

RF Exposure Report

Report No.: SA170526E11C

FCC ID: RSE-OWA0130

Equipment Name: Technicolor Wi-Fi Video Bridge & Extender

Trade Name: technicolor

Model Number: OWA0130

Received Date: June 05, 2018

Test Date: Aug. 15, 2018

Issued Date: Oct. 29, 2018

Applicant: Technicolor Delivery Technologies Belgium

Address: Prins Boudewijnlaan 47, 2650 Edegem Belgium

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Hsin Chu Laboratory

Lab Address: E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,
Taiwan R.O.C.

Test Location: E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,
Taiwan R.O.C.

**FCC Registration /
Designation Number:** 723255 / TW2022

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Table of Contents

Release Control Record	3
1 Certificate of Conformity.....	4
2 RF Exposure.....	5
2.1 Limits For Maximum Permissible Exposure (MPE).....	5
2.2 MPE Calculation Formula	5
2.3 Classification	5
2.4 Antenna Gain	6
2.5 Calculation Result of Maximum Conducted Power	9

Release Control Record

Issue No.	Description	Date Issued
SA170526E11C	Original release.	Oct. 29, 2018

1 Certificate of Conformity

Product: Technicolor Wi-Fi Video Bridge & Extender

Brand: technicolor

Test Model: OWA0130

Sample Status: Product Unit

Applicant: Technicolor Delivery Technologies Belgium

Test Date: Aug. 15, 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.

Prepared by : Wendy Wu , **Date:** Oct. 29, 2018
Wendy Wu / Specialist

Approved by : May Chen , **Date:** Oct. 29, 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				
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

Antenna location



Antenna & Bandwidth for 2400~2483.5MHz

Ant.	Brand	Model Name	Antenna Type	Connector
1	technicolor	--	Printed Antenna	Murata
2	technicolor	--	Printed Antenna	Murata

Antenna	1st (TX)		2nd (TX)	
Bandwidth Mode	20 MHz	40 MHz	20 MHz	40 MHz
802.11b	V	X	X	X
802.11g	V	X	X	X
802.11n	V	V	V	V

For 2400~2483.5MHz

Frequency	Antenna Gain (dBi)			
	Ant. 1 (W1)		Ant. 2 (W2)	
	20 MHz	40 MHz	20 MHz	40 MHz
2412MHz	2.60	-	3.70	-
2422MHz	-	2.70	-	3.60
2437MHz	2.70	2.70	3.00	3.00
2452MHz	-	2.60	-	3.00
2462MHz	2.60	-	3.10	-

Frequency	Maximum Gain (dBi) for CDD mode	
	SDM mode (2 Stream 2 TX) for Power & PSD Gain (KDB 662911 Option 2)	
	20 MHz	40 MHz
2412MHz	4.78	-
2422MHz	-	4.68
2437MHz	4.63	4.63
2452MHz	-	4.73
2462MHz	4.69	-

Note:

1. Antenna Gain refer to antenna report.
2. Maximum Correlated Directional Gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N_{ANT}]$ dBi
3. Maximum Uncorrelated Directional Gain = $10 \log[(10^{G1/10} + 10^{G2/10} + \dots + 10^{GN/10}) / N_{ANT}]$ dBi

Frequency	Maximum Gain (dBi) for SDM mode	
	SDM mode (2 Stream 2 TX) for Power & PSD Gain (KDB 662911 Option 2)	
	20 MHz	40 MHz
2412MHz	2.00	-
2422MHz	-	1.89
2437MHz	1.71	1.71
2452MHz	-	1.76
2462MHz	1.72	-

Note:

1. Antenna Gain refer to antenna report.
2. Maximum Correlated Directional Gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N_{ANT}]$ dBi
3. Maximum Uncorrelated Directional Gain = $10 \log[(10^{G1/10} + 10^{G2/10} + \dots + 10^{GN/10}) / N_{ANT}]$ dBi

Antenna & Bandwidth for 5150~5850MHz

Ant.	Brand	Model Name	Antenna Type	Connector	Cable Length
1	technicolor	--	Printed Antenna	Murata	--
2	technicolor	--	Printed Antenna	Murata	--
3	technicolor	--	Printed Antenna	I-pex	340mm
4	technicolor	--	Printed Antenna	I-pex	150mm

