



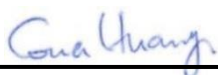
# RF EXPOSURE EVALUATION REPORT

FCC ID : UZ7CC600  
Equipment : Customer Concierge  
Brand Name : ZEBRA  
Model Name : CC600  
Applicant : Zebra Technologies Corporation  
1 Zebra Plaza, Holtsville, NY 11742  
Manufacturer : Zebra Technologies Corporation  
1 Zebra Plaza, Holtsville, NY 11742  
Standard : 47 CFR Part 2.1091

We, SPORTON INTERNATIONAL INC has been evaluated in accordance with 47 CFR Part 2.1091 for the device and pass the 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 variant 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.



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   |
|------------|---------|-------------------------|---------------|
| FA911110   | Rev. 01 | Initial issue of report | Apr. 29, 2019 |
|            |         |                         |               |
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**1. Description of Equipment Under Test (EUT)**

| Product Feature & Specification         |                                                                                                                                                                                                                                             |
|-----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| EUT Type                                | Customer Concierge                                                                                                                                                                                                                          |
| Brand Name                              | ZEBRA                                                                                                                                                                                                                                       |
| Model Name                              | CC600                                                                                                                                                                                                                                       |
| FCC ID                                  | UZ7CC600                                                                                                                                                                                                                                    |
| 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 |
| Mode                                    | 802.11a/b/g/n/ac HT20/HT40/VHT20/VHT40/VHT80<br>Bluetooth BR/EDR/LE                                                                                                                                                                         |
| HW Version                              | DV                                                                                                                                                                                                                                          |
| SW Version                              | 01-15-15.00.OG-U00-PRD                                                                                                                                                                                                                      |
| FW Version                              | FUSION_QA_2_1.4.0.002_O                                                                                                                                                                                                                     |
| MFD                                     | 17-Jan-19                                                                                                                                                                                                                                   |
| EUT Stage                               | Engineering sample                                                                                                                                                                                                                          |

**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:** Daisy Peng

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

| Mode / Band       | Average Power (dBm) |       |       |     |     |
|-------------------|---------------------|-------|-------|-----|-----|
|                   | BR/EDR              |       |       | LE  |     |
|                   | 1Mbps               | 2Mbps | 3Mbps | 1M  | 2M  |
| 2.4 GHz Bluetooth | 1.5                 | 0     | 0     | 1.5 | 1.5 |

### <Non-beamforming mode>

|             | Mode                | Channel | Frequency (MHz) | Ant 1               | Ant 2               | Ant 1+2             |
|-------------|---------------------|---------|-----------------|---------------------|---------------------|---------------------|
|             |                     |         |                 | Tune-Up Limit (dBm) | Tune-Up Limit (dBm) | Tune-Up Limit (dBm) |
| 2.4GHz WLAN | 802.11b 1Mbps       | 1       | 2412            | 21.00               | 21.00               | 23.00               |
|             |                     | 6       | 2437            | 21.00               | 21.00               | 24.00               |
|             |                     | 11      | 2462            | 21.00               | 21.00               | 22.00               |
|             | 802.11g 6Mbps       | 1       | 2412            | 19.00               | 18.00               | 20.00               |
|             |                     | 6       | 2437            | 19.00               | 19.00               | 22.00               |
|             |                     | 11      | 2462            | 17.00               | 18.00               | 20.00               |
|             | 802.11n-HT20 MCS0   | 1       | 2412            | 18.00               | 18.00               | 20.00               |
|             |                     | 6       | 2437            | 18.00               | 19.00               | 22.00               |
|             |                     | 11      | 2462            | 16.00               | 16.00               | 18.00               |
|             | 802.11n-HT40 MCS0   | 3       | 2422            | 16.00               | 16.00               | 17.00               |
|             |                     | 6       | 2437            | 17.00               | 17.00               | 19.00               |
|             |                     | 9       | 2452            | 14.00               | 15.00               | 17.00               |
|             | 802.11ac-VHT20 MCS0 | 1       | 2412            | 17.00               | 17.00               | 19.00               |
|             |                     | 6       | 2437            | 18.00               | 19.00               | 21.00               |
|             |                     | 11      | 2462            | 16.00               | 17.00               | 18.00               |
|             | 802.11ac-VHT40 MCS0 | 3       | 2422            | 16.00               | 16.00               | 17.00               |
|             |                     | 6       | 2437            | 17.00               | 17.00               | 18.00               |
|             |                     | 9       | 2452            | 14.00               | 15.00               | 16.00               |



