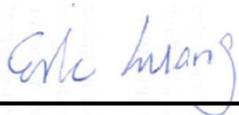


RF Exposure Evaluation Report

APPLICANT : Universal Global Scientific Industrial Co., Ltd.
EQUIPMENT : LTE module
BRAND NAME : SEQUANS Communications
MODEL NAME : VZ22Q, VZ22M
FCC ID : COFVZ22Q
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



SPORTON INTERNATIONAL INC.

No.52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Taoyuan City, Taiwan R.O.C.



Table of Contents

1. ADMINISTRATION DATA 3
1.1. Testing Laboratory 3
2. DESCRIPTION OF EQUIPMENT UNDER TEST (EUT) 3
3. MAXIMUM RF AVERAGE OUTPUT POWER AMONG PRODUCTION UNITS 4
4. RF EXPOSURE LIMIT INTRODUCTION 5
5. RADIO FREQUENCY RADIATION EXPOSURE EVALUATION 6
5.1. Standalone Power Density Calculation 6
5.2. Collocated Power Density Calculation..... 6

Revision History

Table with 4 columns: REPORT NO., VERSION, DESCRIPTION, ISSUED DATE. Row 1: FA4D1209, Rev. 01, Initial issue of report, Jan. 27, 2015.



1. Administration Data

1.1. Testing Laboratory

| Testing Laboratory | |
|--------------------|---|
| Test Site | SPORTON INTERNATIONAL INC. |
| Test Site Location | No.52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Taoyuan City, Taiwan R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978 |

| Applicant | |
|--------------|---|
| Company Name | Universal Global Scientific Industrial Co., Ltd. |
| Address | 141, Lane 351, Taiping Road, Tsaotuen, Nantou 54261, Taiwan |

| Manufacturer | |
|--------------|---|
| Company Name | Universal Scientific Industrial (Shanghai) |
| Address | No. 1558, Zhang Dong Road, Zhangjiang Hi-Tech Park, Shanghai, P.R. China 201203 |

2. Description of Equipment Under Test (EUT)

| Product Feature & Specification | |
|---|---|
| EUT Type | LTE module |
| Brand Name | SEQUANS Communications |
| Model Name | VZ22Q, VZ22M |
| FCC ID | COFVZ22Q |
| Wireless Technology and Frequency Range | LTE Band 13: 779.5 MHz ~ 784.5 MHz LTE Band 4: 1710.7 MHz ~ 1754.3 MHz |
| Mode | • LTE: QPSK, 16QAM |
| Antenna Type | Dipole Antenna |
| HW Version | V01 |
| SW Version | 17940 |
| 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

| LTE Band 4 | | | | |
|--------------------|----------|---------|-----|-------|
| average power(dBm) | | | | |
| Modulation | BW (MHz) | RB size | MPR | Power |
| QPSK | 20 | ≤ 18 | 0 | 24.00 |
| QPSK | 20 | > 18 | 1 | 23.00 |
| 16QAM | 20 | ≤ 18 | 1 | 23.00 |
| 16QAM | 20 | > 18 | 2 | 22.00 |
| QPSK | 15 | ≤ 16 | 0 | 24.00 |
| QPSK | 15 | > 16 | 1 | 23.00 |
| 16QAM | 15 | ≤ 16 | 1 | 23.00 |
| 16QAM | 15 | > 16 | 2 | 22.00 |
| QPSK | 10 | ≤ 12 | 0 | 24.00 |
| QPSK | 10 | > 12 | 1 | 23.00 |
| 16QAM | 10 | ≤ 12 | 1 | 23.00 |
| 16QAM | 10 | > 12 | 2 | 22.00 |
| QPSK | 5 | ≤ 8 | 0 | 24.00 |
| QPSK | 5 | > 8 | 1 | 23.00 |
| 16QAM | 5 | ≤ 8 | 1 | 23.00 |
| 16QAM | 5 | > 8 | 2 | 22.00 |

