



# FCC RADIO EXPOSURE TEST REPORT

**FCC ID** : G95-CGA4234  
**Equipment Name** : DOCSIS3.1 Wireless Residential Gateway with Embedded Digital Voice Adapter  
**Trade Name** : technicolor  
**Model Number** : CGA4234  
**Product Code** : CGA4234DGW-TCH, CGA4234VGW-TCH  
**Applicant** : Technicolor Connected Home USA LLC  
5030 Sugarloaf Parkway Building 6  
Lawrenceville, GA 30044  
**Standard** : 47 CFR Part 2.1091

The product was received on Jan. 19, 2018, and testing was started from Jan. 23, 2018 and completed on Jul. 23, 2018. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in 47 CFR Part 2.1091 and shown compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.



Approved by: Sam Chen

**SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory**

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



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### History of this test report

Report No.	Version	Description	Issued Date
FA811125	01	Initial issue of report	Sep. 10, 2018



### Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
2	-	Exposure evaluation	PASS	-

Reviewed by: Sam Chen

Report Producer: Viola Huang



# 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)
5GHz WLAN	5150-5250 5725-5850	5180-5240 5745-5825	802.11a/n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)

## 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

Test site Designation No. TW0006 with FCC.

Test site registered number IC 4086D with Industry Canada.



## 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 30 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

Antenna Type : PIFA Antenna

Conducted Power for IEEE 802.11b, 1S3T, CDD : 29.84 dBm

Test Freq (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Average Output Power (dBm)	Average Output Power (mW)	EIRP (dBm)	EIRP (W)	Power Density (S) (mW/cm <sup>2</sup> )	Limit of Power Density (S) (mW/cm <sup>2</sup> )
2412	2.35	1.71791	29.84	963.82902	32.19	1.65577	0.14640	1

Note:

- G = Antenna Gain (numeric) >> 10<sup>(2.35/10)</sup> = 1.71791
- P = dBm to mW >> 10<sup>(29.84/10)</sup> = 963.82902 mW
- D = Distance >> 0.30 m
- $E = \sqrt{(30 * P * G)} / d = \sqrt{(30 * 1655.76996)} / 0.30 = 1114.37313 \text{ V/m}$
- PD(S) = (E<sup>2</sup>/377)/10000 = ((1114.37313<sup>2</sup>)/377)/10000 = 0.14640 mW/cm<sup>2</sup>

Conducted Power for IEEE 802.11ac 20MHz Nss 1 MCS0, 1S4T, TXBF: 28.12 dBm

Test Freq (MHz)	Directional Gain (dBi)	Antenna Gain (numeric)	Average Output Power (dBm)	Average Output Power (mW)	EIRP (dBm)	EIRP (W)	Power Density (S) (mW/cm <sup>2</sup> )	Limit of Power Density (S) (mW/cm <sup>2</sup> )
5240	6.92	4.92040	28.12	648.63443	35.04	3.19154	0.28219	1

Note:

- G = Antenna Gain (numeric) >> 10<sup>(6.92/10)</sup> = 4.92040
- P = dBm to mW >> 10<sup>(28.12/10)</sup> = 648.63443 mW
- D = Distance >> 0.30 m
- $E = \sqrt{(30 * P * G)} / d = \sqrt{(30 * 3191.53786)} / 0.30 = 1547.14362 \text{ V/m}$
- PD(S) = (E<sup>2</sup>/377)/10000 = ((1547.14362<sup>2</sup>)/377)/10000 = 0.28219 mW/cm<sup>2</sup>



Conducted Power for IEEE 802.11ac 40MHz Nss 1 MCS0, 1S4T, TXBF: 28.67 dBm

Test Freq (MHz)	Directional Gain (dBi)	Antenna Gain (numeric)	Average Output Power (dBm)	Average Output Power (mW)	EIRP (dBm)	EIRP (W)	Power Density (S) (mW/cm <sup>2</sup> )	Limit of Power Density (S) (mW/cm <sup>2</sup> )
5795	7.31	5.38270	28.67	736.20710	35.98	3.96278	0.35039	1

Note:

- G = Antenna Gain (numeric) >> 10<sup>^(7.31/10)</sup> = 5.38270
- P = dBm to mW >> 10<sup>^(28.67/10)</sup> = 736.20710 mW
- D = Distance >> 0.30 m
- E =  $\sqrt{(30 * P * G) / d}$  =  $\sqrt{(30 * 3962.78034 / 0.30)}$  = 1723.97368 V/m
- PD(S) = (E<sup>2</sup>/377)/10000 = ((1723.97368<sup>2</sup>)/377)/10000 = 0.35039 mW/cm<sup>2</sup>

**Conclusion:**

Both of the WLAN 2.4GHz Band and WLAN 5GHz Band can transmit simultaneously, the formula of calculated the MPE is:

**CPD1 / LPD1 + CPD2 / LPD2 + .....etc. < 1**

**CPD = Calculation power density**

**LPD = Limit of power density**

Therefore, the worst-case situation is 0.14640 / 1 + 0.35039 / 1 = 0.49679, which is less than "1". This confirmed that the device complies.

Note: The above evaluated result include the power tolerance.