RF Exposure Report

Report No.:	SABWIN-WTW-P21040653-2
FCC ID:	J9C-QCNFA725
Test Model:	QCNFA725
Received Date:	Apr. 20, 2021
Test Date:	May 26 to July 05, 2021
Issued Date:	Oct. 08, 2021
Applicant:	Qualcomm Technologies, Inc.
Address:	5775 Morehouse Drive, San Diego, CA 92121-1714
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
Test Location:	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
SABWIN-WTW-P21040653-2	Original release.	Oct. 08, 2021

1 Certificate of Conformity

Product:	Wi-Fi 6E BT 5.2 M.2 1418 Module
Brand:	Qualcomm
Test Model:	QCNFA725
Sample Status:	Engineering sample
Applicant:	Qualcomm Technologies, Inc.
Test Date:	May 26 to July 05, 2021
Standards:	FCC Part 2 (Section 2.1091) 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:** Oct. 08, 2021

Phoenix Huang / Specialist

Approved by : _____ , **Date:** Oct. 08, 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/cm^2)	Average Time (minutes)
Limits For General Population / Uncontrolled Exposure				
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	($180/f^2$)*	30
30-300	27.5	0.073	0.2	30
300-1500	…	…	f/1500	30
1500-100,000	…	…	1.0	30

f = Frequency in MHz ; *Plane-wave equivalent power density

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 20 cm away from the body of the user. So, this device is classified as **Mobile Device**.

2.4 Antenna Gain

Antenna Set	RF Chain No.	Brand	Model	Antenna Net Gain (dBi)	Frequency Range	Cable Loss (dB)	Antenna Type	Connector Type	Cable Length
1	Chain0/1	HONGBO	260-25094	3.53 3.06 3.07 4.81 4.2	2.4~2.4835 GHz 5.15~5.25 GHz 5.25~5.35 GHz 5.47~5.725 GHz 5.725~5.850 GHz	0.76 1.16 1.18 1.2 1.27	PIFA	i-pex(MHF 4L)	300mm
2	Chain0/1	HONGBO	260-25083	5.09 5.14 5.09 5.16 5.12	5.850~5.895 GHz 5.925~6.425 GHz 6.425~6.525 GHz 6.525~6.875 GHz 6.875~7.125 GHz	1.29 1.32 1.35 1.4 1.45	PIFA	i-pex(MHF 4L)	300mm
3	Chain0/1	HONGBO	260-25084	3.22 3.35 3.42 4.77 4.72 4.71 4.75 4.29 4.81 4.74	2.4~2.4835 GHz 5.150~5.250 GHz 5.250~5.350 GHz 5.470~5.725 GHz 5.725~5.850 GHz 5.850~5.895 GHz 5.925~6.425 GHz 6.425~6.525 GHz 6.525~6.875 GHz 6.875~7.125 GHz	0.5 0.76 0.78 0.81 0.85 0.86 0.87 0.91 0.96 0.98	Monopole	i-pex(MHF 4L)	200mm

Note: The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

2.5 Calculation Result

Operation Mode	Max. Power (dBm)	Max. Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
WLAN (2.4GHz)	22.50	177.828	6.54	20	0.15949	1
WLAN (5GHz)	22.00	158.489	7.82	20	0.19087	1
WLAN (5.9GHz)	21.5	141.253	8.1	20	0.18144	1
WLAN (6GHz)	19.00	79.433	8.17	20	0.10369	1
Bluetooth	16.00	39.811	3.53	20	0.01785	1

Note:

1. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
2. 2.4GHz: Directional gain = 3.53dBi + 10log(2) = 6.54dBi
   5GHz:
   U-NII-1: Directional gain = 3.35dBi + 10log(2) = 6.36dBi
   U-NII-2A: Directional gain = 3.42dBi + 10log(2) = 6.43dBi
   U-NII-2C: Directional gain = 4.81dBi + 10log(2) = 7.82dBi
   U-NII-3: Directional gain = 4.72dBi + 10log(2) = 7.73dBi
   U-NII-4: Directional gain = 5.09dBi + 10log(2) = 8.1dBi
   6GHz:
   U-NII-5: Directional gain = 5.14dBi + 10log(2) = 8.15dBi
   U-NII-6: Directional gain = 5.09dBi + 10log(2) = 8.10dBi
   U-NII-7: Directional gain = 5.16dBi + 10log(2) = 8.17dBi
   U-NII-8: Directional gain = 5.12dBi + 10log(2) = 8.13dBi
3. This power include tune-up tolerance range that specified in QCNFA725 Tune Up power table.
4. WLAN (2.4GHz) and Bluetooth, BT-LE and BT-EDR are cann't transmit simultaneously.

Conclusion:

The formula of calculated the MPE is:

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

CPD = Calculation power density

LPD = Limit of power density

Simultaneously transmission condition.

Condition	Technology	
1	WLAN(2.4GHz)	WLAN(6GHz)
2	WLAN(2.4GHz)	WLAN(5GHz)
3	WLAN(2.4GHz)	WLAN(5.9GHz)
4	WLAN(6GHz)	Bluetooth
5	WLAN(5GHz)	Bluetooth
6	WLAN(5.9GHz)	Bluetooth

WLAN 2.4GHz + WLAN 6GHz = 0.15949 / 1 + 0.10369 / 1 = 0.26318

WLAN 2.4GHz + WLAN 5GHz = 0.15949 / 1 + 0.19087 / 1 = 0.35036

WLAN 2.4GHz + WLAN 5.9GHz = 0.15949 / 1 + 0.18144 / 1 = 0.34093

WLAN 6GHz + Bluetooth = 0.10369 / 1 + 0.01785 / 1 = 0.12154

WLAN 5GHz + Bluetooth = 0.19087 / 1 + 0.01785 / 1 = 0.20872

WLAN 5.9GHz + Bluetooth = 0.18144 / 1 + 0.01785 / 1 = 0.19929

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

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