RF EXPOSURE REPORT

OF

Applicant:	Digi International Inc 9350 Excelsior Blvd., Suite 700 Hopkins, MN 55343
Product Name:	ConnectCore 8X
Brand Name:	Digi
Model No.:	CC8X
Model Difference:	N/A
Report Number:	ER/2019/B0069
FCC ID:	MCQ-CCIMX8
IC:	1846A-CCIMX8
FCC Rule Part	Part 2.1091
IC Rule:	RSS-102 issue 5 Mar. 19, 2015
Issue Date:	Jul. 10, 2020

We hereby certify that:

The above equipment was verified by SGS Taiwan Ltd. The evaluation in this report is in compliance with the above rule(s).

The results of this report relate only to the sample identified in this report.

Approved By: _____

John Yeh / Asst. Manager

Testing Laboratory
3702

Revision History

Report Number	Revision	Description	Issue Date	Remark
ER/2019/B0069	Rev.00	Original.	Jul. 10, 2020	Revised By: Susan Lin

Note:

1、 Disclaimer
Antenna information is provided by the applicant, test results of this report are applicable to the sample EUT received.

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1 DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)

1.1 General:

Product Name:	ConnectCore 8X	
Brand Name:	Digi	
Model No.:	CC8X	
Model Difference:	N/A	
Hardware Version:	55001984-02 rev 4P	
Software Version:	82004286 rev 4P	
EUT Serial Number:	F191001000424	
Power Supply:	5Vdc from AC/DC Adapter	
	Adapter:	Model No.: GT-46180-1605, Supplier:. GlobTek, Inc.

1.2 Maximum Output power

The Max. output power value is derived from test report.

Bluetooth	Report Number:	ER/2019/B0065, ER/2019/B0066
	Test Lab:	SGS Taiwan Ltd.
WLAN 2.4GHz	Report Number:	ER/2019/B0064
	Test Lab:	SGS Taiwan Ltd.
WLAN 5GHz	Report Number:	ER/2019/B0067
	Test Lab:	SGS Taiwan Ltd.

1.3 Antenna Information:

1.3.1 BT / WLAN

Antenna Type	Supplier	Antenna Part No.	Freq. (MHz)	Peak Antenna Gain (dBi)	MIMO Antenna Gain (dBi)	Worst Antenna Gain
PCB	YAGEO	ANTX100P001B24553	2.4GHz	**4.6**	**7.61**	V
PCB	TAOGLAS	FXP830.07.0100C	2.4GHz	3.32	6.33	
Dipole	TAOGLAS	GW.48.A151	2.4GHz	**3.42**	**6.43**	V
PCB	TAOGLAS	FXP522.A.07.A.001	2.4GHz	3.78 (Port 1) 3.15 (Port 2)	6.79 (Port1) 6.16 (Port2)	
Dipole	Linx	ANT-DB1-RAF-RPS	2.4GHz	2.5	5.51	
PCB	ethertronic	1001932	2.4GHz	2.5	5.51	
PCB	TAOGLAS	FXP831.07.0100C	2.4GHz	3.0	6.01	

1.3.2 WLAN 5GHz

Antenna Type	Supplier	Antenna Part No.	Frequency (MHz)	Peak Antenna Gain (dBi)	MIMO Antenna Gain (dBi)	Worst Antenna Gain
PCB	YAGEO	ANTX100P001B24553	5150~5250	4.9	7.91	
			5250~5350	3.9	6.91	
			5470~5725	5.1	8.11	
			5725~5850	5.1	8.11	
PCB	TAOGLAS	FXP830.07.0100C	5150~5250	**6.11**	**9.12**	V
			5250~5350	**6.11**	**9.12**	V
			5470~5725	**6.11**	**9.12**	V
			5725~5850	**6.11**	**9.12**	V
Dipole	TAOGLAS	GW.48.A151	5150~5250	4.56	7.57	
			5250~5350	4.56	7.57	
			5470~5725	4.56	7.57	
			5725~5850	4.56	7.57	
PCB	TAOGLAS	FXP522.A.07.A.001	5150~5250	4.63 (Port 1) 4.61 (Port 2)	7.64 (Port 1) 7.62 (Port 2)	
			5250~5350	4.63 (Port 1) 4.61 (Port 2)	7.64 (Port 1) 7.62 (Port 2)	
			5470~5725	4.63 (Port 1) 4.61 (Port 2)	7.64 (Port 1) 7.62 (Port 2)	
			5725~5850	4.63 (Port 1) 4.61 (Port 2)	7.64 (Port 1) 7.62 (Port 2)	
Dipole	Linx	ANT-DB1-RAF-RPS	5150~5250	**4.6**	**7.61**	V
			5250~5350	**4.6**	**7.61**	V
			5470~5725	**4.6**	**7.61**	V
			5725~5850	**4.6**	**7.61**	V
PCB	ethertronic	1001932	5150~5250	5	8.01	
			5250~5350	5	8.01	
			5470~5725	5	8.01	
			5725~5850	5	8.01	
PCB	TAOGLAS	FXP831.07.0100C	5150~5250	5.5	8.51	
			5250~5350	5.5	8.51	
			5470~5725	5.5	8.51	
			5725~5850	5.5	8.51	

