RF Exposure Evaluation Declaration

FCC ID:	MCQ-EX50W
Applicant:	Digi International Inc
Application Type:	Certification
Product:	5G NR/LTE Router
Model No.:	Digi EX40, Digi EX50
Brand Name:	DIGI
FCC Classification:	Digital Transmission System (DTS) Unlicensed National Information Infrastructure (NII)
Test Procedure(s):	KDB 447498 D01v06
Test Date:	August 27, 2021

Reviewed By: Kevin Guo

Approved By: Robin Wu

Revision History

Report No.	Version	Description	Issue Date	Note
2106RSU041-U4	Rev. 01	Initial Report	11-16-2021	Valid

CONTENTS

Description Page

1. General Information 4

1.1. Applicant 4

1.2. Manufacturer 4

1.3. Testing Facility 4

1.4. Product Information 5

1.5. Antenna Details 5

2. RF Exposure Evaluation 6

2.1. Test Limits 6

2.2. Test Result 7

Appendix A - EUT Photograph 9

1. General Information

1.1. Applicant

Digi International Inc

9350 Excelsior Blvd. Suite 700, Hopkins, Minnesota 55343, United States

1.2. Manufacturer

Digi International Inc

9350 Excelsior Blvd. Suite 700, Hopkins, Minnesota 55343, United States

1.3. Testing Facility

☒	**Test Site – MRT Suzhou Laboratory**				
	Laboratory Location (Suzhou - Wuzhong)				
	D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China				
	Laboratory Location (Suzhou - SIP)				
	4b Building, Liando U Valley, No.200 Xingpu Rd., Shengpu Town, Suzhou Industrial Park, China				
	Laboratory Accreditations				
	A2LA: 3628.01		CNAS: L10551		
	FCC: CN1166		ISED: CN0001		
	VCCI:	☐R-20025	☐G-20034	☐C-20020	☐T-20020
		☐R-20141	☐G-20134	☐C-20103	☐T-20104
☒	**Test Site – MRT Shenzhen Laboratory**				
	Laboratory Location (Shenzhen)				
	1G, Building A, Junxiangda Building, Zhongshanyuan Road West, Nanshan District, Shenzhen, China				
	Laboratory Accreditations				
	A2LA: 3628.02		CNAS: L10551		
	FCC: CN1284		ISED: CN0105		
☐	**Test Site – MRT Taiwan Laboratory**				
	Laboratory Location (Taiwan)				
	No. 38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)				
	Laboratory Accreditations				
	TAF: L3261-190725				
	FCC: 291082, TW3261		ISED: TW3261		

1.4. Product Information

Product Name	5G NR/LTE Router
Model No.	Digi EX40, Digi EX50
Brand Name	DIGI
Wi-Fi Specification	802.11a/b/g/n/ac/ax
Antenna Specification	Refer to section 1.5
Power Supply	AC/DC Adapter or POE Adapter
Accessory	
Adapter	Model No.: DA-50F19 Input: 100-240V, 50/60Hz, 1.2A Output: 19.0V, 2.63A, 49.97W

Remark:

1. Different models differ in the configuration of different authorized modules, Digi EX40 will be configured an LTE module, Digi EX50 will be configured a 5G NR module.
2. The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer.

1.5. Antenna Details

Antenna Type	Frequency Band (MHz)	T_X Paths	Antenna Gain (dBi)	CDD Directional Gain (dBi)	
				For Power	For PSD
Omni Antenna	2412 ~ 2462	2	8.00	8.00	11.01
	5150 ~ 5850	2	5.00	5.00	8.01

Note: The EUT supports Cyclic Delay Diversity (CDD) mode, and CDD signals are correlated.

If all antennas have the same gain, G_{ANT}, Directional gain = G_{ANT} + Array Gain, where Array Gain is as follows.

- For power spectral density (PSD) measurements on all devices,

  Array Gain = 10 log (N_{ANT}/ N_{SS}) dB;

- For power measurements on IEEE 802.11 devices,

  Array Gain = 0 dB for $N_{ANT} \leq 4$;

2. RF Exposure Evaluation

2.1. Test Limits

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

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)
(A) Limits for Occupational/ Control Exposures				
300-1500	--	--	f/300	6
1500-100,000	--	--	5	6
(B) Limits for General Population/ Uncontrolled Exposures				
300-1500	--	--	f/1500	6
1500-100,000	--	--	1	30

f= Frequency in MHz

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

Pd is the limit of MPE, $1mW/cm^2$. If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

2.2. Test Result

Product	5G NR/LTE Router
Test Item	RF Exposure Evaluation

Test Mode	Frequency Band (MHz)	Maximum conducted power (dBm)	Antenna Gain (dBi)	Maximum EIRP (dBm)	Power Density at R = 20 cm (mW/cm^2)	Limit (mW/cm^2)
Wi-Fi	2412 ~ 2462	24.85	8.0	32.85	0.3835	1
	5180 ~ 5825	24.86	5.0	29.86	0.1926	1

For Digi EX40

Test Mode	Frequency Band (MHz)	Maximum conducted power (dBm)	Antenna Gain (dBi)	Maximum EIRP (dBm)	Power Density at R = 20 cm (mW/cm^2)	Limit (mW/cm^2)
LTE Band 41-HPUE	2498.5	26.0	7.0	33.0	0.3969	1
Remark: Since Digi EX40 is configurated an LTE module (FCC ID: N7NEM76), for Digi EX40 selected the worst result from the module report to calculate the MPE result with Wi-Fi.						

For Digi EX50

Test Mode	Frequency Band (MHz)	Maximum conducted power (dBm)	Antenna Gain (dBi)	Maximum EIRP (dBm)	Power Density at R = 20 cm (mW/cm^2)	Limit (mW/cm^2)
5G NR n71	665.5	24.5	5.0	29.5	0.1773	0.4437
Remark: Since Digi EX50 is configurated an LTE module (FCC ID: N7NEM91), for Digi EX50 selected the worst result from the module report to calculate the MPE result with Wi-Fi.						

CONCLUSION:

The WLAN 2.4GHz & 5GHz and WCDMA or LTE or 5G NR can transmit simultaneously.

For Digi EX40:

Power Density / Limit = 0.3835 / 1 + 0.1926 / 1 + 0.3969 / 1 = 0.9730 mW/cm^2 < 1 mW/cm^2.

Therefore, the Compliance Distance is 20cm.

For Digi EX50:

Power Density / Limit = 0.3835 / 1 + 0.1926 / 1 + 0.1773 / 0.4437 = 0.9757 mW/cm^2 < 1 mW/cm^2.

Therefore, the Compliance Distance is 20cm.

The End

Appendix A - EUT Photograph

Refer to “2106RSU041-UE” file.