# RF EXPOSURE EVALUATION REPORT

Report No. : FA911110

| 5.2GHz WLAN | Mode                | Channel | Frequency (MHz) | Ant 1               | Ant 2               | Ant 1+2             |
|-------------|---------------------|---------|-----------------|---------------------|---------------------|---------------------|
|             |                     |         |                 | Tune-Up Limit (dBm) | Tune-Up Limit (dBm) | Tune-Up Limit (dBm) |
|             | 802.11a 6Mbps       | 36      | 5180            | 20.00               | 19.00               | 20.00               |
|             |                     | 40      | 5200            | 20.00               | 19.00               | 20.00               |
|             |                     | 44      | 5220            | 20.00               | 19.00               | 20.00               |
|             |                     | 48      | 5240            | 20.00               | 19.00               | 20.00               |
|             | 802.11n-HT20 MCS0   | 36      | 5180            | 19.00               | 19.00               | 21.00               |
|             |                     | 40      | 5200            | 19.00               | 19.00               | 21.00               |
|             |                     | 44      | 5220            | 19.00               | 19.00               | 21.00               |
|             |                     | 48      | 5240            | 19.00               | 19.00               | 21.00               |
|             | 802.11n-HT40 MCS0   | 38      | 5190            | 16.00               | 18.00               | 19.00               |
|             |                     | 46      | 5230            | 20.00               | 19.00               | 22.00               |
|             | 802.11ac-VHT20 MCS0 | 36      | 5180            | 19.00               | 19.00               | 21.00               |
|             |                     | 40      | 5200            | 19.00               | 19.00               | 21.00               |
|             |                     | 44      | 5220            | 19.00               | 19.00               | 21.00               |
|             |                     | 48      | 5240            | 19.00               | 19.00               | 21.00               |
|             | 802.11ac-VHT40 MCS0 | 38      | 5190            | 16.00               | 18.00               | 19.00               |
|             |                     | 46      | 5230            | 19.00               | 19.00               | 22.00               |
|             | 802.11ac-VHT80 MCS0 | 42      | 5210            | 16.00               | 18.00               | 17.00               |

| 5.3GHz WLAN | Mode                | Channel | Frequency (MHz) | Ant 1               | Ant 2               | Ant 1+2             |
|-------------|---------------------|---------|-----------------|---------------------|---------------------|---------------------|
|             |                     |         |                 | Tune-Up Limit (dBm) | Tune-Up Limit (dBm) | Tune-Up Limit (dBm) |
|             | 802.11a 6Mbps       | 52      | 5260            | 19.00               | 19.00               | 20.00               |
|             |                     | 56      | 5280            | 19.00               | 19.00               | 20.00               |
|             |                     | 60      | 5300            | 19.00               | 19.00               | 20.00               |
|             |                     | 64      | 5320            | 20.00               | 20.00               | 20.00               |
|             | 802.11n-HT20 MCS0   | 52      | 5260            | 19.00               | 19.00               | 21.00               |
|             |                     | 56      | 5280            | 19.00               | 19.00               | 21.00               |
|             |                     | 60      | 5300            | 19.00               | 19.00               | 21.00               |
|             |                     | 64      | 5320            | 19.00               | 19.00               | 21.00               |
|             | 802.11n-HT40 MCS0   | 54      | 5270            | 19.00               | 19.00               | 23.00               |
|             |                     | 62      | 5310            | 16.00               | 18.00               | 17.00               |
|             | 802.11ac-VHT20 MCS0 | 52      | 5260            | 19.00               | 19.00               | 21.00               |
|             |                     | 56      | 5280            | 19.00               | 19.00               | 21.00               |
|             |                     | 60      | 5300            | 19.00               | 19.00               | 21.00               |
|             |                     | 64      | 5320            | 19.00               | 19.00               | 21.00               |
|             | 802.11ac-VHT40 MCS0 | 54      | 5270            | 19.00               | 19.00               | 23.00               |
|             |                     | 62      | 5310            | 16.00               | 18.00               | 17.00               |
|             | 802.11ac-VHT80 MCS0 | 58      | 5290            | 15.00               | 17.00               | 12.00               |

