# RF EXPOSURE EVALUATION REPORT

| | |
|---|---|
| **FCC ID** | **: ACJFZS1A20A** |
| **Equipment** | **: Radio module** |
| **Brand Name** | **: Panasonic** |
| **Model Name** | **: WW18A** |
| **Marketing Name** | **: WW18A** |
| **Applicant** | **: Panasonic Corporation of North America<br>Two Riverfront Plaza, 9th Floor, Newark, NJ 07102-5490** |
| **Manufacturer** | **: Panasonic Mobile Communications Co., Ltd.<br>600 Saedo-cho, Tsuzuki-ku, Yokohama-city, Kanagawa 224-8539, Japan** |
| **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.**

**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.**

**Sporton Lab is accredited to ISO 17025 by A2LA (Code: 1250) and the FCC designation No. US1250 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC evaluation.**

Cona Huang

**Approved by: Cona Huang / Deputy Manager**

***SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory***

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# History of this test report

| Report No. | Version | Description | Issued Date |
|---|---|---|---|
| FA0D1135-01 | Rev. 01 | Initial issue of report | Dec. 31, 2020 |
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# 1. Description of Equipment Under Test (EUT)

| Product Feature & Specification | |
|---|---|
| **EUT Type** | Radio module |
| **Brand Name** | Panasonic |
| **Model Name** | WW18A |
| **FCC ID** | ACJFZS1A20A |
| **Wireless Technology and Frequency Range** | WCDMA Band II: 1850 MHz ~ 1910 MHz<br>WCDMA Band IV: 1710 MHz ~ 1755 MHz<br>WCDMA Band V: 824 MHz ~ 849 MHz<br>LTE Band 2: 1850 MHz ~ 1910 MHz<br>LTE Band 4: 1710 MHz ~ 1755 MHz<br>LTE Band 5: 824 MHz ~ 849 MHz<br>LTE Band 7: 2500 MHz ~ 2570 MHz<br>LTE Band 12: 699 MHz ~ 716 MHz<br>LTE Band 13: 777 MHz ~ 787 MHz<br>LTE Band 14: 788 MHz ~ 798 MHz<br>LTE Band 26: 814 MHz ~ 849 MHz<br>LTE Band 41: 2496 MHz ~ 2690 MHz<br>LTE Band 66: 1710.7 MHz ~ 1779.3 MHz |
| **Mode** | RMC 12.2Kbps<br>HSDPA<br>HSUPA<br>DC-HSDPA<br>LTE: QPSK, 16QAM, 64QAM |
| **HW Version** | Rev.B |
| **EUT Stage** | Production Unit |
| **Remark:**<br>1. When the external antenna is used for this device, the device will away human body 20cm above, the MPE calculation to show compliance. | |

| Host Information | |
|---|---|
| **EUT Type** | Tablet Computer |
| **Brand Name** | Panasonic |
| **Model Name** | FZ-S1 |
| **FCC ID** | ACJFZS1A |
| **Wireless Technology and Frequency Range** | WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz<br>WLAN 5.2GHz Band: 5180 MHz ~ 5240 MHz<br>WLAN 5.3GHz Band: 5260 MHz ~ 5320 MHz<br>WLAN 5.5GHz Band: 5500 MHz ~ 5720 MHz<br>WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz<br>Bluetooth: 2402 MHz ~ 2480 MHz<br>NFC : 13.56 MHz |
| **Mode** | WLAN: 802.11a/b/g/n/ac HT20/HT40/VHT20/VHT40/VHT80<br>Bluetooth BR/EDR/LE<br>NFC:ASK |