Antenna	1st (TX)			2nd (TX)			3rd (TX)			4th (TX)		
Bandwidth Mode	20 MHz	40 MHz	80 MHz	20 MHz	40 MHz	80 MHz	20 MHz	40 MHz	80 MHz	20 MHz	40 MHz	80 MHz
802.11a	V	X	X	V	X	X	V	X	X	V	X	X
802.11n	V	V	X	V	V	X	V	V	X	V	V	X
802.11ac	V	V	V	V	V	V	V	V	V	V	V	V

Frequency	Antenna Gain (dBi) for CDD/TxBF/SDM mode											
	1 Stream 4 TX for CDD/TxBF mode			2 Stream 4 TX for CDD/TxBF mode			3 Stream 4 TX for TxBF mode			4 Stream 4 TX for SDM mode		
	20 MHz	40 MHz	80 MHz	20 MHz	40 MHz	80 MHz	20 MHz	40 MHz	80 MHz	20 MHz	40 MHz	80 MHz
5180MHz	7.01	-	-	4.04	-	-	2.32	-	-	1.07	-	-
5190MHz	-	7.25	-	-	4.35	-	-	2.64	-	-	1.39	-
5200MHz	6.49	-	-	3.61	-	-	1.92	-	-	0.67	-	-
5210MHz	-	-	6.74	-	-	3.86	-	-	2.16	-	-	0.92
5230MHz	-	7.29	-	-	4.42	-	-	2.71	-	-	1.46	-
5240MHz	6.65	-	-	3.83	-	-	2.23	-	-	1	-	-
5260MHz	6.81	-	-	3.88	-	-	2.2	-	-	0.95	-	-
5270MHz	-	7.89	-	-	5	-	-	3.33	-	-	2.09	-
5290MHz	-	-	7.31	-	-	4.4	-	-	2.72	-	-	1.47
5300MHz	7.75	-	-	4.83	-	-	3.15	-	-	1.9	-	-
5310MHz	-	7.32	-	-	4.47	-	-	2.76	-	-	1.52	-
5320MHz	6.85	-	-	3.94	-	-	2.23	-	-	0.99	-	-
5500MHz	6.74	-	-	4.03	-	-	2.28	-	-	1.03	-	-
5510MHz	-	6.74	-	-	3.99	-	-	2.25	-	-	1.01	-
5530MHz	-	-	6.99	-	-	4.03	-	-	2.29	-	-	1.05
5550MHz	-	7.07	-	-	4.11	-	-	2.35	-	-	1.1	-
5580MHz	8.04	-	-	5.27	-	-	3.54	-	-	2.29	-	-
5670MHz	-	6.49	-	-	3.59	-	-	2.63	-	-	0.72	-
5700MHz	6.87	-	-	4.05	-	-	2.32	-	-	1.07	-	-
5745MHz	7.06	-	-	4.17	-	-	2.5	-	-	1.25	-	-
5755MHz	-	7.87	-	-	5.06	-	-	3.31	-	-	2.06	-
5775MHz	-	-	7.36	-	-	4.48	-	-	3.31	-	-	2.06
5785MHz	6.83	-	-	4.02	-	-	2.29	-	-	1.05	-	-
5795MHz	-	6.43	-	-	3.6	-	-	1.86	-	-	0.61	-
5825MHz	6.45	-	-	3.62	-	-	1.92	-	-	0.7	-	-

Note:

1. Antenna Gain refer to "OWA0130 with shielding antenna table_20161012.xls" files
2. Maximum Correlated Directional Gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N_{ANT}]$ dBi
3. Maximum Uncorrelated Directional Gain = $10 \log[(10^{G1/10} + 10^{G2/10} + \dots + 10^{GN/10}) / N_{ANT}]$ dBi

2.5 Calculation Result of Maximum Conducted Power

For 2.4GHz, 5GHz (U-NII-1 & UNII-3 band) and Bluetooth data was copied from the original test report (Report No.: SA170529E11B)