| 5.5GHz WLAN | Mode                | Channel | Frequency (MHz) | Ant 1               | Ant 2               | Ant 1+2             |
|-------------|---------------------|---------|-----------------|---------------------|---------------------|---------------------|
|             |                     |         |                 | Tune-Up Limit (dBm) | Tune-Up Limit (dBm) | Tune-Up Limit (dBm) |
|             | 802.11a 6Mbps       | 100     | 5500            | 20.00               | 21.00               | 19.00               |
|             |                     | 116     | 5580            | 21.00               | 20.00               | 19.00               |
|             |                     | 124     | 5620            | 21.00               | 20.00               | 19.00               |
|             |                     | 132     | 5660            | 21.00               | 20.00               | 19.00               |
|             |                     | 144     | 5720            | 21.00               | 20.00               | 19.00               |
|             | 802.11n-HT20 MCS0   | 100     | 5500            | 20.00               | 20.00               | 19.00               |
|             |                     | 116     | 5580            | 21.00               | 20.00               | 19.00               |
|             |                     | 124     | 5620            | 20.00               | 20.00               | 19.00               |
|             |                     | 132     | 5660            | 20.00               | 20.00               | 19.00               |
|             |                     | 144     | 5720            | 20.00               | 20.00               | 19.00               |
|             | 802.11n-HT40 MCS0   | 102     | 5510            | 19.00               | 20.00               | 20.00               |
|             |                     | 110     | 5550            | 21.00               | 21.00               | 22.00               |
|             |                     | 126     | 5630            | 21.00               | 21.00               | 22.00               |
|             |                     | 134     | 5670            | 21.00               | 20.00               | 22.00               |
|             |                     | 142     | 5710            | 21.00               | 20.00               | 22.00               |
|             | 802.11ac-VHT20 MCS0 | 100     | 5500            | 20.00               | 20.00               | 19.00               |
|             |                     | 116     | 5580            | 20.00               | 20.00               | 19.00               |
|             |                     | 124     | 5620            | 20.00               | 20.00               | 19.00               |
|             |                     | 132     | 5660            | 20.00               | 20.00               | 19.00               |
|             |                     | 144     | 5720            | 20.00               | 20.00               | 19.00               |
|             | 802.11ac-VHT40 MCS0 | 102     | 5510            | 19.00               | 19.00               | 20.00               |
|             |                     | 110     | 5550            | 21.00               | 20.00               | 22.00               |
|             |                     | 126     | 5630            | 21.00               | 20.00               | 22.00               |
|             |                     | 134     | 5670            | 21.00               | 20.00               | 22.00               |
|             |                     | 142     | 5710            | 21.00               | 20.00               | 22.00               |
|             | 802.11ac-VHT80 MCS0 | 106     | 5530            | 19.00               | 19.00               | 18.00               |
|             |                     | 122     | 5610            | 20.00               | 20.00               | 22.00               |
|             |                     | 138     | 5690            | 20.00               | 19.00               | 22.00               |

| 5.8GHz WLAN | Mode                | Channel | Frequency (MHz) | Ant 1               | Ant 2               | Ant 1+2             |
|-------------|---------------------|---------|-----------------|---------------------|---------------------|---------------------|
|             |                     |         |                 | Tune-Up Limit (dBm) | Tune-Up Limit (dBm) | Tune-Up Limit (dBm) |
|             | 802.11a MCS0        | 149     | 5745            | 21.00               | 21.00               | 24.00               |
|             |                     | 157     | 5785            | 21.00               | 21.00               | 23.00               |
|             |                     | 165     | 5825            | 22.00               | 21.00               | 24.00               |
|             | 802.11n-HT20 MCS0   | 149     | 5745            | 21.00               | 21.00               | 25.00               |
|             |                     | 157     | 5785            | 21.00               | 21.00               | 22.00               |
|             |                     | 165     | 5825            | 21.00               | 21.00               | 24.00               |
|             | 802.11n-HT40 MCS0   | 151     | 5755            | 21.00               | 21.00               | 24.00               |
|             |                     | 159     | 5795            | 21.00               | 22.00               | 24.00               |
|             | 802.11ac-VHT20 MCS0 | 149     | 5745            | 21.00               | 21.00               | 25.00               |
|             |                     | 157     | 5785            | 21.00               | 21.00               | 22.00               |
|             |                     | 165     | 5825            | 21.00               | 21.00               | 24.00               |
|             | 802.11ac-VHT40 MCS0 | 151     | 5755            | 21.00               | 21.00               | 24.00               |
|             |                     | 159     | 5795            | 21.00               | 21.00               | 24.00               |
|             | 802.11ac-VHT80 MCS0 | 155     | 5775            | 21.00               | 21.00               | 24.00               |