**Reviewed by: Jason Wang**

**Report Producer: Carlie Tsai**

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

| Mode | | Maximum Average power(dBm) |
|---|---|---|
| WCDMA | Band II | 24 |
| | Band IV | 24 |
| | Band V | 24 |
| LTE | Band 2 | 24 |
| | Band 4 | 24 |
| | Band 5 | 24 |
| | Band 7 | 23 |
| | Band 12 | 24 |
| | Band 13 | 24 |
| | Band 14 | 24 |
| | Band 26 | 24 |
| | Band 41 | 23 |
| | Band 66 | 24 |

| Mode | Maximum Average power(dBm) |
|---|---|
| 2.4GHz WLAN | 19.5 |
| 5GHz WLAN | 18.5 |
| Bluetooth | 11.3 |

## 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/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

# 4. Radio Frequency Radiation Exposure Evaluation

## 4.1. Standalone Power Density Calculation

**<WWAN radio module>**

| 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 |
|---|---|---|---|---|---|---|---|---|---|
| WCDMA Band 2 | 1850 | 4.10 | 24.00 | 28.100 | 0.646 | 645.654 | 0.129 | 1.000 | 0.129 |
| WCDMA Band 4 | 1710 | 4.10 | 24.00 | 28.100 | 0.646 | 645.654 | 0.129 | 1.000 | 0.129 |
| WCDMA Band 5 | 804 | 1.40 | 24.00 | 25.400 | 0.347 | 346.737 | 0.069 | 0.536 | 0.129 |
| LTE Band 2 | 1850 | 4.10 | 24.00 | 28.100 | 0.646 | 645.654 | 0.129 | 1.000 | 0.129 |
| LTE Band 4 | 1710 | 4.10 | 24.00 | 28.100 | 0.646 | 645.654 | 0.129 | 1.000 | 0.129 |
| LTE Band 5 | 824 | 1.40 | 24.00 | 25.400 | 0.347 | 346.737 | 0.069 | 0.549 | 0.126 |
| LTE Band 7 | 2500 | 4.10 | 23.00 | 27.100 | 0.513 | 512.861 | 0.102 | 1.000 | 0.102 |
| LTE Band 12 | 699 | 1.40 | 24.00 | 25.400 | 0.347 | 346.737 | 0.069 | 0.466 | 0.148 |
| LTE Band 13 | 777 | 1.40 | 24.00 | 25.400 | 0.347 | 346.737 | 0.069 | 0.518 | 0.133 |
| LTE Band 14 | 788 | 1.40 | 24.00 | 25.400 | 0.347 | 346.737 | 0.069 | 0.525 | 0.131 |
| LTE Band 26 | 814 | 1.40 | 24.00 | 25.400 | 0.347 | 346.737 | 0.069 | 0.543 | 0.127 |
| LTE Band 41 | 2496 | 4.10 | 23.00 | 27.100 | 0.513 | 512.861 | 0.102 | 1.000 | 0.102 |
| LTE Band 66 | 1710 | 4.10 | 24.00 | 28.100 | 0.646 | 645.654 | 0.129 | 1.000 | 0.129 |

**<Host>**

| 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 |
|---|---|---|---|---|---|---|---|---|---|
| WLAN2.4GHz Band | 2400 | 2.00 | 19.5 | 21.500 | 0.141 | 141.254 | 0.028 | 1.000 | 0.028 |
| WLAN5GHz Band | 5150 | 4.25 | 18.5 | 22.750 | 0.188 | 188.365 | 0.037 | 1.000 | 0.037 |
| Bluetooth | 2400 | 2.00 | 11.3 | 13.300 | 0.021 | 21.380 | 0.004 | 1.000 | 0.004 |

## 4.2. Collocated Power Density Calculation

| WWAN Power Density / Limit | WLAN Power Density / Limit | Bluetooth Power Density / Limit | ∑(Power Density / Limit) of WWAN+WLAN+Bluetooth |
|---|---|---|---|
| 0.148 | 0.037 | 0.004 | 0.189 |

**Note:**

1. The wlan module is also integrated into FCC ID:ACJFZS1A, report no: FA091742., evaluation simultaneous transmission to show compliance
2. ∑(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 all 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:

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