RF EXPOSURE REPORT

REPORT NO.: SA141029C03

MODEL NO.: MR72-HW

FCC ID: UDX-60033010

RECEIVED: Oct. 07, 2014

TESTED: Oct. 07 ~ Dec. 10, 2014

ISSUED: Dec. 22, 2014

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 Tsuen, Kwei Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
SA141029C03	Original release	Dec. 22, 2014

1. CERTIFICATION

PRODUCT:	802.11 abgn/ac device
MODEL NO.:	MR72-HW
BRAND:	Cisco
APPLICANT:	Cisco Systems, Inc.
TESTED:	Oct. 07 ~ Dec. 10, 2014
TEST SAMPLE:	ENGINEERING SAMPLE
STANDARDS:	**FCC Part 2 (Section 2.1091)**
	KDB 447498 D03
	IEEE C95.1

The above equipment (model: MR72-HW) 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. 22, 2014

Pettie Chen / Senior Specialist

APPROVED BY : _____ **, DATE :** Dec. 22, 2014

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 22cm away or farther depends on the antenna type used as evaluated in following section. So, this device is classified as **Mobile Device**.

2.4 CALCULATION RESULT OF MAXIMUM CONDUCTED POWER

For Dipole antenna (Radio 1 & 2) + PIFA antenna (Radio 3 & 4):

RADIO	ANTENNA	FREQUENCY BAND (MHz)	MAX POWER (dBm)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm^2)	LIMIT (mW/cm^2)
1	Dipole	2412-2462	27.97	7.01	22	0.518	1
2	Dipole	5180-5240	21.59	10.01	22	0.238	1
		5745-5825	22.31	10.01	22	0.281	1
3	PIFA	2412-2462	19.64	5.7	22	0.056	1
		5180-5240	13.98	6.5	22	0.018	1
		5745-5825	21.62	6.5	22	0.107	1
4	PIFA	2402-2480	2.54	4.2	22	0.0008	1

NOTE:

1. Radio 1: Dipole antenna: Directional gain = 4dBi + 10log(2) = 7.01dBi
2. Radio 2: Dipole antenna: Directional gain = 7dBi + 10log(2) = 10.01dBi

*Antenna gains were calculated for coherent signals per KDB 662911 D01

FREQUENCY BAND	MAX POWER (dBm)				TOTAL POWER (dBm)	POWER LIMIT (dBm)
	RADIO 1	RADIO 2	RADIO 3	RADIO 4		
2.4GHz	27.97	-	19.64	2.54	28.58	30
5180-5240MHz	-	21.59	13.98	-	22.28	30
5745-5825MHz	-	22.31	21.62	-	24.99	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 + Radio 2 + Radio 3 (2.4G) + Radio 3 (5GHz) + Radio 4

= 0.518 + 0.281 + 0.056 + 0.107 + 0.0008 = 0.962

Therefore the maximum calculations of above situations are less than the “1” limit.

For Patch antenna (Radio 1 & 2) + PIFA antenna (Radio 3 & 4):

RADIO	ANTENNA	FREQUENCY BAND (MHz)	MAX POWER (dBm)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm^2)	LIMIT (mW/cm^2)
1	Patch	2412-2462	27.82	11.11	34	0.538	1
2	Patch	5180-5240	19.16	10.11	34	0.058	1
		5745-5825	26.90	10.11	34	0.346	1
3	PIFA	2412-2462	19.64	5.7	34	0.024	1
		5180-5240	13.98	6.5	34	0.008	1
		5745-5825	21.62	6.5	34	0.045	1
4	PIFA	2402-2480	2.54	4.2	34	0.0003	1

NOTE:

1. Radio 1: Patch antenna: Directional gain = 8.1dBi + 10log(2) = 11.11dBi
2. Radio 2: Patch antenna: Directional gain = 7.1dBi + 10log(2) = 10.11dBi

*Antenna gains were calculated for coherent signals per KDB 662911 D01

FREQUENCY BAND	MAX POWER (dBm)				TOTAL POWER (dBm)	POWER LIMIT (dBm)
	RADIO 1	RADIO 2	RADIO 3	RADIO 4		
2.4GHz	27.82	-	19.64	2.54	28.45	30
5180-5240MHz	-	19.16	13.98	-	20.31	30
5745-5825MHz	-	26.90	21.62	-	28.03	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 + Radio 2 + Radio 3 (2.4G) + Radio 3 (5GHz) + Radio 4

= 0.538 + 0.346 + 0.024 + 0.045 + 0.0003 = 0.952

Therefore the maximum calculations of above situations are less than the “1” limit.

For Sector antenna (Radio 1 & 2) + PIFA antenna (Radio 3 & 4):

RADIO	ANTENNA	FREQUENCY BAND (MHz)	MAX POWER (dBm)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm^2)	LIMIT (mW/cm^2)
1	Sector	2412-2462	24.99	14.01	33	0.580	1
2	Sector	5180-5240	7.96	16.01	33	0.018	1
		5745-5825	20.50	16.01	33	0.327	1
3	PIFA	2412-2462	19.64	5.7	33	0.025	1
		5180-5240	13.98	6.5	33	0.008	1
		5745-5825	21.62	6.5	33	0.047	1
4	PIFA	2402-2480	2.54	4.2	33	0.0003	1

NOTE:

1. Radio 1: Sector antenna: Directional gain = 11dBi + 10log(2) = 14.01dBi
2. Radio 2: Sector antenna: Directional gain = 13dBi + 10log(2) = 16.01dBi

*Antenna gains were calculated for coherent signals per KDB 662911 D01

FREQUENCY BAND	MAX POWER (dBm)				TOTAL POWER (dBm)	POWER LIMIT (dBm)
	RADIO 1	RADIO 2	RADIO 3	RADIO 4		
2.4GHz	24.99	-	19.64	2.54	26.12	30
5180-5240MHz	-	7.96	13.98	-	14.95	30
5745-5825MHz	-	20.50	21.62	-	24.11	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 + Radio 2 + Radio 3 (2.4G) + Radio 3 (5GHz) + Radio 4

= 0.580 + 0.327 + 0.025 + 0.047 + 0.0003 = 0.9793

Therefore the maximum calculations of above situations are less than the “1” limit.