

RF Exposure Evaluation Report

APPLICANT : Technicolor Connected Home USA LLC
EQUIPMENT : DOCSIS 3.1 Residential Voice Gateway
BRAND NAME : Technicolor
MODEL NAME : CGA437TTCH4, CGA437TXXXXX (where X
can be alphanumeric, -, or blank)
FCC ID : G95-CGA437T
STANDARD : 47 CFR Part 2.1091

The product evaluation date was started from Dec. 08, 2022 and completed on Dec. 08, 2022. We, Sporton International Inc. (Kunshan), would like to declare that the device has been evaluated in accordance with 47 CFR Part 2.1091 and FCC KDB 447498 D01 v06, and pass the limit. Without written approval of Sporton International Inc. (Kunshan), the test report shall not be reproduced except in full.



Approved by: Si Zhang



Sporton International Inc. (Kunshan)

***No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300
People's Republic of China***



Table of Contents

1. ADMINISTRATION DATA	4
1.1. Testing Laboratory	4
2. DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)	5
3. MAXIMUM RF AVERAGE OUTPUT TUNE UP POWER AMONG PRODUCTION UNITS	6
4. RF EXPOSURE LIMIT INTRODUCTION	9
5. RADIO FREQUENCY RADIATION EXPOSURE EVALUATION	10
5.1. Standalone Power Density Calculation	10
5.2. Collocated Power Density Calculation.....	11

**Revision History**

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA2O1817	Rev. 01	Initial issue of report.	Dec. 23, 2022
FA2O1817	Rev. 02	Added the transmitter simultaneously evaluation on section 5.2	Jan. 19, 2022



1. Administration Data

1.1. Testing Laboratory

Sporton International Inc. (Kunshan) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Testing Laboratory			
Test Firm	Sporton International Inc. (Kunshan)		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158 FAX : +86-512-57900958		
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.
	SAR01-KS	CN1257	314309

Applicant	
Company Name	Technicolor Connected Home USA LLC
Address	4855 Peachtree Industrial Blvd. Suite 200 Norcross, Georgia 30092

Manufacturer	
Company Name	Technicolor Connected Home USA LLC
Address	4855 Peachtree Industrial Blvd. Suite 200 Norcross, Georgia 30092



2. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	DOCSIS 3.1 Residential Voice Gateway
Brand Name	Technicolor
Model Name	CGA437TTCH4, CGA437TXXXXX (where X can be alphanumeric, -, or blank)
FCC ID	G95-CGA437T
Wireless Technology and Frequency Range	WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz WLAN 5.2GHz Band: 5180 MHz ~ 5240 MHz WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz WLAN 6GHz U-NII-5: 5925 MHz ~ 6425 MHz WLAN 6GHz U-NII-6: 6425 MHz ~ 6525 MHz WLAN 6GHz U-NII-7: 6525 MHz ~ 6875 MHz WLAN 6GHz U-NII-8: 6875 MHz ~ 7125 MHz
Mode	WLAN 2.4GHz 802.11b/g/n HT20/HT40 WLAN 2.4GHz 802.11ac VHT20/VHT40/ WLAN 2.4GHz 802.11ax HE20/HE40 WLAN 5GHz 802.11a/n HT20/HT40 WLAN 5GHz 802.11ac VHT20/VHT40/VHT80 WLAN 5GHz 802.11ax HE20/HE40/HE80 WLAN 6GHz 802.11ax HE20/HE40/HE80/HE160
Antenna Type	WLAN: Murphy Antenna
HW Version	1.0.0
SW Version	RG21.3-CGA437TTCH3-TCH_CORE-21.2P1_WLAN
EUT Stage	Identical Prototype

Remark:

- The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
- This device support beamforming for WLAN 2.4GHz 802.11n/ac/ax HT20/HT40/VHT20/VHT40/HE20/HE40, WLAN 5GHz 802.11n/ac/ax HT20/HT40/VHT20/VHT40/VHT80/HE20/HE40/HE80, WLAN 6GHz 802.11ax HE20/HE40/HE80/HE160.
- The device supports 1S4T(CDD&TXBF) and 4S4T(SDM) mode, and SDM mode is only for WLAN 2.4GHz and WLAN 5GHz.
- WLAN2.4GHz/WLAN5GHz all support SISO and MIMO mode, we chose MIMO tune up power to perform MPE calculation conservatively.

Comments and Explanations:

- The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.
- The maximum RF output tune up power, antenna gain also the safe distance used for evaluate RF exposure were declared by manufacturer.

