

RF Exposure Report

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

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**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)

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:** 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/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

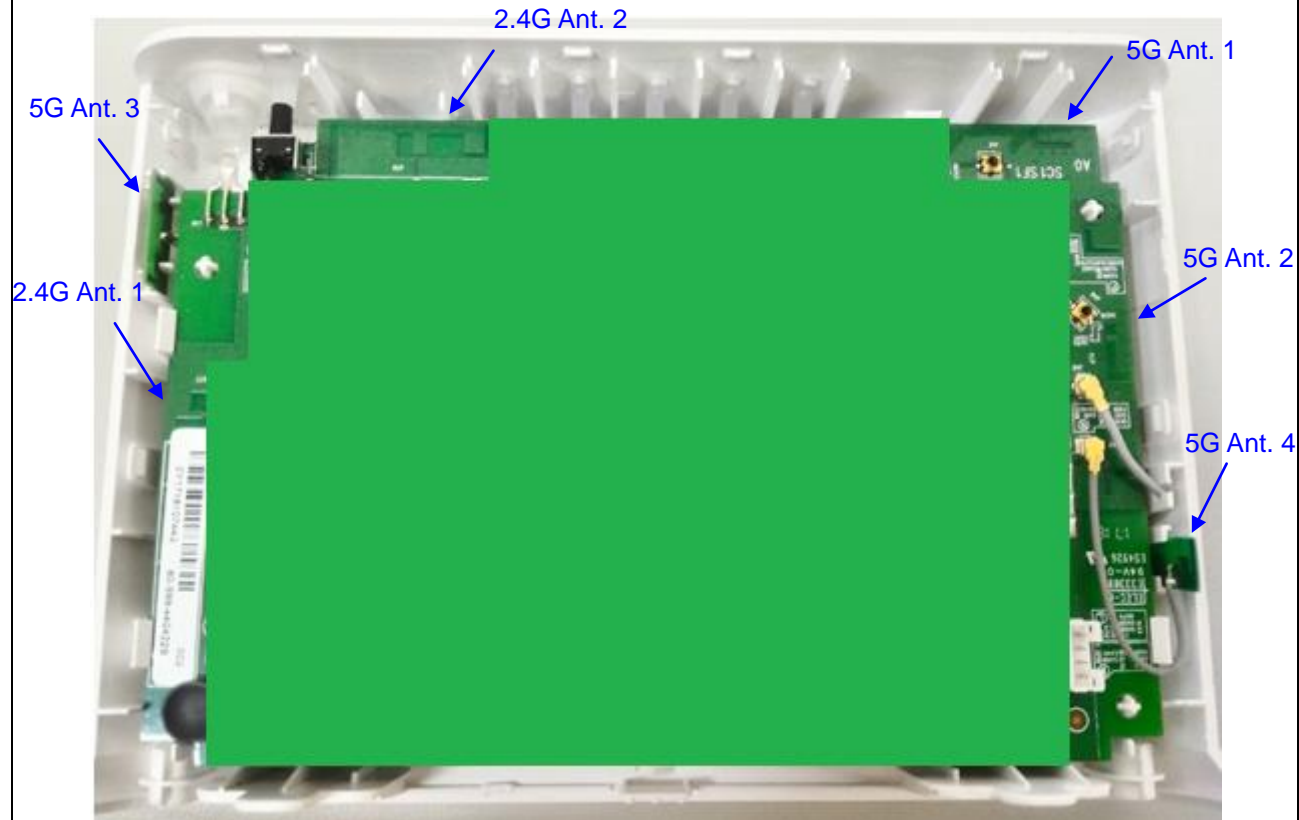
2.3 Classification

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 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. $P_{out} * G = \text{EIRP Power} = \text{Conducted Power(mW)} * \text{Gain(numeric)}$
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. $P_d = (P_{out} * G) / (4 * \pi * r^2) = (91.419 * 2.904023) / (4 * 3.1416 * 20^2) = 0.05282 \text{ (mW/cm}^2\text{)}$

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. $P_{out} * G = \text{EIRP Power} = \text{Conducted Power(mW)} * \text{Gain(numeric)}$
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. $P_d = (P_{out} * G) / (4 * \pi * r^2) = (436.251 * 5.357967) / (4 * 3.1416 * 20^2) = 0.46501 \text{ (mW/cm}^2\text{)}$

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. $P_{out} * G = \text{EIRP Power} = \text{Conducted Power(mW)} * \text{Gain(numeric)}$
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. $P_d = (P_{out} * G) / (4 * \pi * r^2) = (442.505 * 6.123504) / (4 * 3.1416 * 20^2) = 0.53907 \text{ (mW/cm}^2\text{)}$

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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