

# 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  
Two Riverfront Plaza, 9th Floor, Newark, NJ 07102-5490  
Manufacturer : Panasonic Mobile Communications Co., Ltd.  
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.

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Approved by: Cona Huang / Deputy Manager



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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                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Remark:</b><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 <sup>2</sup> ) | Averaging time (minutes) |
|----------------------------------------------------------------|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| <b>(A) Limits for Occupational/Controlled Exposures</b>        |                               |                               |                                     |                          |
| 0.3-3.0                                                        | 614                           | 1.63                          | *(100)                              | 6                        |
| 3.0-30                                                         | 1842/f                        | 4.89/f                        | *(900/f <sup>2</sup> )              | 6                        |
| 30-300                                                         | 61.4                          | 0.163                         | 1.0                                 | 6                        |
| 300-1500                                                       |                               |                               | f/300                               | 6                        |
| 1500-100,000                                                   |                               |                               | 5                                   | 6                        |
| <b>(B) Limits for General Population/Uncontrolled Exposure</b> |                               |                               |                                     |                          |
| 0.3-1.34                                                       | 614                           | 1.63                          | *(100)                              | 30                       |
| 1.34-30                                                        | 824/f                         | 2.19/f                        | *(180/f <sup>2</sup> )              | 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 <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) | 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 <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) | 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 | Σ (Power Density / Limit) of WWAN+WLAN+Bluetooth |
|----------------------------|----------------------------|---------------------------------|--------------------------------------------------|
| 0.148                      | 0.037                      | 0.004                           | 0.189                                            |

**Note:**

- The wlan module is also integrated into FCC ID:ACJFZS1A, report no: FA091742., evaluation simultaneous transmission to show compliance
- 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 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.