



# RF Exposure Evaluation Report

**Equipment** : Wireless 802.11 a/b/g/n/ac Access Point  
**Brand Name** : CISCO  
**Model No.** : MR42E-HW  
**FCC ID** : UDX-60063010  
**Standard** : 47 CFR Part 2.1091  
**Applicant** : Cisco Systems, Inc.  
: 170 West Tasman Drive, San Jose, CA 95134 USA  
**Manufacturer** : Cisco Systems, Inc.  
: 170 West Tasman Drive, San Jose, CA 95134 USA

The product sample received on Jun. 06, 2017 and completely tested on Sep. 01, 2017. We, SPORTON, would like to declare that the tested sample has been evaluated in accordance with 47 CFR Part 2.1091 and pass the limit.

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Cliff Chang  
SPORTON INTERNATIONAL INC.





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**PHOTOGRAPHS OF EUT V01**





# 1 General Description

## 1.1 EUT General Information

RF General Information			
Evaluation Mode	Frequency Range (MHz)	Operating Frequency (MHz)	Modulation Type
2.4GHz WLAN	2400-2483.5	2412-2462	802.11b: DSSS (DBPSK, DQPSK, CCK) 802.11g/n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)
5GHz WLAN	5150-5250 5250-5350 5470-5725 5725-5850	5180-5240 5260-5320 5500-5720 5745-5825	802.11a/n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)
Bluetooth	2400-2483.5	2402-2480	LE: DSSS (GFSK)

## 1.2 Testing Location

Testing Location		
<input type="checkbox"/>	HWA YA	ADD : No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL : 886-3-327-3456 FAX : 886-3-327-0973
<input checked="" type="checkbox"/>	JHUBEI	ADD : No.8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C. TEL : 886-3-656-9065 FAX : 886-3-656-9085

## 2 Maximum Permissible Exposure

### 2.1 Limit of Maximum Permissible Exposure

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> , H  <sup>2</sup> or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842 / f	4.89 / f	(900 / f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100,000			5	6

(B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> , H  <sup>2</sup> or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30

Note: f = frequency in MHz ; \*Plane-wave equivalent power density

### 2.2 MPE Calculation Method

The MPE was calculated at 27 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

$$E \text{ (V/m)} = \frac{\sqrt{30 \times P \times G}}{d} \qquad \text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

**E** = Electric field (V/m)

**P** = RF output power (W)

**G** = EUT Antenna numeric gain (numeric)

**d** = Separation distance between radiator and human body (m)

The formula can be changed to

$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$



### 2.3 Calculated Result and Limit

Exposure Environment: General Population / Uncontrolled Exposure

Simultaneous Transmission Analysis Mode (Dipole Antenna / Set 1 and Set 2):

MPE

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	EIRP (W)	Distance (cm)	S (mW/cm <sup>2</sup> )	S Limit (mW/cm <sup>2</sup> )
2.4G;D1D (Radio 1)	5.90	25.91	31.81	1.51705	27	0.16560	1.00000
5.2G;D1D (Radio 2)	10.31	25.54	35.85	3.84592	27	0.41982	1.00000
5.3G;D1D (Radio 2)	10.31	19.64	29.95	0.98855	27	0.10791	1.00000
5.6G;D1D (Radio 2)	10.31	19.64	29.95	0.98855	27	0.10791	1.00000
5.8G;D1D (Radio 2)	10.31	25.67	35.98	3.96278	27	0.43258	1.00000
2.4G;D1D (Radio 3)	3.70	20.92	24.62	0.28973	27	0.03163	1.00000
5.2G;D1D (Radio 3)	5.20	20.39	25.59	0.36224	27	0.03954	1.00000
5.3G;D1D (Radio 3)	5.20	21.06	26.26	0.42267	27	0.04614	1.00000
5.6G;D1D (Radio 3)	5.20	21.35	26.55	0.45186	27	0.04932	1.00000
5.8G;D1D (Radio 3)	5.20	20.44	25.64	0.36644	27	0.04000	1.00000
2.4G;BT-LE (Radio 4)	4.30	5.52	9.82	0.00959	27	0.00105	1.00000

Radio 1 (2.4GHz) + Radio 2 (5GHz) + Radio 3 (2.4GHz) + Radio 4 (BT4.0)

Mode	Gain (dBi)	Power (dBm)	EIRP (dBm)	EIRP (W)	Distance (cm)	S (W/m <sup>2</sup> )	S Limit (W/m <sup>2</sup> )	Ratio (S/Limit)
2.4G;D1D (Radio 1)	5.9	25.91	31.81	1.51705	27	0.16560	1	0.16560
5.8G;D1D (Radio 2)	10.31	25.67	35.98	3.96278	27	0.43258	1	0.43258
2.4G;D1D (Radio 3)	3.7	20.92	24.62	0.28973	27	0.03163	1	0.03163
2.4G;BT-LE (Radio 4)	4.3	5.52	9.82	0.00959	27	0.00105	1	0.00105
							Sum Ratio	0.63086
							Ratio Limit	1



