RF Exposure Evaluation declaration

Product Name	: ConnectCore 6 Plus
Trade Name	: DIGI
Model No.	: CC-WMX-KK8D-TN
FCC ID.	: MCQ-CCIMX6P

Applicant : DIGI INTERNATIONAL INC

Address : 11001 Bren Road East Minnetonka, MN 55343 (USA)

Date of Receipt	:	Dec. 11, 2017
Date of Declaration	:	Feb. 13, 2018
Report No.	:	17C0115R-SAUSP03V00
Report Version	:	V2.0
Iac-MR	Alla	Testing Laboratory 3024

The declaration results relate only to the samples calculated.

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1. **RF Exposure Evaluation**

1.1. 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	Electric Field	Magnetic Field	Power Density	Average Time
(MHz)	Strength (V/m)	Strength (A/m)	(mW/cm ²)	(Minutes)
	(A) Limits for C	ccupational/ Contr	ol 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

Friis Formula Friis transmission formula: Pd = (Pout*G)/(4*pi*r²)

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 id the limit of MPE, 1 mW/cm². 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.

1.2. Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

The temperature and related humidity: 18° C and 78° RH.



1.3. Test Result of RF Exposure Evaluation

Product	ConnectCore 6 Plus
Test Mode	Transmit Mode
Test Condition	RF Exposure Evaluation

Antenna Gain

2.4G Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.5 dBi or 1.78 in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

BT 2.0 Function				
GFSK				
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	
0	2402	8.356	0.003	
39	2441	8.811	0.003	
78	2480	8.241	0.003	

BT 2.0 Function					
π/4 DQPSK	π/4 DQPSK				
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)		
0	2402	6.871	0.002		
39	2441	7.295	0.003		
78	2480	6.792	0.002		

The power density Pd (4th column) at a distance of 20 cm calculated from the Friis transmission formula is far below the limit of 1 mW/cm².



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2.4G Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.5 dBi or 1.78 in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

BT 2.0 Function				
8-QPSK				
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	
0	2402	7.6033	0.003	
39	2441	7.9616	0.003	
78	2480	7.4817	0.003	

BLE Function				
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm²)	
0	2402	1.507	0.001	
19	2440	1.663	0.001	
39	2480	1.694	0.001	

The power density Pd (4th column) at a distance of 20 cm calculated from the Friis transmission formula is far below the limit of 1 mW/cm^2 .



WiFi

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Antenna Gain

2.4G Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.5 dBi or 1.78 in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

IEEE 802.11b (ANT 0)				
WLAN Function				
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	
1	2412	66.681	0.024	
6	2437	65.163	0.023	
11	2462	66.222	0.023	

IEEE 802.11g (ANT 0)				
WLAN Function				
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	
1	2412	60.814	0.022	
6	2437	57.943	0.021	
11	2462	53.334	0.019	

The power density Pd (4th column) at a distance of 20 cm calculated from the Friis transmission formula is far below the limit of 1 mW/cm^2 .



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2.4G Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.5 dBi or 1.78 in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

IEEE 802.11n (20MHz) (ANT 0)				
WLAN Function				
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm²)	
1	2412	51.9996	0.01841	
6	2437	53.0884	0.01880	
11	2462	47.2063	0.01672	

IEEE 802.11n (40MHz) (ANT 0)				
WLAN Function				
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	
3	2422	44.9780	0.01593	
6	2437	47.2063	0.01672	
9	2452	32.8095	0.01162	

The power density Pd (4th column) at a distance of 20 cm calculated from the Friis transmission formula is far below the limit of 1 mW/cm^2 .



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5G Antenna Gain: The maximum Gain measured in fully anechoic chamber is 4.6 dBi or 2.88 in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

IEEE 802.11a (ANT 0)					
WLAN Function	WLAN Function				
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)		
36	5180	20.1837	0.01156		
40	5220	21.2814	0.01219		
44	5240	21.0378	0.01205		

IEEE 802.11a (ANT 0)				
WLAN Function				
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	
149	5745	20.0909	0.01151	
157	5785	20.6538	0.01183	
165	5825	20.9894	0.01203	

The power density Pd (4th column) at a distance of 20 cm calculated from the Friis transmission formula is far below the limit of 1 mW/cm².