Antenna Gain:

WLAN	Ant.1	Ant.2	Ant.3	Ant.4	Beamforming	SDM
WLAN2.4GHz	4.35	5.11	4.10	3.53	7.58	1.87
WLAN5.2GHz	3.95	4.10	3.00	4.50	7.39	1.94
WLAN5.8GHz	3.08	3.58	4.51	3.73	8.14	2.14
WLAN6GHz	4.29	5.05	4.53	5.25	8.29	-



3. Maximum RF average output tune up power among production units

<For CDD/MIMO mode>

<2.4GHz WLAN >

Mode		Maximum Average Power (dBm)
		Ant.1+2+3+4
2.4GHz	802.11b	30.0
	802.11g	30.0
	802.11n-HT20	30.0
	802.11n-HT40	28.0
	802.11ac-VHT20	30.0
	802.11ac-VHT40	28.0
	802.11ax-HE20	30.0
	802.11ax-HE40	28.0

<5GHz WLAN >

Mode		Maximum Average Power (dBm)
		Ant.1+2+3+4
5.2GHz	802.11a	27.0
	802.11n-HT20	28.0
	802.11n-HT40	28.0
	802.11ac-VHT20	28.0
	802.11ac-VHT40	28.0
	802.11ac-VHT80	24.0
	802.11ax-HE20	30.0
	802.11ax-HE40	29.0
	802.11ax-HE80	24.0
5.8GHz	802.11a	30.0
	802.11n-HT20	30.0
	802.11n-HT40	30.0
	802.11ac-VHT20	30.0
	802.11ac-VHT40	30.0
	802.11ac-VHT80	30.0
	802.11ax-HE20	30.0
	802.11ax-HE40	30.0
	802.11ax-HE80	30.0

<6GHz WLAN >

Mode		Maximum Average Power (dBm)
		Ant.1+2+3+4
6GHz	802.11ax-HE20	11.24
	802.11ax-HE40	14.74
	802.11ax-HE80	17.74
	802.11ax-HE160	19.74

Note: WLAN2.4GHz/WLAN5GHz/6GHz all support SISO/MIMO mode, we only chose MIMO tune up power to perform MPE calculation conservatively for MIMO power is higher.

<For SDM mode>

<2.4GHz WLAN >

Mode		Maximum Average Power (dBm)
		Ant.1+2+3+4
2.4GHz	802.11n-HT20	30.0
	802.11n-HT40	30.0
	802.11ac-VHT20	30.0
	802.11ac-VHT40	28.0
	802.11ax-HE20	30.0
	802.11ax-HE40	28.0

<5GHz WLAN >

Mode		Maximum Average Power (dBm)
		Ant.1+2+3+4
5.2GHz	802.11n-HT20	30.0
	802.11n-HT40	30.0
	802.11ac-VHT20	30.0
	802.11ac-VHT40	30.0
	802.11ac-VHT80	24.0
	802.11ax-HE20	30.0
	802.11ax-HE40	30.0
	802.11ax-HE80	24.0
5.8GHz	802.11n-HT20	30.0
	802.11n-HT40	30.0
	802.11ac-VHT20	30.0
	802.11ac-VHT40	30.0
	802.11ac-VHT80	30.0
	802.11ax-HE20	30.0
	802.11ax-HE40	30.0
	802.11ax-HE80	30.0

Note: This device support SDM for WLAN 2.4GHz 802.11n/ac/ax HT20/HT40/VHT20/VHT40/HE20/HE40 and WLAN 5GHz 802.11n/ac/ax HT20/HT40/VHT20/VHT40/VHT80/HE20/HE40/HE80.



<For Beamforming mode>

<2.4GHz WLAN >

Mode		Maximum Average Power (dBm)
		Ant.1+2+3+4
2.4GHz	802.11n-HT20	28.4
	802.11n-HT40	27.0
	802.11ac-VHT20	28.4
	802.11ac-VHT40	27.0
	802.11ax-HE20	28.4
	802.11ax-HE40	27.0

<5GHz WLAN >

Mode		Maximum Average Power (dBm)
		Ant.1+2+3+4
5.2GHz	802.11n-HT20	28.0
	802.11n-HT40	28.0
	802.11ac-VHT20	28.0
	802.11ac-VHT40	28.0
	802.11ac-VHT80	20.0
	802.11ax-HE20	28.0
	802.11ax-HE40	28.0
	802.11ax-HE80	20.0
5.8GHz	802.11n-HT20	27.8
	802.11n-HT40	27.8
	802.11ac-VHT20	27.8
	802.11ac-VHT40	27.8
	802.11ac-VHT80	27.8
	802.11ax-HE20	27.8
	802.11ax-HE40	27.8
	802.11ax-HE80	27.8