Radio 1 (2.4GHz) + Radio 2 (5GHz) + Radio 3 (5GHz) + Radio 4 (BT4.0)

Mode	Gain (dBi)	Power (dBm)	EIRP (dBm)	EIRP (W)	Distance (cm)	S (W/m <sup>2</sup> )	S Limit (W/m <sup>2</sup> )	Ratio (S/Limit)
2.4G;D1D (Radio 1)	5.9	25.91	31.81	1.51705	27	0.16560	1	0.16560
5.8G;D1D (Radio 2)	10.31	25.67	35.98	3.96278	27	0.43258	1	0.43258
5.6G;D1D (Radio 3)	5.2	21.35	26.55	0.45186	27	0.04932	1	0.04932
2.4G;BT-LE (Radio 4)	4.3	5.52	9.82	0.00959	27	0.00105	1	0.00105
							Sum Ratio	0.64855
							Ratio Limit	1



**Simultaneous Transmission Analysis Mode (Patch Antenna / Set 3):**

**MPE**

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	EIRP (W)	Distance (cm)	S (mW/cm <sup>2</sup> )	S Limit (mW/cm <sup>2</sup> )
2.4G;D1D (Radio 1)	13.20	22.79	35.99	3.97192	27	0.43357	1.00000
5.2G;D1D (Radio 2)	14.00	21.99	35.99	3.97192	27	0.43357	1.00000
5.3G;D1D (Radio 2)	11.00	18.94	29.94	0.98628	27	0.10766	1.00000
5.6G;D1D (Radio 2)	14.00	15.97	29.97	0.99312	27	0.10841	1.00000
5.8G;D1D (Radio 2)	14.00	21.98	35.98	3.96278	27	0.43258	1.00000
2.4G;D1D (Radio 3)	10.35	20.14	30.49	1.11944	27	0.12220	1.00000
5.2G;D1D (Radio 3)	9.24	20.29	29.53	0.89743	27	0.09796	1.00000
5.3G;D1D (Radio 3)	9.24	20.71	29.95	0.98855	27	0.10791	1.00000
5.6G;D1D (Radio 3)	9.24	20.55	29.79	0.95280	27	0.10401	1.00000
5.8G;D1D (Radio 3)	9.24	20.81	30.05	1.01158	27	0.11042	1.00000
2.4G;BT-LE (Radio 4)	10.95	5.52	16.47	0.04436	27	0.00484	1.00000

**Radio 1 (2.4GHz) + Radio 2 (5GHz) + Radio 3 (2.4GHz) + Radio 4 (BT4.0)**

Mode	Gain (dBi)	Power (dBm)	EIRP (dBm)	EIRP (W)	Distance (cm)	S (W/m <sup>2</sup> )	S Limit (W/m <sup>2</sup> )	Ratio (S/Limit)
2.4G;D1D (Radio 1)	13.2	22.79	35.99	3.97192	27	0.43357	1	0.43357
5.8G;D1D (Radio 2)	14	21.99	35.99	3.97192	27	0.43357	1	0.43357
2.4G;D1D (Radio 3)	10.35	20.14	30.49	1.11944	27	0.12220	1	0.12220
2.4G;BT-LE (Radio 4)	10.95	5.52	16.47	0.04436	27	0.00484	1	0.00484
							Sum Ratio	0.99418
							Ratio Limit	1





Radio 1 (2.4GHz) + Radio 2 (5GHz) + Radio 3 (5GHz) + Radio 4 (BT4.0)

Mode	Gain (dBi)	Power (dBm)	EIRP (dBm)	EIRP (W)	Distance (cm)	S (W/m <sup>2</sup> )	S Limit (W/m <sup>2</sup> )	Ratio (S/Limit)
2.4G;D1D (Radio 1)	13.2	22.79	35.99	3.97192	27	0.43357	1	0.43357
5.8G;D1D (Radio 2)	14	21.99	35.99	3.97192	27	0.43357	1	0.43357
5.8G;D1D (Radio 3)	9.24	20.81	30.05	1.01158	27	0.11042	1	0.11042
2.4G;BT-LE (Radio 4)	10.95	5.52	16.47	0.04436	27	0.00484	1	0.00484
							Sum Ratio	0.98240
							Ratio Limit	1