1.4 Rated Power

1.4.1 2.4GHz

Mode	Freq. Range (MHz)	Channels	Modulation Technology	Max Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Worst Case
BR+EDR	2402-2480	79	GFSK + π/4DQPSK + 8DPSK	10.68	4.60	**15.28**	V
BLE	2402-2480	40	GFSK	1.99		6.59	
802.11b/g/n_HT20	2412-2462	11	DSSS & OFDM	22.00	7.61	**29.61**	V
802.11 n_HT40	2412-2452			16.11		23.72	
Modulation type:		CCK, DQPSK, DBPSK for DSSS					
		64QAM, 16QAM, QPSK, BPSK for OFDM					

1.4.2 WLAN 5GHz:

Wi-Fi	Freq. Range (MHz)	Modulation Technology	Max. Output Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Worst Case
11a	5150~5250	OFDM	11.99	9.12	21.11	
	5250~5350		16.55	9.12	**25.67**	V
	5470~5725		16.16	9.12	25.28	
	5725~5850		16.24	9.12	25.36	
11n HT20	5150~5250		12.49	9.12	21.61	
	5250~5350		15.56	9.12	24.68	
	5470~5725		15.49	9.12	24.61	
	5725~5850		15.22	9.12	24.34	
11n HT40	5150~5250		13.67	9.12	22.79	
	5250~5350		15.74	9.12	24.86	
	5470~5725		15.81	9.12	24.93	
	5725~5850		15.48	9.12	24.60	
11ac VHT80	5150~5250		11.01	9.12	20.13	
	5250~5350		10.22	9.12	19.34	
	5470~5725		14.42	9.12	23.54	
	5725~5850		13.87	9.12	22.99	
Modulation type		64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 802.11ac only				

2 FCC MAXIMUM PERMISSIBLE EXPOSURE (MPE)

2.1 FCC Standard Applicable

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

This is a Mobile device, the MPE is required.

According to §1.1310 and §2.1091 RF exposure is calculated.

Limits for Maximum Permissive Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Averaging Time (minute)
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
1500-15000	/	/	1.0	30

f = frequency in MHz

* = Plane-wave equipment power density

Prediction of MPE limit at a given distance

$S=PG/4\pi R^2$

Where: S = Power density

P = Power input to antenna

G = Power gain of the antenna in the direction of interest relative to an isotropic radiator

R = Distance to the center of radiation of the antenna

2.2 ISED Standard Applicable

This submittal(s) (test report) is intended to comply with RSS-102 issue 5 Radio frequency Radiation Exposure requirement.

This is a Mobile device, the MPE is required.

Limits for Maximum Permissive Exposure (MPE)

RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)				
Frequency Range (MHz)	**Electric Field (V/m rms)**	**Magnetic Field Strength (A/m rms)**	**Power Density (W/m^2)**	**Reference Period (minutes)**
0.003-10	83	90	-	Instantaneous*
0.1-10	-	$0.73/f$	-	6**
1.1-10	$87/f^{0.5}$	-	-	6**
10-20	27.46	0.0728	2	6
20-48	$58.07/f^{0.25}$	$0.1540/f^{0.25}$	$8.944/f^{0.5}$	6
48-300	22.06	0.05852	1.291	6
300-6000	$3.142f^{0.3417}$	$0.008335f^{0.3417}$	$0.02619f^{0.6834}$	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	$616000/f^{1.2}$
150000-300000	$0.158f^{0.5}$	$4.21 \times 10\text{-}4f^{0.5}$	$6.67 \times 10\text{-}5f$	$616000/f^{1.2}$

F = frequency in MHz
* = Based on nerve stimulation (NS).
** = Based on specific absorption rate (SAR)
Maximum Permissible Exposure (MPE) Evaluation

Prediction of MPE limit at a given distance

$S=PG/4\pi R^2$

Where: S = Power density

P = Power input to antenna

G = Power gain of the antenna in the direction of interest relative to an isotropic radiator

R = Distance to the center of radiation of the antenna

2.3 Power Density Calculation (Worst Case)

FCC								ISED		
Operation Mode	Evaluation Frequency (MHz)	Operation Distance (cm)	Output Power EIRP (dBm)	Output Power EIRP (mW)	Power Density (mW/cm2)	Limit (mW/cm2)	Pass / Fail	Power Density (W/m2)	Limit (W/m2)	Pass / Fail
BT	2441.00	20	15.28	33.73	0.007	1.000	Pass	0.067	5.410	Pass
WLAN 2.4G	2437.00	20	29.61	914.11	0.182	1.000	Pass	1.819	5.404	Pass
WLAN 5G	5300.00	20	25.67	368.98	0.073	1.000	Pass	0.734	9.190	Pass

2.4 Collocated Power Density Calculation

FCC

Operation Mode	PD or FS	Limit	PD or FS / Limit	Σ(PD or FS / Limit) <= 1
BT	0.007	1.00	0.007	0.189
WLAN 2.4G	0.182	1.00	0.182	

ISED

Operation Mode	PD or FS	Limit	PD or FS / Limit	Σ(PD or FS / Limit) <= 1
BT	0.067	5.41	0.012	0.349
WLAN 2.4G	1.819	5.40	0.337	

Note:

1. Σ(E- Field Strength / Limit): This is a summation of [(E- Field Strength for each transmitter/antenna included in the simultaneous transmission) / (corresponding MPE limit)].

2. Considering the collocated transmitters, the aggregated (E- Field Strength /limit) is smaller than 1, and MPE of collocated transmitters is compliant

~ End of Report ~