limits For General Population / Uncontrolled Exposure | | | | |
| 300-1500 | … | … | F/1500 | 30 |
| 1500-100,000 | … | … | 1.0 | 30 |

F = Frequency in MHz

### 2.2 MPE Calculation Formula

$Pd = (Pout*G) / (4*pi*r^2)$

where

Pd = power density in $mW/cm^2$

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

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

### 2.3 Classification

The antenna of this product, under normal use condition, is at least 36cm away from the body of the user. So, this device is classified as Mobile Device.

## 3 Calculation Result of Maximum Conducted Power

| Ant. No. | Frequency Band (MHz) | Max Power (dBm) | Antenna Gain (dBi) | Distance (cm) | Power Density ($mW/cm^2$) | Limit ($mW/cm^2$) |
|---|---|---|---|---|---|---|
| Radio 1 | | | | | | |
| 20 | WLAN 2412~2462 (CDD mode) | 25.09 | 7.01 | 36 | 0.100 | 1 |
| | WLAN 2412~2462 (Beamforming mode) | 21.53 | 7.01 | 36 | 0.044 | 1 |
| 23 | WLAN 2412~2462 (CDD mode) | 24.87 | 14.01 | 36 | 0.474 | 1 |
| | WLAN 2412~2462 (Beamforming mode) | 20.68 | 14.01 | 36 | 0.181 | 1 |
| 25 | WLAN 2412~2462 (CDD mode) | 25.12 | 11.11 | 36 | 0.258 | 1 |
| | WLAN 2412~2462 (Beamforming mode) | 21.99 | 11.11 | 36 | 0.125 | 1 |
| 27 | WLAN 2412~2462 (CDD mode) | 24.69 | 12.81 | 36 | 0.345 | 1 |
| | WLAN 2412~2462 (Beamforming mode) | 21.16 | 12.81 | 36 | 0.153 | 1 |
| AIR-ANT2513P4M-N | WLAN 2412~2462 (CDD mode) | 22.82 | 16.01 | 36 | 0.469 | 1 |
| | WLAN 2412~2462 (Beamforming mode) | 19.68 | 16.01 | 36 | 0.228 | 1 |

| Ant. No. | Frequency Band (MHz) | Max Power (dBm) | Antenna Gain (dBi) | Distance (cm) | Power Density ($mW/cm^2$) | Limit ($mW/cm^2$) |
|---|---|---|---|---|---|---|
| Radio 2 | | | | | | |
| 20 | WLAN 5180~5240 (CDD mode) | 21.88 | 10.01 | 36 | 0.095 | 1 |
| | WLAN 5745~5825 (CDD mode) | 25.09 | 10.01 | 36 | 0.199 | 1 |
| | WLAN 5180~5240 (Beamforming mode) | 18.87 | 10.01 | 36 | 0.047 | 1 |
| | WLAN 5745~5825 (Beamforming mode) | 22.08 | 10.01 | 36 | 0.099 | 1 |
| 21 | WLAN 5180~5240 (CDD mode) | 9.79 | 16.01 | 36 | 0.023 | 1 |
| | WLAN 5745~5825 (CDD mode) | 22.66 | 16.01 | 36 | 0.452 | 1 |
| | WLAN 5180~5240 (Beamforming mode) | 6.78 | 16.01 | 36 | 0.012 | 1 |
| | WLAN 5745~5825 (Beamforming mode) | 19.65 | 16.01 | 36 | 0.226 | 1 |
| 25 | WLAN 5180~5240 (CDD mode) | 19.16 | 10.11 | 36 | 0.052 | 1 |
| | WLAN 5745~5825 (CDD mode) | 25.35 | 10.11 | 36 | 0.216 | 1 |
| | WLAN 5180~5240 (Beamforming mode) | 16.15 | 10.11 | 36 | 0.026 | 1 |
| | WLAN 5745~5825 (Beamforming mode) | 22.27 | 10.11 | 36 | 0.106 | 1 |
| 27 | WLAN 5180~5240 (CDD mode) | 11.24 | 14.31 | 36 | 0.022 | 1 |
| | WLAN 5745~5825 (CDD mode) | 24.50 | 14.31 | 36 | 0.467 | 1 |
| | WLAN 5180~5240 (Beamforming mode) | 8.23 | 14.31 | 36 | 0.011 | 1 |
| | WLAN 5745~5825 (Beamforming mode) | 21.49 | 14.31 | 36 | 0.233 | 1 |
| AIR-ANT2513P4M-N | WLAN 5180~5240 (CDD mode) | 20.17 | 16.01 | 36 | 0.255 | 1 |
| | WLAN 5745~5825 (CDD mode) | 22.66 | 16.01 | 36 | 0.452 | 1 |
| | WLAN 5180~5240 (Beamforming mode) | 17.16 | 16.01 | 36 | 0.127 | 1 |
| | WLAN 5745~5825 (Beamforming mode) | 19.65 | 16.01 | 36 | 0.226 | 1 |
| Radio 3 | | | | | | |
| - | WLAN 2412~2462 | 23.82 | 3.9 | 36 | 0.036 | 1 |
| | WLAN 5180~5240 | 15.77 | 5.2 | 36 | 0.008 | 1 |
| | WLAN 5745~5825 | 18.55 | 5.2 | 36 | 0.015 | 1 |
| Radio 4 | | | | | | |
| - | BT LE 2402~2480 | 5.16 | 5.6 | 36 | 0.001 | 1 |

