RF Exposure Evaluation Declaration

Product Name	:	M2M DATA MODULE
Trade Name	:	WNC
Model No.	:	IMQ5
FCC ID	:	NKRIMQ5

Applicant	:	Wistron Neweb Corporation
Address	:	20 Park Avenue II, Hsinchu Science Park, Hsinchu 308, Taiwan, R.O.C

Date of Receipt	:	Dec. 02, 2019
Date of Declaration	:	Mar. 04, 2020
Report No.	:	19C0019R-RF-US-Exp
Report Version	:	V1.0

Testing Laboratory
3024

RF Exposure Evaluation Declaration

Issued Date : Mar. 04, 2020

Report No. : 19C0019R-RF-US-Exp

Product Name	:	M2M DATA MODULE
Applicant	:	Wistron Neweb Corporation
Address	:	20 Park Avenue II, Hsinchu Science Park, Hsinchu 308, Taiwan, R.O.C
Manufacturer	:	Wistron Neweb Corporation
Address	:	20 Park Avenue II, Hsinchu Science Park, Hsinchu 308, Taiwan, R.O.C
Trade Name	:	WNC
Model No.	:	IMQ5
FCC ID	:	NKRIMQ5
EUT Voltage	:	DC 3.8V
Testing Voltage	:	DC 3.8V
Applicable Standard	:	FCC 47 CFR Part 2.1091 Radiofrequency radiation exposure evaluation: mobile devices.
Test Lab	:	Hsin Chu Laboratory
Address	:	No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 310, Taiwan, R.O.C. TEL: +886-3-582-8001 / FAX: +886-3-582-8958
Test Result	:	Complied

Tested By : Max Chang

(Max Chang / Engineer)

Approved By : Louis Hsu

(Louis Hsu / Deputy Manager)

Revision History

Report No.	Version	Description	Issued Date
19C0019R-RF-US-Exp	V1.0	Initial issue of report	Mar. 04, 2020

1.1. Test Facility

Ambient conditions in the laboratory:

Items	Test Item	Required	Test Site
Temperature (°C)	Peak Output Power	15 - 35	3
Humidity (%RH)		25 - 75	

Note: Test site information refers to Laboratory Information.

Laboratory Information

USA	**:**	**FCC Registration Number: TW3024**
Canada	**:**	**IC Registration Number: 22397-1 / 22397-2 / 22397-3**

The address and introduction of DEKRA Testing and Certification Co., Ltd. laboratories can be founded in our Web site: http://www.dekra.com.tw

If you have any comments, please don't hesitate to contact us. Our test sites as below:

Test Laboratory	DEKRA Testing and Certification Co., Ltd.
Address	1. No. 75-2, 3rd Lin, WangYe Keng, Yonghxing Tsuen, Qionglin Shiang, Hsinchu County 307, Taiwan, R.O.C. 2. No.372, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C. 3. No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C.
Phone number	1. +886-3-592-8858 2. +886-3-582-8001 3. +886-3-582-8001
Fax number	1. +886-3-592-8859 2. +886-3-582-8958 3. +886-3-582-8958
E mail address	info.tw@dekra.com
Website	http://www.dekra.com.tw

1.2. List of Test Equipment

Peak Output Power / SR12-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal & Spectrum Analyzer	R&S	FSV40	101049	2019/09/11	2020/09/10
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2019/03/15	2020/03/14
Spectrum Analyzer	Keysight	N9030B	MY57140404	2019/06/18	2020/06/17
Spectrum Analyzer	Keysight	N9010B	MY57110159	2019/05/03	2020/05/02
Wireless Conn. Tseter	R&S	CMW500	157118	2019/08/08	2020/08/07
Wideband Radio Communication Tester	R&S	CMW500	106071	2019/01/16	2020/01/15

Note: All equipment upon which need to calibrated are with calibration period of 1 year.

1.3. Uncertainty

Test item	Uncertainty
Peak Output Power	± 2.26 dB

Note: Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2. RF Exposure Evaluation

2.1. 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 (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm2)	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

RF Field Strength Limits for Controlled Use Devices (Controlled Environment)

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m2)	Reference Period (minutes)
0.003-1023	170	180	-	Instantaneous*
0.1-10	-	1.6/ f	-	6**
1.29-10	193/ f 0.5	-	-	6**
10-20	61.4	0.163	10	6
20-48	129.8/ f 0.25	0.3444/ f 0.25	44.72/ f 0.5	6
48-100	49.33	0.1309	6.455	6
100-6000	15.60 f 0.25	0.04138 f 0.25	0.6455f0.5	6
6000-15000	137	0.364	50	6
15000-150000	137	0.364	50	616000/ f 1.2
150000-300000	0.354 f 0.5	9.40 x 10-4 f 0.5	3.33 x 10-4 f	616000/ f 1.2
Note: f is frequency in MHz. *Based on nerve stimulation (NS). ** Based on specific absorption rate (SAR).				