<6GHz WLAN >

Mode		Maximum Average Power (dBm)
		Ant.1+2+3+4
6GHz	802.11ax-HE20	11.21
	802.11ax-HE40	14.21
	802.11ax-HE80	16.21
	802.11ax-HE160	18.71

Note: This device support beamforming for WLAN 2.4GHz 802.11n/ac/ax HT20/HT40/VHT20/VHT40/HE20/HE40, WLAN 5GHz 802.11n/ac/ax HT20/HT40/VHT20/VHT40/VHT80/HE20/HE40/HE80, WLAN 6GHz 802.11ax HE20/HE40/HE80/HE160

4. RF Exposure Limit Introduction

According to ANSI/IEEE C95.1-1992, the criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §1.1310.

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f ²)	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				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500			f/1500	30
1500-100,000			1.0	30

The MPE was calculated at 26 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

$$S = \frac{PG}{4\pi R^2}$$

Where:

S = Power Density

P = Output Power at Antenna Terminals

G = Gain of Transmit Antenna (linear gain)

R = Distance from Transmitting Antenna

5. Radio Frequency Radiation Exposure Evaluation

5.1. Standalone Power Density Calculation

<For CDD/MIMO mode>

Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Average EIRP (mW)	Power Density at 26cm (mW/cm ²)	Limit (mW/cm ²)	Power Density / Limit
2.4GHz WLAN	2412.0	5.11	30.00	35.110	3243.396	0.382	1.000	0.382
5.2GHz WLAN	5180.0	4.50	30.00	34.500	2818.383	0.332	1.000	0.332
5.8GHz WLAN	5745.0	4.51	30.00	34.510	2824.880	0.333	1.000	0.333
6GHz WLAN	2925.0	5.25	19.74	24.990	315.500	0.037	1.000	0.037

<For Beamforming mode>

Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Average EIRP (mW)	Power Density at 26cm (mW/cm ²)	Limit (mW/cm ²)	Power Density / Limit
2.4GHz WLAN	2412.0	7.58	28.40	35.980	3962.780	0.467	1.000	0.467
5.2GHz WLAN	5180.0	7.39	28.00	35.390	3459.394	0.407	1.000	0.407
5.8GHz WLAN	5745.0	8.14	27.50	35.640	3664.376	0.462	1.000	0.462
6GHz WLAN	2925.0	8.29	18.71	27.000	501.187	0.059	1.000	0.059

<For SDM mode>

Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Average EIRP (mW)	Power Density at 26cm (mW/cm ²)	Limit (mW/cm ²)	Power Density / Limit
2.4GHz WLAN	2412.0	1.87	30.00	31.870	1538.155	0.181	1.000	0.181
5.2GHz WLAN	5180.0	1.94	28.00	29.940	986.279	0.116	1.000	0.116
5.8GHz WLAN	5745.0	2.14	30.00	32.140	1636.817	0.193	1.000	0.193

Note:

1. For conservativeness, the lowest frequency of each band is used to determine the MPE limit of that band.
2. Chose the maximum power to do MPE analysis.

5.2. Collocated Power Density Calculation

<For CDD/MIMO mode>

WLAN2.4GHz Power Density / Limit	WLAN5GHz Power Density / Limit	WLAN6GHz Power Density / Limit	Σ (Power Density / Limit) of WLAN2.4GHz + WLAN5GH + WLAN6GHz
0.382	0.333	0.037	0.752

<For Beamforming mode>

WLAN2.4GHz Power Density / Limit	WLAN5GHz Power Density / Limit	WLAN6GHz Power Density / Limit	Σ (Power Density / Limit) of WLAN2.4GHz + WLAN5GH + WLAN6GHz
0.467	0.462	0.059	0.988

Note:

1. Due to (power density /limit) of CDD/MIMO mode is more than SDM mode, so it is no need to consider SDM mode simultaneous transmission analysis.
2. Σ (Power Density / Limit): This is a summation of [(power density for each transmitter/antenna included in the simultaneous transmission)/ (corresponding MPE limit)], for WLAN2.4GHz + WLAN5GHz + WLAN6GHz.
3. Considering the WLAN2.4GHz and WLAN5GHz module collocation with the WLAN6GHz transmitter of the EIRP performance listed in the table above, the aggregated (power density /limit) is smaller than 1, and MPE of 3 collocated transmitters is compliant.

Conclusion:

According to 47 CFR §2.1091, the RF exposure analysis concludes that the RF Exposure is FCC compliant.

-----THE END-----