

RF EXPOSURE EVALUATION REPORT

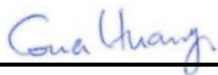
FCC ID : NKRIMA2
Equipment : M2M DATA MODULE
Brand Name : WNC
Model Name : IMA2, IMA2G
Applicant : Wistron NeWeb Corporation
20 Park Avenue II, Hsinchu Science
Park, Hsinchu 308, Taiwan, R.O.C
Manufacturer : Wistron NeWeb Corporation
20 Park Avenue II, Hsinchu Science
Park, Hsinchu 308, Taiwan, R.O.C
Standard : 47 CFR Part 2.1091

We, SPORTON INTERNATIONAL INC has been evaluated this product in accordance with 47 CFR Part 2.1091 and it complies with applicable limit.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code: 1190) and the FCC designation No. TW1190 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC evaluation.



Approved by: Cona Huang / Deputy Manager

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



Table of Contents

1. DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)	4
2. MAXIMUM RF AVERAGE OUTPUT POWER AMONG PRODUCTION UNITS	4
3. RF EXPOSURE LIMIT INTRODUCTION	5
4. RADIO FREQUENCY RADIATION EXPOSURE EVALUATION	6
4.1. Standalone Power Density Calculation	6
4.2. Collocated Power Density Calculation.....	6



History of this test report

Report No.	Version	Description	Issued Date
FA9D3102	Rev. 01	Initial issue of report	Jul. 07, 2020

**1. Description of Equipment Under Test (EUT)**

Product Feature & Specification	
EUT Type	M2M DATA MODULE
Brand Name	WNC
Model Name	IMA2, IMA2G
FCC ID	NKRIMA2
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: QPSK, 16QAM
HW Version	v1.0
EUT Stage	Identical Prototype

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

Reviewed by: Jason Wang

Report Producer: Wan Liu

2. Maximum RF average output power among production units

Band	Item	Parameter	Unit	Min.	Typ.	Max.
LTE Band 2	Max. TX Power	20 MHz 1 RBs/QPSK	dBm	20.3	23	25.7
LTE Band 4	Max. TX Power	20 MHz 1 RBs/QPSK	dBm	20.3	23	25.7
LTE Band 12	Max. TX Power	10 MHz 1 RBs/QPSK	dBm	20.3	23	25.7

3. 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

4. Radio Frequency Radiation Exposure Evaluation

4.1. Standalone Power Density Calculation

Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum ERP (dBm)	Maximum ERP (W)	Maximum EIRP (dBm)	Maximum EIRP (W)	Maximum Output Power Limit (W)	Average EIRP (mW)	Power Density at 20cm (mW/cm ²)	Limit (mW/cm ²)
LTE Band 2	1850	7.00	25.70	30.550	1.135	32.700	1.862	2.000	1862.087	0.371	1.000
LTE Band 4	1710	4.00	25.70	27.550	0.569	29.700	0.933	1.000	933.254	0.186	1.000
LTE Band 12	699	4.50	25.70	28.050	0.638	30.200	1.047	3.000	1047.129	0.208	0.466

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

4.2. Collocated Power Density Calculation

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 2	1850	4.50	25.70	30.2	1.05	1047.13	0.208	1.000	0.208
LTE Band 4	1710	4.00	25.70	29.7	0.93	933.25	0.186	1.000	0.186
LTE Band 12	699	4.50	25.70	30.2	1.05	1047.13	0.208	0.466	0.447
WLAN2.4GHz Band	2412			17.0	0.05	50.12	0.010	1.000	0.010
WLAN5GHz Band	5180			17.0	0.05	50.12	0.010	1.000	0.010
Bluetooth	2402			8.0	0.01	6.31	0.001	1.000	0.001

Note:

- This MPE analysis is applicable to any collocated transmitters with transmit power for WLAN EIRP is less than or equal to 17dBm and for Bluetooth EIRP is less than or equal to 8dBm.

WWAN Power Density / Limit	WLAN Power Density / Limit	Bluetooth Power Density / Limit	Σ (Power Density / Limit) of WWAN+WLAN+Bluetooth
0.447	0.010	0.001	0.458

Note:

- 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.
- 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	Band	Frequency (MHz)	Maximum Conducted Power (dBm)	Stanalone Maximum Antenna Gain (dBi)	Collocated Maximum Antenna Gain (dBi)
M2M DATA MODULE	LTE	Band 2	1850.7~1909.3	25.7	7.0	4.5
		Band 4	1710.7~1754.3	25.7	4.0	4.0
		Band 12	699.7~715.3	25.7	4.5	4.5