

RF Exposure Report

Report No.: SA180903E04

FCC ID: G95TCHT2AA0

Test Model: TCHT2AA0

Received Date: Sep. 03, 2018

Test Date: Oct. 05, 2018

Issued Date: Dec. 18, 2018

Applicant: Technicolor Connected Home USA LLC

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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
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**FCC Registration /
Designation Number:** 723255 / TW2022

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Release Control Record

Issue No.	Description	Date Issued
SA180903E04	Original release.	Dec. 18, 2018

1 Certificate of Conformity

Product: Integrated Device

Brand: Technicolor

Test Model: TCHT2AA0

Sample Status: FGR1

Applicant: Technicolor Connected Home USA LLC

Test Date: Oct. 05, 2018

Standards: FCC Part 2 (Section 2.1091)

KDB 447498 D01 General RF Exposure Guidance v06

IEEE C95.1-1992

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.

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Approved by : May Chen , **Date:** Dec. 18, 2018
May Chen / 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				
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

f = Frequency in MHz ; *Plane-wave equivalent power density

2.2 MPE Calculation Formula

$$P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot r^2)$$

where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 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 20cm away from the body of the user.
So, this device is classified as **Mobile Device**.

2.4 Antenna Gain

WLAN & BT Antenna Spec.					
Antenna No.	Gain(dBi) Including cable loss	Frequency range (MHz)	Antenna Type	Antenna Connector	Cable Length (mm)
WiFi 1 & BT (Ant 2)	3.79 (BT)	2400~2500	PCB	i-pex(MHF)	130 +/-2
	Refer to below table	2400~2500			
		5150~5250			
		5250~5350			
		5470~5725			
5725~5850					
WiFi 2 (Ant 1)	Refer to below able	2400~2500	PCB	i-pex(MHF)	115 +/-2
		5150~5250			
		5250~5350			
		5470~5725			
		5725~5850			
Zigbee Antenna Spec.					
Antenna No.	Gain(dBi) Including cable loss	Frequency range (MHz)	Antenna Type	Antenna Connector	Cable Length (mm)
Zigbee	4.50	2400~2500	PCB	i-pex(MHF)	60 +/-2
LTE Antenna Spec.					
Antenna No.	Gain(dBi) Including cable loss	Frequency range (MHz)	Antenna Type	Antenna Connector	Cable Length (mm)
LTE	1.10	700~900	PCB	i-pex(MHF)	85 +/-2
	2.4	1700~2150			

2.4GHz				
Channel (MHz)	SISO 1S1T Ant 1 (dBi)	SISO 1S1T Ant 2 (dBi)	CCD mode for power gain 1S2T (1&2) (dBi)	CCD mode for PSD gain 1S2T (1&2) (dBi)
2412	2.37	3.79	3.79	5.75
2422	2.48	3.63	3.63	5.64
2437	2.44	3.56	3.56	5.62
2452	2.49	3.42	3.42	5.52
2462	2.50	3.33	3.33	5.35
5GHz				
Channel (MHz)	SISO 1S1T Ant 1 (dBi)	SISO 1S1T Ant 2 (dBi)	CCD mode for power gain 1S2T (1&2) (dBi)	CCD mode for PSD gain 1S2T (1&2) (dBi)
5180	3.21	4.23	4.23	5.82
5190	3.20	4.07	4.07	5.80
5200	3.10	4.00	4.00	5.74
5210	3.15	3.72	3.72	5.62
5230	2.98	3.72	3.72	5.55
5240	3.01	3.74	3.74	5.56
5250	3.00	3.57	3.57	5.48
5260	2.85	3.54	3.54	5.45
5270	2.98	3.45	3.45	5.45
5290	2.89	3.24	3.24	5.31
5300	2.95	3.20	3.20	5.24
5310	2.97	3.09	3.09	5.32
5320	3.17	3.20	3.20	5.54
5500	2.75	2.55	2.75	5.06
5510	2.80	2.53	2.80	4.99
5530	2.70	2.73	2.73	5.17
5550	2.66	2.87	2.87	5.10
5570	2.23	2.38	2.38	4.71
5580	2.16	2.45	2.45	4.73
5590	2.16	2.54	2.54	4.68
5600	2.38	2.49	2.49	4.58
5610	2.46	2.40	2.46	4.60
5620	2.44	2.42	2.44	4.71
5630	2.36	2.46	2.46	4.77
5670	2.52	2.49	2.52	5.12
5690	2.55	2.60	2.60	5.28
5700	2.54	2.57	2.57	5.24
5710	2.67	2.59	2.67	5.26
5720	2.71	2.70	2.71	5.28
5745	2.79	2.78	2.79	5.27
5755	2.95	2.87	2.95	5.28
5775	3.00	3.08	3.08	5.33
5785	2.86	2.96	2.96	5.10
5795	2.89	2.94	2.94	5.10
5825	3.13	3.22	3.22	5.24

2.5 Calculation Result

For WLAN, Zigbee, Bluetooth

Operation Mode	Evaluation Frequency (MHz)	Max. Average Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
WLAN 2.4GHz	2437	303.119	5.62	20	0.21996	1
WLAN UNII-1	5230	249.626	5.55	20	0.17825	1
WLAN UNII-2A	5260	250.195	5.45	20	0.17459	1
WLAN UNII-2C	5550	250.201	5.10	20	0.16107	1
WLAN UNII-3	5755	313.358	5.28	20	0.21027	1
Bluetooth	2440	8.147	3.79	20	0.00388	1
Zigbee	2440	122.462	4.50	20	0.06866	1

*Limit of Power Density = F/1500

For 3G/LTE <Worst case> (FCC ID: QIPEMS31-X)

Operation Mode	Evaluation Frequency (MHz)	Max. Average Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
CAT M1 B12	715.3	214.783	1.10	20	0.05505	0.4769*

*Limit of Power Density = F/1500

Conclusion:

The formula of calculated the MPE is:

$CPD1 / LPD1 + CPD2 / LPD2 + \dots \text{etc.} < 1$

CPD = Calculation power density

LPD = Limit of power density

WLAN 2.4GHz + Zigbee + LTE = $0.21996 / 1 + 0.06866 / 1 + 0.05505 / 0.4769 = 0.40406$

WLAN 5GHz + Zigbee + LTE = $0.21027 / 1 + 0.06866 / 1 + 0.05505 / 0.4769 = 0.39437$

Bluetooth + Zigbee + LTE = $0.00388 / 1 + 0.06866 / 1 + 0.05505 / 0.4769 = 0.18798$

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

Appendix

3G/LTE module

MPE Evaluation for FCC ID: QIPEMS31-X Module

Operation Mode	Evaluation Frequency (MHz)	Max. Average Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)	Ratio
CAT M1 B2	1850.7	218.273	2.40	20	0.07546	1	0.07546
CAT M1 B4	1710.7	230.675	2.40	20	0.07975	1	0.07975
CAT M1 B12	715.3	214.783	1.10	20	0.05505	0.4769*	0.11544
CAT M1 B13	782	195.884	1.10	20	0.05020	0.5213*	0.09629

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