# RF Exposure Evaluation Report

| | | |
|---|---|---|
| APPLICANT | : | NetComm Wireless Limited |
| EQUIPMENT | : | 3G Light Industrial M2M Router |
| BRAND NAME | : | NetComm Wireless |
| MODEL NAME | : | NWL-12-01 |
| MARKETING NAME | : | 3G Light Industrial M2M Router |
| FCC ID | : | XIA-NWL1201 |
| STANDARD | : | 47 CFR Part 2.1091 |

**We, SPORTON INTERNATIONAL 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 INC., the test report shall not be reproduced except in full.**

Reviewed by: Eric Huang / Deputy Manager

Approved by: Jones Tsai / Manager

Testing Laboratory
1190

***SPORTON INTERNATIONAL INC.***
***No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.***

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## Revision History

| REPORT NO. | VERSION | DESCRIPTION | ISSUED DATE |
|---|---|---|---|
| FA373184 | Rev. 01 | Initial issue of report | Nev. 06, 2013 |
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# 1. Administration Data

## 1.1. Testing Laboratory

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|---|---|
| **Test Site** | SPORTON INTERNATIONAL INC. |
| **Test Site Location** | No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park,<br>Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.<br>TEL: +886-3-327-3456<br>FAX: +886-3-328-4978 |

## 1.2. Applicant

| | |
|---|---|
| **Company Name** | NetComm Wireless Limited |
| **Address** | Level 2, 18-20 Orion Road Lane Cove, NSW Australia 2066 |

## 1.3. Manufacturer

| | |
|---|---|
| **Company Name** | NetComm Wireless Limited |
| **Address** | Level 2, 18-20 Orion Road Lane Cove, NSW Australia 2066 |

## 2. Description of Equipment Under Test (EUT)

| Product Feature & Specification | |
|---|---|
| **EUT Type** | 3G Light Industrial M2M Router |
| **Brand Name** | NetComm Wireless |
| **Model Name** | NWL-12-01 |
| **Marketing Name** | 3G Light Industrial M2M Router |
| **FCC ID** | XIA-NWL1201 |
| **IMEI Code** | SN104 |
| **Wireless Technology and Frequency Range** | GSM850: 824.2 MHz ~ 848.8 MHz<br>GSM1900: 1850.2 MHz ~ 1909.8 MHz<br>WCDMA Band V: 826.4 MHz ~ 846.6 MHz<br>WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz<br>Zigbee: 2400 MHz ~ 2483.5 MHz |
| **Mode** | ・GSM/GPRS/EGPRS<br>・RMC 12.2Kbps Rel 99<br>・HSDPA Rel 7, Cat14<br>・HSUPA Rel 6, Cat6<br>・Zigbee: DSSS (OQPSK) |
| **Antenna Type** | WWAN: Dipole Antenna<br>Zigbee: PIFA Antenna |
| **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.

## 3. Maximum RF average output power among production units

| Mode | GSM 850 | GSM 1900 |
|---|---|---|
| | Burst average power(dBm) | |
| GPRS (GMSK, 1 Tx slot) | 33.0 | 30.0 |
| GPRS (GMSK, 2 Tx slots) | 31.0 | 27.0 |
| GPRS (GMSK, 3 Tx slots) | 29.0 | 25.0 |
| GPRS (GMSK, 4 Tx slots) | 27.0 | 23.0 |
| EDGE (8PSK, 1 Tx slot) | 27.0 | 25.0 |
| EDGE (8PSK, 2 Tx slots) | 24.0 | 22.0 |
| EDGE (8PSK, 3 Tx slots) | 23.0 | 21.0 |
| EDGE (8PSK, 4 Tx slots) | 22.0 | 20.0 |

| Mode | WCDMA Band V | WCDMA Band II |
|---|---|---|
| | Average power(dBm) | |
| RMC 12.2K | 24.0 | 24.0 |
| HSDPA Subtest-1 | 24.0 | 24.0 |
| HSUPA Subtest-5 | 24.0 | 24.0 |