| LTE Band 13 | | | | |
|--------------------|----------|---------|-----|-------|
| average power(dBm) | | | | |
| Modulation | BW (MHz) | RB size | MPR | Power |
| QPSK | 10 | ≤ 12 | 0 | 24.00 |
| QPSK | 10 | > 12 | 1 | 23.00 |
| 16QAM | 10 | ≤ 12 | 1 | 23.00 |
| 16QAM | 10 | > 12 | 2 | 22.00 |
| QPSK | 5 | ≤ 8 | 0 | 24.00 |
| QPSK | 5 | > 8 | 1 | 23.00 |
| 16QAM | 5 | ≤ 8 | 1 | 23.00 |
| 16QAM | 5 | > 8 | 2 | 22.00 |



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 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 13 | 777 | 10.0 | 24.0 | 31.860 | 1.535 | 34.000 | 2.512 | 3.000 | 2511.886 | 0.500 | 0.518 |
| LTE Band 4 | 1710 | 6.0 | 24.0 | 27.860 | 0.611 | 30.000 | 1.000 | 1.000 | 1000.000 | 0.199 | 1.000 |

Note: For conservativeness, the lowest uplink 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/WiMax is less than or equal to 29dBm and for Bluetooth is less than or equal to 15dBm.
2. A maximum antenna gain of 5 dBi for WLAN/WiMAX/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 13 | 777 | 6.5 | 24.0 | 30.5 | 1.12 | 1122.02 | 0.223 | 0.518 | 0.431 |
| LTE Band 4 | 1710 | 6.0 | 24.0 | 30.0 | 1.00 | 1000.00 | 0.199 | 1.000 | 0.199 |
| WLAN2.4GHz Band | 2412 | 5.0 | 29.0 | 34.0 | 2.51 | 2511.89 | 0.500 | 1.000 | 0.500 |
| WLAN5GHz Band | 5180 | 5.0 | 29.0 | 34.0 | 2.51 | 2511.89 | 0.500 | 1.000 | 0.500 |
| WiMax2.6GHz | 2500 | 5.0 | 29.0 | 34.0 | 2.51 | 2511.89 | 0.500 | 1.000 | 0.500 |
| WiMax3.5GHz | 3400 | 5.0 | 29.0 | 34.0 | 2.51 | 2511.89 | 0.500 | 1.000 | 0.500 |
| WiMax3.7GHz | 3600 | 5.0 | 29.0 | 34.0 | 2.51 | 2511.89 | 0.500 | 1.000 | 0.500 |
| Bluetooth | 2402 | 5.0 | 15.0 | 20.0 | 0.10 | 100.00 | 0.020 | 1.000 | 0.020 |



<Collocated analysis>

Note:

1. For collocation analysis, LTE Band 13 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

| Max WLAN Power Density / Limit | Max Bluetooth Power Density / Limit | Max WWAN Power Density / Limit | Σ (Power Density / Limit) of WWAN + WLAN + Bluetooth |
|--------------------------------|-------------------------------------|--------------------------------|---|
| 0.500 | 0.020 | 0.431 | 0.951 |

Conclusion:

Based on 47 CFR§2.1091, the analysis concludes that this product is compliant with the RF exposure requirements in mobile exposure condition, provided the peak gain of the connected WWAN antenna, the conducted power and the antenna gain of the collocated transmitter, do not exceed the limits for each frequency band listed below.

| Device | Technology | Band | Frequency (MHz) | Maximum Conducted Power (dBm) | Standalone Maximum Antenna Gain (dBi) | Collocated Maximum Antenna Gain (dBi) |
|------------|------------|---------|-----------------|-------------------------------|---------------------------------------|---------------------------------------|
| LTE Module | LTE | Band 13 | 777 - 787 | 24.0 | 10.0 | 6.5 |
| | | Band 4 | 1710 - 1755 | 24.0 | 6.0 | 6.0 |