Product	ConnectCore 6 Plus
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Test Condition	RF Exposure Evaluation

5G Antenna Gain: The maximum Gain measured in fully anechoic chamber is 4.6 dBi or 2.88 in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

IEEE 802.11a (ANT 0)				
WLAN Function				
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	
52	5260	20.9411	0.01200	
60	5300	20.6538	0.01183	
64	5320	20.7491	0.01189	

IEEE 802.11a (ANT 0)				
WLAN Function				
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	
100	5500	20.0447	0.01148	
116	5580	19.9986	0.01146	
140	5700	20.1372	0.01154	

The power density Pd (4th column) at a distance of 20 cm calculated from the Friis transmission formula is far below the limit of 1 mW/cm².



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5G Antenna Gain: The maximum Gain measured in fully anechoic chamber is 4.6 dBi or 2.88 in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

IEEE 802.11n (20MHz) (ANT 0)				
WLAN Function				
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	
36	5180	21.2324	0.01217	
40	5220	20.4644	0.01173	
44	5240	20.8449	0.01194	

IEEE 802.11n (20MHz) (ANT 0)				
WLAN Function				
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm²)	
149	5745	21.0863	0.01208	
157	5785	20.1837	0.01156	
165	5825	20.3236	0.01164	

The power density Pd (4th column) at a distance of 20 cm calculated from the Friis transmission formula is far below the limit of 1 mW/cm^2 .



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Output Power into Antenna & RF Exposure Evaluation Distance:

IEEE 802.11a (ANT 0)				
WLAN Function				
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm²)	
52	5260	19.9986	0.01146	
60	5300	20.1372	0.01154	
64	5320	20.0909	0.01151	

IEEE 802.11a (ANT 0)				
WLAN Function				
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	
100	5500	20.5116	0.01175	
116	5580	21.1836	0.01214	
144	5720	20.5116	0.01036	

The power density Pd (4th column) at a distance of 20 cm calculated from the Friis transmission formula is far below the limit of 1 mW/cm².



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5G Antenna Gain: The maximum Gain measured in fully anechoic chamber is 4.6 dBi or 2.88 in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

IEEE 802.11n (40MHz) (ANT 0)				
WLAN Function				
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm²)	
38	5190	14.2233	0.00815	
46	5230	16.2181	0.00929	

IEEE 802.11n (40MHz) (ANT 0)				
WLAN Function				
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm²)	
151	5755	16.1065	0.00923	
159	5795	16.0694	0.00921	

The power density Pd (4th column) at a distance of 20 cm calculated from the Friis transmission formula is far below the limit of 1 mW/cm^2 .



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5G Antenna Gain: The maximum Gain measured in fully anechoic chamber is 4.6 dBi or 2.88 in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

IEEE 802.11n (40MHz) (ANT 0)				
WLAN Function				
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm²)	
54	5270	1.2706	0.00073	
62	5310	17.2982	0.00991	

IEEE 802.11n (40MHz) (ANT 0)				
WLAN Function		-		
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm²)	
102	5510	10.7895	0.00618	
110	5550	16.1436	0.00925	
142	5710	15.9956	0.00808	

The power density Pd (4th column) at a distance of 20 cm calculated from the Friis transmission formula is far below the limit of 1 mW/cm^2 .



Product	ConnectCore 6 Plus
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Test Condition	RF Exposure Evaluation

5G Antenna Gain: The maximum Gain measured in fully anechoic chamber is 4.6 dBi or 2.88 in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

IEEE 802.11ac (80MHz) (ANT 0)				
WLAN Function				
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm²)	
42	5210	8.3946	0.00481	

IEEE 802.11ac (80MHz) (ANT 0)			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm²)
155	5775	13.4276	0.00769

The power density Pd (4th column) at a distance of 20 cm calculated from the Friis transmission formula is far below the limit of 1 mW/cm^2 .



Product	ConnectCore 6 Plus
Test Mode	Transmit Mode
Test Condition	RF Exposure Evaluation

5G Antenna Gain: The maximum Gain measured in fully anechoic chamber is 4.6 dBi or 2.88 in linear scale.

Output Power into Antenna & RF Exposure Evaluation Distance:

IEEE 802.11ac (80MHz) (ANT 0)			
WLAN Function			
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm²)
58	5290	9.6828	0.00555

IEEE 802.11ac (80MHz) (ANT 0)				
WLAN Function				
Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm²)	
106	5530	6.5163	0.00373	
138	5690	13.1220	0.00663	

The power density Pd (4th column) at a distance of 20 cm calculated from the Friis transmission formula is far below the limit of 1 mW/cm².



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Power Density (WIFI 5G) (mW/cm²)	Power Density (BT) (mW/cm²)	Total Power Density (WIFI+BT) (mW/cm²)	Limit (mW/cm ²)
0.1219	0.003	0.1249	1

Only Wi-Fi 5 GHz can transmit at the same time as Bluetooth.