| Band / Mode | Average Power (dBm) |
|---|---|
| 2.4GHz Band | 17.0 |

# 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/f2) | 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/f2) | 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. Power Density Calculations

| Band | Frequency (MHz) | Antenna Gain (dBi) | Maximum Power (dBm) | Maximum ERP/EIRP (W) | Maximum ERP/EIRP Limit (W) | Average EIRP (mW) | Power Density at 20cm (mW/cm2) | Limit (mW/cm2) |
|---|---|---|---|---|---|---|---|---|
| GPRS 850 (1 Tx slot) | 824.2 | 0.2 | 33.0 | 1.27 | 7.0 | 263.03 | 0.05 | 0.55 |
| GPRS 850 (2 Tx slots) | 824.2 | 0.2 | 31.0 | 0.80 | 7.0 | 331.13 | 0.07 | 0.55 |
| GPRS 850 (3 Tx slots) | 824.2 | 0.2 | 29.0 | 0.51 | 7.0 | 311.89 | 0.06 | 0.55 |
| GPRS 850 (4 Tx slots) | 824.2 | 0.2 | 27.0 | 0.32 | 7.0 | 263.03 | 0.05 | 0.55 |
| EGPRS 850 (1 Tx slot) | 824.2 | 0.2 | 27.0 | 0.32 | 7.0 | 66.07 | 0.01 | 0.55 |
| EGPRS 850 (2 Tx slots) | 824.2 | 0.2 | 24.0 | 0.16 | 7.0 | 33.11 | 0.01 | 0.55 |
| EGPRS 850 (3 Tx slots) | 824.2 | 0.2 | 23.0 | 0.13 | 7.0 | 78.34 | 0.02 | 0.55 |
| EGPRS 850 (4 Tx slots) | 824.2 | 0.2 | 22.0 | 0.10 | 7.0 | 83.18 | 0.02 | 0.55 |
| GPRS 1900 (1 Tx slot) | 1850.2 | 2.7 | 30.0 | 0.93 | 2.0 | 117.49 | 0.02 | 1.00 |
| GPRS 1900 (2 Tx slots) | 1850.2 | 2.7 | 27.0 | 0.59 | 2.0 | 147.91 | 0.03 | 1.00 |
| GPRS 1900 (3 Tx slots) | 1850.2 | 2.7 | 25.0 | 0.37 | 2.0 | 139.32 | 0.03 | 1.00 |
| GPRS 1900 (4 Tx slots) | 1850.2 | 2.7 | 23.0 | 0.59 | 2.0 | 295.12 | 0.06 | 1.00 |
| EGPRS 1900 (1 Tx slot) | 1850.2 | 2.7 | 25.0 | 0.30 | 2.0 | 37.15 | 0.01 | 1.00 |
| EGPRS 1900 (2 Tx slots) | 1850.2 | 2.7 | 22.0 | 0.23 | 2.0 | 58.88 | 0.01 | 1.00 |
| EGPRS 1900 (3 Tx slots) | 1850.2 | 2.7 | 21.0 | 0.19 | 2.0 | 69.82 | 0.01 | 1.00 |
| EGPRS 1900 (4 Tx slots) | 1850.2 | 2.7 | 20.0 | 0.47 | 2.0 | 234.42 | 0.05 | 1.00 |
| WCDMA Band 5 | 826.4 | 0.2 | 24.0 | 0.16 | 7.0 | 263.03 | 0.05 | 0.55 |
| WCDMA Band 2 | 1852.4 | 2.7 | 24.0 | 0.47 | 2.0 | 467.74 | 0.09 | 1.00 |
| 2.4GHz Band | 2400.0 | 0.0 | 17.0 | 0.05 | 1.0 | 50.12 | 0.01 | 1.00 |

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

## Conclusion:

According to 47 CFR §2.1091, the RF exposure analysis concludes that the RF Exposure is FCC compliant.