**Simultaneous Transmission Analysis Mode (Patch Antenna / Set 4):**

**MPE**

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	EIRP (W)	Distance (cm)	S (mW/cm <sup>2</sup> )	S Limit (mW/cm <sup>2</sup> )
2.4G;D1D (Radio 1)	9.80	25.67	35.47	3.52371	27	0.38465	1.00000
5.2G;D1D (Radio 2)	10.30	25.60	35.90	3.89045	27	0.42468	1.00000
5.3G;D1D (Radio 2)	10.30	19.65	29.95	0.98855	27	0.10791	1.00000
5.6G;D1D (Radio 2)	9.00	20.96	29.96	0.99083	27	0.10816	1.00000
5.8G;D1D (Radio 2)	10.30	25.61	35.91	3.89942	27	0.42566	1.00000
2.4G;D1D (Radio 3)	5.50	20.92	26.42	0.43853	27	0.04787	1.00000
5.2G;D1D (Radio 3)	5.23	20.80	26.03	0.40087	27	0.04376	1.00000
5.3G;D1D (Radio 3)	5.23	21.45	26.68	0.46559	27	0.05082	1.00000
5.6G;D1D (Radio 3)	5.23	20.59	25.82	0.38194	27	0.04169	1.00000
5.8G;D1D (Radio 3)	5.23	20.81	26.04	0.40179	27	0.04386	1.00000
2.4G;BT-LE (Radio 4)	6.10	5.52	11.62	0.01452	27	0.00158	1.00000

**Radio 1 (2.4GHz) + Radio 2 (5GHz) + Radio 3 (2.4GHz) + Radio 4 (BT4.0)**

Mode	Gain (dBi)	Power (dBm)	EIRP (dBm)	EIRP (W)	Distance (cm)	S (W/m <sup>2</sup> )	S Limit (W/m <sup>2</sup> )	Ratio (S/Limit)
2.4G;D1D (Radio 1)	9.8	25.67	35.47	3.52371	27	0.38465	1	0.38465
5.8G;D1D (Radio 2)	10.3	25.61	35.91	3.89942	27	0.42566	1	0.42566
2.4G;D1D (Radio 3)	5.5	20.92	26.42	0.43853	27	0.04787	1	0.04787
2.4G;BT-LE (Radio 4)	6.1	5.52	11.62	0.01452	27	0.00158	1	0.00158
							Sum Ratio	0.85976
							Ratio Limit	1



Radio 1 (2.4GHz) + Radio 2 (5GHz) + Radio 3 (5GHz) + Radio 4 (BT4.0)

Mode	Gain (dBi)	Power (dBm)	EIRP (dBm)	EIRP (W)	Distance (cm)	S (W/m <sup>2</sup> )	S Limit (W/m <sup>2</sup> )	Ratio (S/Limit)
2.4G;D1D (Radio 1)	9.8	25.67	35.47	3.52371	27	0.38465	1	0.38465
5.8G;D1D (Radio 2)	10.3	25.61	35.91	3.89942	27	0.42566	1	0.42566
5.3G;D1D (Radio 3)	5.23	21.45	26.68	0.46559	27	0.05082	1	0.05082
2.4G;BT-LE (Radio 4)	6.1	5.52	11.62	0.01452	27	0.00158	1	0.00158
							Sum Ratio	0.86271
							Ratio Limit	1



**Simultaneous Transmission Analysis Mode (Omni Antenna / Set 5):**

**MPE**

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	EIRP (W)	Distance (cm)	S (mW/cm <sup>2</sup> )	S Limit (mW/cm <sup>2</sup> )
2.4G;D1D (Radio 1)	5.40	25.91	31.31	1.35207	27	0.14759	1.00000
5.2G;D1D (Radio 2)	5.80	25.91	31.71	1.48252	27	0.16183	1.00000
5.3G;D1D (Radio 2)	5.80	23.95	29.75	0.94406	27	0.10305	1.00000
5.6G;D1D (Radio 2)	5.80	23.87	29.67	0.92683	27	0.10117	1.00000
5.8G;D1D (Radio 2)	5.80	25.67	31.47	1.40281	27	0.15313	1.00000
2.4G;D1D (Radio 3)	3.90	20.92	24.82	0.30339	27	0.03312	1.00000
5.2G;D1D (Radio 3)	3.70	20.69	24.39	0.27479	27	0.03000	1.00000
5.3G;D1D (Radio 3)	3.70	21.21	24.91	0.30974	27	0.03381	1.00000
5.6G;D1D (Radio 3)	3.70	21.35	25.05	0.31989	27	0.03492	1.00000
5.8G;D1D (Radio 3)	3.70	20.44	24.14	0.25942	27	0.02832	1.00000
2.4G;BT-LE (Radio 4)	4.50	5.52	10.02	0.01005	27	0.00110	1.00000

