RF Exposure Report

Report No.: SABHQC-WTW-P20110057

FCC ID: RSE-4122TCH2

Product Name: DGA0122

Product Description: Dual Band Wi-Fi DSL Gateway

Trade Name: Technicolor

Model Number: DGA4122TCH2

Series Model: DGA4122CPR

Product Code: DGA4122TCH2, DGA4122CPR

Received Date: Nov. 05, 2020

Test Date: Nov. 18, 2020

Issued Date: Jan. 27, 2021

Applicant: Technicolor Delivery Technologies Belgium

Address: Prins Boudewinnlaan 47 Edegem B-2650 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

FCC Registration / Designation Number: 723255 / TW2022

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Release Control Record

Issue No.	Description	Date Issued
SABHQC-WTW-P20110057	Original release.	Jan. 27, 2021

1   Certificate of Conformity

Product Name: DGA0122

Product Description: Dual Band Wi-Fi DSL Gateway

Brand: Technicolor

Test Model: DGA4122TCH2

Series Model: DGA4122CPR

Product Code: DGA4122TCH2, DGA4122CPR

Sample Status: Product Unit

Applicant: Technicolor Delivery Technologies Belgium

Test Date: Nov. 18, 2020

Standards: FCC Part 2 (Section 2.1091)

IEEE C95.3-2002

References Test Guidance: KDB 447498 D01 General RF Exposure Guidance v06

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:** _____Jan. 27, 2021_____

Claire Kuan / Specialist

Approved by : _____ , **Date:** _____Jan. 27, 2021_____

Clark Lin / Technical 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/cm²)	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 30cm away from the body of the user. So, this device is classified as **Mobile Device**.

2.4 Antenna Gain

2.4G Antenna Information					
Ant.	Brand	Model No.	Antenna Type	Cable Length	Connector
2G1	Technicolor	--	Metallic Antenna	--	Murata
2G2	Technicolor	--	Metallic Antenna	--	Murata

5G Antenna Information					
Ant.	Brand	Model No.	Antenna Type	Cable Length	Connector
5G1	Technicolor	--	Metallic Antenna	--	Murata
5G2	Technicolor	--	Metallic Antenna	--	Murata
5G3	Technicolor	6252355B	PCB Antenna	170 mm	i-Pex

Antenna & Bandwidth for 2400~2483.5MHz

Number of Transmit Antennas	1TX		2TX	
Bandwidth Mode	20 MHz	40 MHz	20 MHz	40 MHz
802.11b	V	X	X	X
802.11g	V	X	V	X
802.11n	V	V	V	V

Frequency	Max. Antenna Gain (dBi)		Max Gain (dBi) for CDD mode
	Ant. 0	Ant. 1	CDD Mode
2400~2483.5MHz	2.71	3.52	6.13

Note:
1. Antenna Gain refer to "DGA4122TCH2, DGA4122CPR -Lab2_Antenna_Test_Report_20191125" 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

Antenna & Bandwidth for 5150~5850MHz

Antenna	1st (TX)			2nd (TX)			3rd (TX)		
Bandwidth Mode	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
802.11n	V	V	X	V	V	X	V	V	X
802.11ac	V	V	V	V	V	V	V	V	V

Frequency	Max. Antenna Gain (dBi)			Max. Directional Gain (dBi)		
	5G-ANT1	5G-ANT2	5G-ANT3	CDD Mode	TXBF Nss1	TXBF Nss2
5150~5250MHz	3.79	3.30	3.82	3.41	3.41	0.64
5250~5350MHz	4.18	3.34	3.67	3.53	3.53	0.99
5470~5725MHz	4.07	3.59	4.16	3.73	3.73	0.90
5725~5850MHz	3.62	3.43	4.03	3.98	3.98	0.97

Note:
1. Antenna Gain refer to "P20110057 Operation Description of Antenna Specification" files.
2. Maximum Correlated Directional Gain following KDB662911 D03 MIMO Antenna Gain Measurement.

2.5 Calculation Result of Maximum Conducted Power

For WLAN – 2.4GHz Worst Condition: 802.11n 20MHz 1S2T CDD

Frequency (MHz)	Conducted Power		Directional Gain (dBi)	Distance (cm)	Power Density (mW/cm²)	Limit (mW/cm²)
	(dBm)	(mW)				
2437	25.25	334.965	6.13	30	0.12149	1

Note:
1. Pout*G = EIRP Power = Conducted Power(mW) * Gain(numeric)
2. Gain(dBi) to Gain(numeric) = $10^{(6.13/10)}$ = 4.102
3. Distance (cm) = r = declare by manufacture = 30 cm
4. Pd = (Pout*G) / (4*pi*r^2) = (334.965 * 4.102) / (4 * 3.1416 * 30^2) = 0.12149 (mW/cm²)

For WLAN – 5GHz_U_NII_1 Worst Condition: 802.11ac 20MHz 1S3T CDD

Frequency (MHz)	Conducted Power		Directional Gain (dBi)	Distance (cm)	Power Density (mW/cm²)	Limit (mW/cm²)
	(dBm)	(mW)				
5240	26.07	404.576	3.82	30	0.08621	1

Note:
1. Pout*G = EIRP Power = Conducted Power(mW) * Gain(numeric)
2. Gain(dBi) to Gain(numeric) = $10^{(3.82/10)}$ = 2.410
3. Distance (cm) = r = declare by manufacture = 30 cm
4. Pd = (Pout*G) / (4*pi*r^2) = (404.576 * 2.410) / (4 * 3.1416 * 30^2) = 0.08621 (mW/cm²)

For WLAN – 5GHz_U_NII_3 Worst Condition: 802.11ac 80MHz 1S3T CDD

Frequency (MHz)	Conducted Power		Directional Gain (dBi)	Distance (cm)	Power Density (mW/cm²)	Limit (mW/cm²)
	(dBm)	(mW)				
5775	25.49	353.997	4.03	30	0.07916	1

Note:
1. Pout*G = EIRP Power = Conducted Power(mW) * Gain(numeric)
2. Gain(dBi) to Gain(numeric) = $10^{(4.03/10)}$ = 2.529
3. Distance (cm) = r = declare by manufacture = 30 cm
5. Pd = (Pout*G) / (4*pi*r2) = (353.997 *2.529) / (4 * 3.1416 * 30^2) = 0.07916 (mW/cm2)

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 = (0.12149 / 1) + (0.08621 / 1) = 0.208

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

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