



RF Exposure Evaluation Report

APPLICANT : Wistron NeWeb Corporation
EQUIPMENT : M2M DATA MODULE
BRAND NAME : WNC
MODEL NAME : IMA2A
FCC ID : NKRIMA2A
STANDARD : 47 CFR Part 2.1091

We, Sporton International (Kunshan) Inc., would like to declare that the device has been evaluated in accordance with 47 CFR Part 2.1091, and pass the limit. Without written approval of Sporton International (Kunshan) Inc., the test report shall not be reproduced except in full.

Approved by: Mark Qu / Manager



Sporton International (Kunshan) Inc.

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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA851701	Rev. 01	Initial issue of report	Jul. 19, 2018
FA851701	Rev. 02	Modify SW Version to IMA2A_v20.13	Sep. 13, 2018



1. Administration Data

1.1. Testing Laboratory

Testing Laboratory	
Test Site	Sporton International (Kunshan) Inc.
Test Site Location	No.3-2 Ping-Xiang Rd, Kunshan Development Zone Kunshan City Jiangsu Province 215335 China TEL : +86-512-57900158 FAX : +86-512-57900958

Applicant	
Company Name	Wistron NeWeb Corporation
Address	20 Park Avenue II, Hsinchu Science Park, Hsinchu 308, Taiwan, R.O.C

Manufacturer	
Company Name	Wistron NeWeb Corporation
Address	20 Park Avenue II, Hsinchu Science Park, Hsinchu 308, Taiwan, R.O.C



2. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	M2M DATA MODULE
Brand Name	WNC
Model Name	IMA2A
FCC ID	NKRIMA2A
Wireless Technology and Frequency Range	LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 12: 699 MHz ~ 716 MHz
Mode	LTE Category M1: QPSK/16QAM
Antenna Type	WWAN: Fixed External Antenna
HW Version	v1.0
SW Version	IMA2A_v20.13
EUT Stage	Identical Prototype
Note: 1. This device has no voice function. 2. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.	



3. Maximum RF average output power among production units

Mode		Maximum Average power(dBm)
LTE	Band 2	23.0 +2/-3
	Band 4	23.0 +2/-3
	Band 12	23.0 +2/-3

4. RF Exposure Limit Introduction

According to ANSI/IEEE C95.1-1992, the criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §1.1310.

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f ²)	6
30-300	61.4	0.163	1.0	6
300-1500			f/300	6
1500-100,000			5	6
(B) 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

The MPE was calculated at 20 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

$$S = \frac{PG}{4\pi R^2}$$

Where:

S = Power Density

P = Output Power at Antenna Terminals

G = Gain of Transmit Antenna (linear gain)

R = Distance from Transmitting Antenna



5. Radio Frequency Radiation Exposure Evaluation

5.1. Standalone Power Density Calculation

Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (W)	Maximum Output Power Limit (W)	Power Density at 20cm (mW/cm ²)	Limit (mW/cm ²)
LTE Band 12	699.7	8.00	25.0	33.000	1.995	2.000	0.397	1.000
LTE Band 4	1710.7	5.00	25.0	30.000	1.000	1.000	0.199	1.000
LTE Band 2	1850.7	5.00	25.0	30.000	1.000	3.000	0.199	0.466

Note: For conservativeness, the lowest frequency of each band is used to determine the MPE limit of that band

5.2. Collocated Power Density Calculation

Note:

1. This MPE analysis is applicable to any collocated transmitters with transmit power for WLAN/Bluetooth is less than or equal to 25dBm.
2. A maximum antenna gain of 5 dBi for WLAN /BT has been assumed for all collocated antennas.

Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (W)	Average EIRP (mW)	Power Density at 20cm (mW/cm ²)	Limit (mW/cm ²)	Power Density / Limit
LTE Band 12	699.7	7.00	25.0	32.0	1.58	1584.89	0.315	1.000	0.315
LTE Band 4	1710.7	4.00	25.0	29.0	0.79	794.33	0.158	1.000	0.158
LTE Band 2	1850.7	4.00	25.0	29.0	0.79	794.33	0.158	0.466	0.339
WLNA2.4GHz Band	2412.0	5.00	20.0	25.0	0.32	316.23	0.063	1.000	0.063
WLNA5GHz Band	5180.0	5.00	20.0	25.0	0.32	316.23	0.063	1.000	0.063
Bluetooth	2402.0	5.00	20.0	25.0	0.32	316.23	0.063	1.000	0.063

Max WLAN 2.4GHz Power Density/Limit	Max WLAN 5GHz Power Density/Limit	Max Bluetooth Power Density / Limit	Max WWAN Power Density / Limit	Σ (Power Density / Limit) of WWAN + WLAN 2.4GHz + Bluetooth	Σ (Power Density / Limit) of WWAN + WLAN 5GHz + Bluetooth
0.063	0.063	0.063	0.339	0.465	0.465

Note:

1. For collocation analysis, LTE Band 2 is chosen for summation due to the highest (power density/limit) among all WWAN wireless modes.
2. Σ (Power Density / Limit): This is a summation of [(power density for each transmitter/antenna included in the simultaneous transmission)/ (corresponding MPE limit)], for WWAN + WLAN + Bluetooth.
3. Considering the WWAN module collocation with the WLAN and Bluetooth transmitter of the EIRP performance listed in the table above, the aggregated (power density /limit) is smaller than 1, and MPE of 3 collocated transmitters is compliant



Conclusion:

Based on FCC OET Bulletin 65 Supplement C and 47 CFR §2.1091, the analysis concludes that this product when transmitting in standalone within a host device, is compliant with the FCC RF exposure requirements in mobile exposure condition, provided the conducted power and antenna gain do not exceed the limits for each given frequency band per wireless technology as follow table:

Device	Technology	Frequency (MHz)	Maximum Conducted Power (dBm)	Standalone Maximum Antenna Gain (dBi)	Collocated Maximum Antenna Gain (dBi)
IMA2A	LTE Band 12	699.7	25.0	8.0	7.0
	LTE Band 4	1710.7	25.0	5.0	4.0
	LTE Band 2	1850.7	25.0	5.0	4.0
Collocated Transmitters	WLAN	2412.0	20.0	/	5.0
	WLAN	5180.0	20.0		5.0
	BT	2402.0	20.0		5.0