For WLAN – 2.4GHz Worst Condition: 802.11n (20MHz) 2Tx CDD

Frequency (MHz)	Conducted Power		Directional Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
	(dBm)	(mW)				
2437	19.61	91.419	4.63	20	0.05282	1

Note:

1. $P_{out} \cdot G = \text{EIRP Power} = \text{Conducted Power (mW)} \cdot \text{Gain (numeric)}$
2. $\text{Gain (dBi)} \text{ to } \text{Gain (numeric)} = 10^{(4.63/10)} = 2.904023$
3. Distance (cm) = r = declare by manufacture = 20 cm
4. $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot r^2) = (91.419 \cdot 2.904023) / (4 \cdot 3.1416 \cdot 20^2) = 0.05282 \text{ (mW/cm}^2\text{)}$

For WLAN – 5GHz U_NII 1 Worst Condition: 11ac (40MHz) 1S4T TxBF

Frequency (MHz)	Conducted Power		Directional Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
	(dBm)	(mW)				
5230	26.40	436.251	7.29	20	0.46501	1

Note:

1. $P_{out} \cdot G = \text{EIRP Power} = \text{Conducted Power (mW)} \cdot \text{Gain (numeric)}$
2. $\text{Gain (dBi)} \text{ to } \text{Gain (numeric)} = 10^{(7.29/10)} = 5.357967$
3. Distance (cm) = r = declare by manufacture = 20 cm
4. $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot r^2) = (436.251 \cdot 5.357967) / (4 \cdot 3.1416 \cdot 20^2) = 0.46501 \text{ (mW/cm}^2\text{)}$

For WLAN – 5GHz U_NII 2A Worst Condition: 11ac (40MHz) 1S4T TxBF

Frequency (MHz)	Conducted Power		Directional Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
	(dBm)	(mW)				
5270	21.42	138.723	7.89	20	0.16978	1

Note:

1. $P_{out} \cdot G = \text{EIRP Power} = \text{Conducted Power (mW)} \cdot \text{Gain (numeric)}$
2. $\text{Gain (dBi)} \text{ to } \text{Gain (numeric)} = 10^{(7.89/10)} = 6.151769$
3. Distance (cm) = r = declare by manufacture = 20 cm
4. $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot r^2) = (138.723 \cdot 6.151769) / (4 \cdot 3.1416 \cdot 20^2) = 0.16978 \text{ (mW/cm}^2\text{)}$

For WLAN – 5GHz U_NII 2C Worst Condition: 11ac (40MHz) 1S4T CDD

Frequency (MHz)	Conducted Power		Directional Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
	(dBm)	(mW)				
5670	22.63	183.417	6.49	20	0.16262	1

Note:

1. $P_{out} \cdot G = \text{EIRP Power} = \text{Conducted Power(mW)} \cdot \text{Gain(numeric)}$
2. $\text{Gain(dBi)} \text{ to } \text{Gain(numeric)} = 10^{(6.49/10)} = 4.456562$
3. Distance (cm) = r = declare by manufacture = 20 cm
4. $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot r^2) = (183.417 \cdot 4.456562) / (4 \cdot 3.1416 \cdot 20^2) = 0.16262 \text{ (mW/cm}^2\text{)}$

For WLAN – 5GHz U_NII 3 Worst Condition: 11ac (40MHz) 1S4T TxBF

Frequency (MHz)	Conducted Power		Directional Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
	(dBm)	(mW)				
5755	26.46	442.505	7.87	20	0.53907	1

Note:

1. $P_{out} \cdot G = \text{EIRP Power} = \text{Conducted Power(mW)} \cdot \text{Gain(numeric)}$
2. $\text{Gain(dBi)} \text{ to } \text{Gain(numeric)} = 10^{(7.87/10)} = 6.123504$
3. Distance (cm) = r = declare by manufacture = 20 cm
4. $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot r^2) = (442.505 \cdot 6.123504) / (4 \cdot 3.1416 \cdot 20^2) = 0.53907 \text{ (mW/cm}^2\text{)}$

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

$$\text{WLAN 2.4GHz} + \text{WLAN 5GHz} = (0.05282 / 1) + (0.53907 / 1) = 0.59189$$

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

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