Note:
Radio 1, Ant. No. 20, 2.4GHz: Directional gain = 4dBi + 10log(2) = 7.01dBi
Radio 1, Ant. No. 23, 2.4GHz: Directional gain = 11dBi + 10log(2) = 14.01dBi
Radio 1, Ant. No. 25, 2.4GHz: Directional gain = 8.1dBi + 10log(2) = 11.11dBi
Radio 1, Ant. No. 27, 2.4GHz: Directional gain = 9.8dBi + 10log(2) = 12.81dBi
Radio 1, Ant. No. AIR-ANT2513P4M-N, 2.4GHz: Directional gain = 13dBi + 10log(2) = 16.01dBi
Radio 2, Ant. No. 20, 5GHz: Directional gain = 7dBi + 10log(2) = 10.01dBi
Radio 2, Ant. No. 21, 5GHz: Directional gain = 13dBi + 10log(2) = 16.01dBi
Radio 2, Ant. No. 25, 5GHz: Directional gain = 7.1dBi + 10log(2) = 10.11dBi
Radio 2, Ant. No. 27, 5GHz: Directional gain = 11.3dBi + 10log(2) = 14.31dBi
Radio 2, Ant. No. AIR-ANT2513P4M-N, 5GHz: Directional gain = 13dBi + 10log(2) = 16.01dBi

| Ant. No.: 20 | | | | | | |
|---|---|---|---|---|---|---|
| Frequency Band | Max. Power (dBm) | | | | Total Power (dBm) | Power Limit (dBm) |
| | Radio 1 | Radio 2 | Radio 3 | Radio 4 | | |
| 2.4GHz | 25.09 | - | 23.82 | 5.16 | 27.54 | 30 |
| 5180~5240MHz | - | 21.88 | 15.77 | - | 22.83 | 30 |
| 5745~5825MHz | - | 25.09 | 18.55 | - | 25.96 | 30 |

| Ant. No.: 23/21 | | | | | | |
|---|---|---|---|---|---|---|
| Frequency Band | Max. Power (dBm) | | | | Total Power (dBm) | Power Limit (dBm) |
| | Radio 1 | Radio 2 | Radio 3 | Radio 4 | | |
| 2.4GHz | 24.87 | - | 23.82 | 5.16 | 27.41 | 30 |
| 5180~5240MHz | - | 9.79 | 15.77 | - | 16.75 | 30 |
| 5745~5825MHz | - | 22.66 | 18.55 | - | 24.08 | 30 |