**Radio 1 (2.4GHz) + Radio 2 (5GHz) + Radio 3 (2.4GHz) + Radio 4 (BT4.0)**

Mode	Gain (dBi)	Power (dBm)	EIRP (dBm)	EIRP (W)	Distance (cm)	S (W/m <sup>2</sup> )	S Limit (W/m <sup>2</sup> )	Ratio (S/Limit)
2.4G;D1D (Radio 1)	5.4	25.91	31.31	1.35207	27	0.14759	1	0.14759
5.2G;D1D (Radio 2)	5.80	25.91	31.71	1.48252	27	0.16183	1	0.16183
2.4G;D1D (Radio 3)	3.9	20.92	24.82	0.30339	27	0.03312	1	0.03312
2.4G;BT-LE (Radio 4)	4.5	5.52	10.02	0.01005	27	0.00110	1	0.00110
							Sum Ratio	0.34364
							Ratio Limit	1



Radio 1 (2.4GHz) + Radio 2 (5GHz) + Radio 3 (5GHz) + Radio 4 (BT4.0)

Mode	Gain (dBi)	Power (dBm)	EIRP (dBm)	EIRP (W)	Distance (cm)	S (W/m <sup>2</sup> )	S Limit (W/m <sup>2</sup> )	Ratio (S/Limit)
2.4G;D1D (Radio 1)	5.4	25.91	31.31	1.35207	27	0.14759	1	0.14759
5.8G;D1D (Radio 2)	5.8	25.91	31.71	1.48252	27	0.16183	1	0.16183
5.6G;D1D (Radio 3)	3.7	21.35	25.05	0.31989	27	0.03492	1	0.03492
2.4G;BT-LE (Radio 4)	4.5	5.52	10.02	0.01005	27	0.00110	1	0.00110
							Sum Ratio	0.34544
							Ratio Limit	1



**Simultaneous Transmission Analysis Mode (Omni Antenna / Set 6):**

**MPE**

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	EIRP (W)	Distance (cm)	S (mW/cm <sup>2</sup> )	S Limit (mW/cm <sup>2</sup> )
2.4G;D1D (Radio 1)	5.20	25.91	31.11	1.29122	27	0.14095	1.00000
5.2G;D1D (Radio 2)	5.80	25.91	31.71	1.48252	27	0.16183	1.00000
5.3G;D1D (Radio 2)	5.80	23.95	29.75	0.94406	27	0.10305	1.00000
5.6G;D1D (Radio 2)	5.80	23.87	29.67	0.92683	27	0.10117	1.00000
5.8G;D1D (Radio 2)	5.80	25.67	31.47	1.40281	27	0.15313	1.00000
2.4G;D1D (Radio 3)	1.96	20.92	22.88	0.19409	27	0.02119	1.00000
5.2G;D1D (Radio 3)	2.25	21.24	23.49	0.22336	27	0.02438	1.00000
5.3G;D1D (Radio 3)	2.25	21.31	23.56	0.22699	27	0.02478	1.00000
5.6G;D1D (Radio 3)	2.25	21.35	23.60	0.22909	27	0.02501	1.00000
5.8G;D1D (Radio 3)	2.25	20.44	22.69	0.18578	27	0.02028	1.00000
2.4G;BT-LE (Radio 4)	2.56	5.52	8.08	0.00643	27	0.00070	1.00000

**Radio 1 (2.4GHz) + Radio 2 (5GHz) + Radio 3 (2.4GHz) + Radio 4 (BT4.0)**

Mode	Gain (dBi)	Power (dBm)	EIRP (dBm)	EIRP (W)	Distance (cm)	S (W/m <sup>2</sup> )	S Limit (W/m <sup>2</sup> )	Ratio (S/Limit)
2.4G;D1D (Radio 1)	5.2	25.91	31.11	1.29122	27	0.14095	1	0.14095
5.2G;D1D (Radio 2)	5.8	25.91	31.71	1.48252	27	0.16183	1	0.16183
2.4G;D1D (Radio 3)	1.96	20.92	22.88	0.19409	27	0.02119	1	0.02119
2.4G;BT-LE (Radio 4)	2.56	5.52	8.08	0.00643	27	0.00070	1	0.00070
							Sum Ratio	0.32467
							Ratio Limit	1



Radio 1 (2.4GHz) + Radio 2 (5GHz) + Radio 3 (5GHz) + Radio 4 (BT4.0)

Mode	Gain (dBi)	Power (dBm)	EIRP (dBm)	EIRP (W)	Distance (cm)	S (W/m <sup>2</sup> )	S Limit (W/m <sup>2</sup> )	Ratio (S/Limit)
2.4G;D1D (Radio 1)	5.2	25.91	31.11	1.29122	27	0.14095	1	0.14095
5.2G;D1D (Radio 2)	5.8	25.91	31.71	1.48252	27	0.16183	1	0.16183
5.6G;D1D (Radio 3)	2.25	21.35	23.60	0.22909	27	0.02501	1	0.02501
2.4G;BT-LE (Radio 4)	2.56	5.52	8.08	0.00643	27	0.00070	1	0.00070
							Sum Ratio	0.32849
							Ratio Limit	1