

RF Exposure Report

Report No.: SA160818E07

FCC ID: G95TCA301

Test Model: TCA301TCH1

Series Model: TCA301TCH2, TCA301ROG1, TCA301COX2, TCA301BHN2,
TCA301CMP2, TCA301TWC2

Received Date: Aug. 06, 2016

Test Date: Aug. 23, 2016

Issued Date: Dec. 15, 2016

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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Release Control Record

Issue No.	Description	Date Issued
SA160818E07	Original release.	Dec. 15, 2016

1 Certificate of Conformity

Product: Integrated Device

Brand: Technicolor

Test Model: TCA301TCH1

Series Model: TCA301TCH2, TCA301ROG1, TCA301COX2, TCA301BHN2, TCA301CMP2,
TCA301TWC2

Sample Status: ENGINEERING SAMPLE

Applicant: Technicolor Connected Home USA LLC

Test Date: Aug. 23, 2016

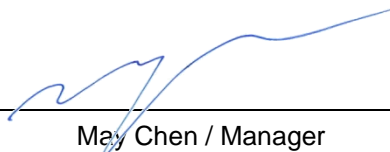
Standards: FCC Part 2 (Section 2.1091)

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.

Prepared by :  , **Date:** Dec. 15, 2016
Claire Kuan / Specialist

Approved by :  , **Date:** Dec. 15, 2016
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				
300-1500	F/1500	30
1500-100,000	1.0	30

F = Frequency in MHz

2.2 MPE Calculation Formula

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

where

Pd = power density in mW/cm²

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 20cm away from the body of the user.

So, this device is classified as **Mobile Device**.

2.4 Antenna Gain

1 The antennas provided to the EUT, please refer to the following table:

WLAN & BT Antenna Spec.					
Antenna No.	Transmitter Circuit	Max Gain(dBi) Including cable loss	Frequency range (MHz)	Antenna Type	Antenna Connector
WiFi 1 & BT	Chain (0)	2.29	2400~2500	FPCB	i-pex(MHF)
		3.36	5150~5250		
		3.66	5250~5350		
		3.77	5470~5725		
		3.36	5725~5850		
WiFi 2	Chain (1)	2.34	2400~2500	PCB	i-pex(MHF)
		3.62	5150~5250		
		3.55	5250~5350		
		2.86	5470~5725		
		2.99	5725~5850		
Zigbee Antenna Spec.					
Antenna No.		Gain(dBi) Including cable loss	Frequency range (MHz)	Antenna Type	Antenna Connector
Zigbee-A		2.33	2400~2500	PCB	i-pex(MHF)
Zigbee- Thread		2.5	2400~2500	PCB	i-pex(MHF)
WWAN Antenna Spec.					
Antenna No.		Gain(dBi) Including cable loss	Frequency range (MHz)	Antenna Type	Antenna Connector
WWAN 1		1.62	704~894	PCB	i-pex(MHF)
		2.36	1710~2170		
WWAN 2		0.63	704~894	FPCB	i-pex(MHF)
		1.66	1710~2170		

2 The detail information of WLAN antenna gain as below table:

2.4GHz					
	Channel	SISO 1S1T Ant 1	SISO 1S1T Ant 2	CCD mode for power gain 1S2T (1&2)	CCD mode for PSD gain 1S2T (1&2)
BW20	2412	1.29	1.90	1.90	4.17
	2437	1.65	1.98	1.98	4.28
	2462	2.15	2.15	2.15	4.60
BW40	2422	1.39	1.94	1.94	4.22
	2437	1.65	1.98	1.98	4.28
	2452	2.03	2.09	2.09	4.51
5GHz					
	Channel	SISO 1S1T Ant 1	SISO 1S1T Ant 2	CCD mode for power gain 1S2T (1&2)	CCD mode for PSD gain 1S2T (1&2)
BW20	5180	2.66	3.38	3.38	4.57
	5200	2.81	3.38	3.38	4.59
	5240	3.32	3.55	3.55	4.72
	5260	3.43	3.54	3.54	4.81
	5300	3.53	3.25	3.53	4.48
	5320	3.66	3.08	3.66	4.26
	5500	3.76	2.59	3.76	3.38
	5580	3.34	2.37	3.34	3.31
	5700	3.24	2.73	3.24	3.24
	5745	3.26	2.94	3.26	3.50
	5785	3.23	2.84	3.23	3.55
	5825	1.68	2.86	2.86	3.34
BW40	5190	3.73	3.31	3.31	4.51
	5230	3.36	3.62	3.62	4.77
	5270	3.45	3.5	3.50	4.76
	5310	3.46	3.07	3.46	4.28
	5510	3.78	2.45	3.78	3.33
	5550	3.55	2.06	3.55	3.47
	5670	3.21	2.65	3.21	3.06
	5755	3.28	2.99	3.28	3.57
	5795	2.56	2.86	2.86	3.31

2.5 Calculation Result

WLAN

Frequency Band (MHz)	Max. Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
2412 ~ 2462	154.565	4.60	20	0.08868	1
5180 ~ 5240, 5260 ~ 5320, 5500 ~ 5580 & 5660 ~ 5700, 5745 ~ 5825	170.674	4.81	20	0.10278	1

BT-EDR

Frequency Band (MHz)	Max. Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
2402 ~ 2480	2.118	2.29	0.2	0.00071	1

BT-LE

Frequency Band (MHz)	Max. Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
2402 ~ 2480	1.442	2.29	0.2	0.00049	1

Zigbee

Frequency Band (MHz)	Max. Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
2405 ~ 2475	170.216	2.33	20	0.05791	1

Zigbee Thread

Frequency Band (MHz)	Max. Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
2405 ~ 2475	151.356	2.33	0.2	0.05355	1

WWAN

Frequency Band (MHz)	Time average power (mW)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
824MHz ~849MHz	568.775 ^(Note)	0.2	0.18564	0.5495

Note

Operation Mode	The Worst Case			Total Peak. Power Output		Time average power (mW)	Power Density (mW/cm ²)	
	Mode	Channel Number	Freq. (MHz)	mW	dBm		Value	Limit
850 band (e.r.p.)	GPRS	128	824.2	2275.1	33.57	933.125	0.30445	0.5495
1900 band (e.i.r.p.)	GPRS	512	1850.2	1279.38	31.07	319.845	0.06363	1

Note: Calculations for RF Exposure compliance in the cellular and PCS bands are base on the maximum source based time-average power obtained from 2-Slot GPRS operation. The resulting duty cycle factor is 2/8, or 6.02dB.

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

Simultaneously transmission condition.

Condition	Technology				
1	WLAN (2.4GHz)	Bluetooth	Zigbee	Zigbee Thread	WWAN (2G/3G/4G)
2	WLAN (5GHz)	Bluetooth	Zigbee	Zigbee Thread	WWAN (2G/3G/4G)

Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.

Condition 1: $0.08868/1 + 0.00071/1 + 0.05791/1 + 0.05355/1 + 0.18564/0.5495 = 0.53871$

Condition 2: $0.010278/1 + 0.00071/1 + 0.05791/1 + 0.05355/1 + 0.18564/0.5495 = 0.55281$

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

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