| Ant. No.: 25 | | | | | | |
|---|---|---|---|---|---|---|
| Frequency Band | Max. Power (dBm) | | | | Total Power (dBm) | Power Limit (dBm) |
| | Radio 1 | Radio 2 | Radio 3 | Radio 4 | | |
| 2.4GHz | 25.12 | - | 23.82 | 5.16 | 27.55 | 30 |
| 5180~5240MHz | - | 19.16 | 15.77 | - | 20.80 | 30 |
| 5745~5825MHz | - | 25.35 | 18.55 | - | 26.17 | 30 |

| Ant. No.: 27 | | | | | | |
|---|---|---|---|---|---|---|
| Frequency Band | Max. Power (dBm) | | | | Total Power (dBm) | Power Limit (dBm) |
| | Radio 1 | Radio 2 | Radio 3 | Radio 4 | | |
| 2.4GHz | 24.69 | - | 23.82 | 5.16 | 27.31 | 30 |
| 5180~5240MHz | - | 11.24 | 15.77 | - | 17.08 | 30 |
| 5745~5825MHz | - | 24.50 | 18.55 | - | 25.48 | 30 |

| Ant. No.: AIR-ANT2513P4M-N | | | | | | |
|---|---|---|---|---|---|---|
| Frequency Band | Max. Power (dBm) | | | | Total Power (dBm) | Power Limit (dBm) |
| | Radio 1 | Radio 2 | Radio 3 | Radio 4 | | |
| 2.4GHz | 22.82 | - | 23.82 | 5.16 | 26.39 | 30 |
| 5180~5240MHz | - | 20.17 | 15.77 | - | 21.52 | 30 |
| 5745~5825MHz | - | 22.66 | 18.55 | - | 24.08 | 30 |

**Conclusion:**
The formula of calculated the MPE is:
CPD1 / LPD1 + CPD2 / LPD2 + ……etc. < 1
CPD = Calculation power density
LPD = Limit of power density

Radio 1 (Ant. 20) + Radio 2 (Ant. 20) + Radio 3 (2.4G) + Radio 4
= 0.100 + 0.199 + 0.036 + 0.001 = 0.336 < 1

Radio 1 (Ant. 20) + Radio 2 (Ant. 20) + Radio 3 (5G) + Radio 4
= 0.100 + 0.199 + 0.015 + 0.001 = 0.315 < 1

Radio 1 (Ant. 23) + Radio 2 (Ant. 21) + Radio 3 (2.4G) + Radio 4
= 0.474 + 0.452 + 0.036 + 0.001 = 0.963 < 1

Radio 1 (Ant. 23) + Radio 2 (Ant. 21) + Radio 3 (5G) + Radio 4
= 0.474 + 0.452 + 0.015 + 0.001 = 0.942 < 1

Radio 1 (Ant. 25) + Radio 2 (Ant. 25) + Radio 3 (2.4G) + Radio 4
= 0.258 + 0.216 + 0.036 + 0.001 = 0.511 < 1

Radio 1 (Ant. 25) + Radio 2 (Ant. 25) + Radio 3 (5G) + Radio 4
= 0.258 + 0.216 + 0.015 + 0.001 = 0.490 < 1

Radio 1 (Ant. 27) + Radio 2 (Ant. 27) + Radio 3 (2.4G) + Radio 4
= 0.345 + 0.467 + 0.036 + 0.001 = 0.849 < 1

Radio 1 (Ant. 27) + Radio 2 (Ant. 27) + Radio 3 (5G) + Radio 4
= 0.345 + 0.467 + 0.015 + 0.001 = 0.828 < 1

Radio 1 (Ant. AIR-ANT2513P4M-N) + Radio 2 (Ant. AIR-ANT2513P4M-N) + Radio 3 (2.4G) + Radio 4
= 0.469 + 0.452 + 0.036 + 0.001 = 0.958 < 1

Radio 1 (Ant. AIR-ANT2513P4M-N) + Radio 2 (Ant. AIR-ANT2513P4M-N) + Radio 3 (5G) + Radio 4
= 0.469 + 0.452 + 0.015 + 0.001 = 0.937 < 1

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