Friis Formula

Friis transmission 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 id the limit of MPE, 1 mW/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 Procedure

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

2.3. Test Result of RF Exposure Evaluation

Product	M2M DATA MODULE
Test Mode	Transmit
Test Condition	RF Exposure Evaluation

Band	Usable maximum Antenna Gain by manufacturer's declaration (dBi)	Usable maximum Antenna Gain under limit of output power (dBi)
2	3.02	14.0
4	3.02	14.0
12	3.20	14.0
13	3.20	11.0
25	3.02	9.0
26	3.20	11.0

Product	M2M DATA MODULE
Test Mode	Transmit
Test Condition	RF Exposure Evaluation

LTE Band 2

Antenna Gain

Based on the Maximum Conducted Output Power, the usable maximum antenna gain is 3.02 dBi.

Output Power into Antenna & RF Exposure Evaluation Distance:

Channel Frequency (MHz)	Maximum Output Power by manufacturer's declaration		Conducted Output Power by Testing		Maximum Power Density at R = 20 cm (mW/cm^2)	Limit (mW/cm^2)
	(dBm)	(mW)	(dBm)	(mW)		
1857.5	22.70	186.21	20.71	117.76	0.074	1.000
1880.0	22.70	186.21	20.83	121.06	0.074	1.000
1902.5	22.70	186.21	21.12	129.42	0.074	1.000

LTE Band 4

Antenna Gain

Based on the Maximum Conducted Output Power, the usable maximum antenna gain is 3.02 dBi.

Output Power into Antenna & RF Exposure Evaluation Distance:

Channel Frequency (MHz)	Maximum Output Power by manufacturer's declaration		Conducted Output Power by Testing		Maximum Power Density at R = 20 cm (mW/cm^2)	Limit (mW/cm^2)
	(dBm)	(mW)	(dBm)	(mW)		
1717.5	22.70	186.21	21.46	139.96	0.074	1.000
1732.5	22.70	186.21	21.50	141.25	0.074	1.000
1747.5	22.70	186.21	21.62	145.21	0.074	1.000

LTE Band 12

Antenna Gain

Based on the Maximum Conducted Output Power, the usable maximum antenna gain is 3.2 dBi.

Output Power into Antenna & RF Exposure Evaluation Distance:

Channel Frequency (MHz)	Maximum Output Power by manufacturer's declaration		Conducted Output Power by Testing		Maximum Power Density at R = 20 cm (mW/cm^2)	Limit (mW/cm^2)
	(dBm)	(mW)	(dBm)	(mW)		
700.5	22.70	186.21	21.42	138.68	0.077	0.468
707.5	22.70	186.21	21.51	141.58	0.077	0.472
711.0	22.70	186.21	21.75	149.62	0.077	0.477

LTE Band 13

Antenna Gain

Based on the Maximum Conducted Output Power, the usable maximum antenna gain is 3.2 dBi.

Output Power into Antenna & RF Exposure Evaluation Distance:

Channel Frequency (MHz)	Maximum Output Power by manufacturer's declaration		Conducted Output Power by Testing		Maximum Power Density at R = 20 cm (mW/cm^2)	Limit (mW/cm^2)
	(dBm)	(mW)	(dBm)	(mW)		
779.5	22.70	186.21	20.91	123.31	0.077	0.471
782.0	22.70	186.21	21.10	128.82	0.077	0.473
784.5	22.70	186.21	21.34	136.14	0.077	0.474

LTE Band 25

Antenna Gain

Based on the Maximum Conducted Output Power, the usable maximum antenna gain is 3.02 dBi.

Output Power into Antenna & RF Exposure Evaluation Distance:

Channel Frequency (MHz)	Maximum Output Power by manufacturer's declaration		Conducted Output Power by Testing		Maximum Power Density at R = 20 cm (mW/cm^2)	Limit (mW/cm^2)
	(dBm)	(mW)	(dBm)	(mW)		
1857.5	22.70	186.21	21.09	128.53	0.074	1.000
1882.5	22.70	186.21	21.15	130.32	0.074	1.000
1907.5	22.70	186.21	21.59	144.21	0.074	1.000

LTE Band 26

Antenna Gain

Based on the Maximum Conducted Output Power, the usable maximum antenna gain is 3.2 dBi.

Output Power into Antenna & RF Exposure Evaluation Distance:

Channel Frequency (MHz)	Maximum Output Power by manufacturer's declaration		Conducted Output Power by Testing		Maximum Power Density at R = 20 cm (mW/cm^2)	Limit (mW/cm^2)
	(dBm)	(mW)	(dBm)	(mW)		
816.5	22.70	186.21	21.63	145.55	0.077	0.444
831.5	22.70	186.21	21.71	148.25	0.077	0.454
841.5	22.70	186.21	21.45	139.64	0.077	0.564

Note:

1. The antenna information is from the customer declaration.
2. The results are evaluated using the maximum power.