# RF Exposure Report

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|---|---|
| **Report No.:** | SA170526E11B |
| **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:** | June 21 to Aug. 15, 2018 |
| **Issued Date:** | Oct. 01, 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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## Release Control Record

| Issue No. | Description | Date Issued |
|---|---|---|
| SA170526E11B | Original release. | Oct. 01, 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:** | June 21 to Aug. 15, 2018 |
| **Standards:** | FCC Part 2 (Section 2.1091)<br>KDB 447498 D01 General RF Exposure Guidance v06<br>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:** Oct. 01, 2018

Wendy Wu / Specialist

**Approved by :** _____ , **Date:** Oct. 01, 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

$Pd = (Pout*G) / (4*pi*r^2)$

where

Pd = power density in $mW/cm^2$

Pout = output power to antenna in mW

G = gain of antenna in linear scale

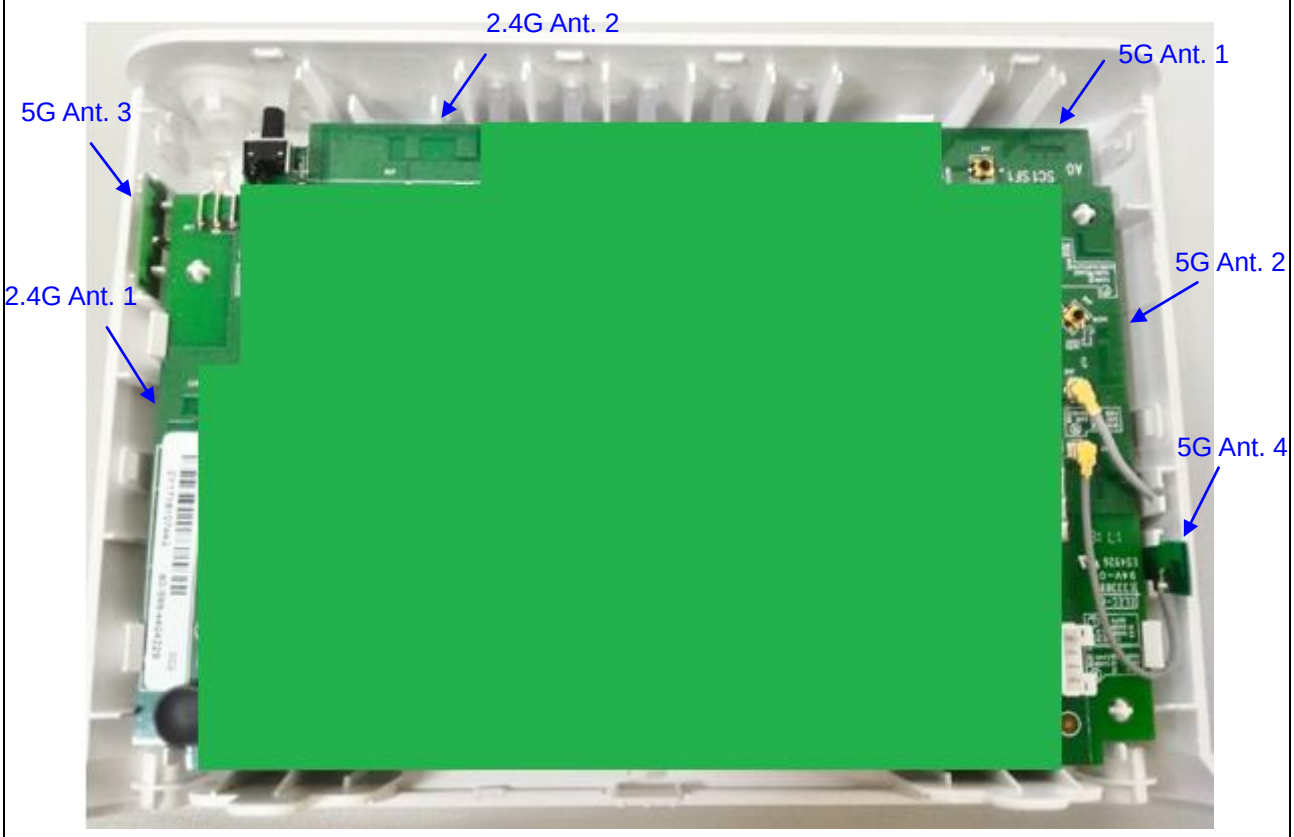
Pi = 3.1416

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<br>SDM mode (2 Stream 2 TX)<br>for Power & PSD Gain<br>(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 = $10 \log[(10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20})^2 / N_{ANT}]$ dBi
3. Maximum Uncorrelated Directional Gain = $10 \log[(10^{G1/10} + 10^{G2/10} + \ldots + 10^{GN/10}) / N_{ANT}]$ dBi

| Frequency | Maximum Gain (dBi) for SDM mode<br>SDM mode (2 Stream 2 TX)<br>for Power & PSD Gain<br>(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 = $10 \log[(10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20})^2 / N_{ANT}]$ dBi
3. Maximum Uncorrelated Directional Gain = $10 \log[(10^{G1/10} + 10^{G2/10} + \ldots + 10^{GN/10}) / N_{ANT}]$ 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 = $10 \log[(10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20})^2 / N_{ANT}]$ dBi
3. Maximum Uncorrelated Directional Gain = $10 \log[(10^{G1/10} + 10^{G2/10} + \ldots + 10^{GN/10}) / N_{ANT}]$ dBi

2.5 Calculation Result of Maximum Conducted Power

**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. Pout*G = EIRP Power = Conducted Power(mW) * Gain(numeric)
2. Gain(dBi) to Gain(numeric) = $10^{(4.63/10)}$ = 2.904023
3. Distance (cm) = r = declare by manufacture = 20 cm
4. Pd = (Pout*G) / ($4*pi*r^2$) = (91.419 * 2.904023) / ( $4 * 3.1416 * 20^2$ ) = 0.05282 ($mW/cm^2$)

**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. Pout*G = EIRP Power = Conducted Power(mW) * Gain(numeric)
2. Gain(dBi) to Gain(numeric) = $10^{(7.29/10)}$ = 5.357967
3. Distance (cm) = r = declare by manufacture = 20 cm
4. Pd = (Pout*G) / ($4*pi*r^2$) = (436.251 * 5.357967) / ( $4 * 3.1416 * 20^2$ ) = 0.46501 ($mW/cm^2$)

**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. Pout*G = EIRP Power = Conducted Power(mW) * Gain(numeric)
2. Gain(dBi) to Gain(numeric) = $10^{(7.87/10)}$ = 6.123504
3. Distance (cm) = r = declare by manufacture = 20 cm
4. Pd = (Pout*G) / ($4*pi*r^2$) = (442.505 * 6.123504) / ( $4 * 3.1416 * 20^2$ ) = 0.53907 ($mW/cm^2$)

**Conclusion:**

The formula of calculated the MPE is:

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

CPD = Calculation power density

LPD = Limit of power density

**WLAN 2.4GHz + 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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