**<Beamforming mode>**

| 2.4GHz WLAN | Mode                | Channel | Frequency (MHz) | Ant 1+2             |
|-------------|---------------------|---------|-----------------|---------------------|
|             |                     |         |                 | Tune-Up Limit (dBm) |
|             | 802.11ac-VHT20 MCS0 | 1       | 2412            | 21.00               |
|             |                     | 6       | 2437            | 21.00               |
|             |                     | 11      | 2462            | 21.00               |
|             | 802.11ac-VHT40 MCS0 | 3       | 2422            | 16.00               |
|             |                     | 6       | 2437            | 19.00               |
|             |                     | 9       | 2452            | 17.00               |

| 5.2GHz WLAN | Mode                | Channel | Frequency (MHz) | Ant 1+2             |
|-------------|---------------------|---------|-----------------|---------------------|
|             |                     |         |                 | Tune-Up Limit (dBm) |
|             | 802.11ac-VHT20 MCS0 | 36      | 5180            | 19.00               |
|             |                     | 40      | 5200            | 19.00               |
|             |                     | 44      | 5220            | 19.00               |
|             |                     | 48      | 5240            | 16.00               |
|             | 802.11ac-VHT40 MCS0 | 38      | 5190            | 21.00               |
|             |                     | 46      | 5230            | 22.00               |
|             | 802.11ac-VHT80 MCS0 | 42      | 5210            | 20.00               |
|             |                     |         |                 |                     |

| 5.3GHz WLAN | Mode                | Channel | Frequency (MHz) | Ant 1+2             |
|-------------|---------------------|---------|-----------------|---------------------|
|             |                     |         |                 | Tune-Up Limit (dBm) |
|             | 802.11ac-VHT20 MCS0 | 52      | 5260            | 18.00               |
|             |                     | 56      | 5280            | 18.00               |
|             |                     | 60      | 5300            | 18.00               |
|             |                     | 64      | 5320            | 18.00               |
|             | 802.11ac-VHT40 MCS0 | 54      | 5270            | 20.00               |
|             |                     | 62      | 5310            | 20.00               |
|             | 802.11ac-VHT80 MCS0 | 58      | 5290            | 19.00               |
|             |                     |         |                 |                     |

| 5.5GHz WLAN | Mode                | Channel | Frequency (MHz) | Ant 1+2             |
|-------------|---------------------|---------|-----------------|---------------------|
|             |                     |         |                 | Tune-Up Limit (dBm) |
|             | 802.11ac-VHT20 MCS0 | 100     | 5500            | 18.00               |
|             |                     | 116     | 5580            | 18.00               |
|             |                     | 124     | 5620            | 18.00               |
|             |                     | 132     | 5660            | 18.00               |
|             |                     | 144     | 5720            | 19.00               |
|             | 802.11ac-VHT40 MCS0 | 102     | 5510            | 21.00               |
|             |                     | 110     | 5550            | 21.00               |
|             |                     | 126     | 5630            | 21.00               |
|             |                     | 134     | 5670            | 21.00               |
|             |                     | 142     | 5710            | 21.00               |
|             | 802.11ac-VHT80 MCS0 | 106     | 5530            | 21.00               |
|             |                     | 122     | 5610            | 21.00               |
|             |                     | 138     | 5690            | 19.00               |
|             |                     |         |                 |                     |
|             |                     |         |                 |                     |
|             |                     |         |                 |                     |



| 5.8GHz WLAN | Mode                | Channel | Frequency<br>(MHz) | Ant 1+2                   |
|-------------|---------------------|---------|--------------------|---------------------------|
|             |                     |         |                    | Tune-Up<br>Limit<br>(dBm) |
|             | 802.11ac-VHT20 MCS0 | 149     | 5745               | 22.00                     |
|             |                     | 157     | 5785               | 23.00                     |
|             |                     | 165     | 5825               | 23.00                     |
|             | 802.11ac-VHT40 MCS0 | 151     | 5755               | 23.00                     |
|             |                     | 159     | 5795               | 23.00                     |
|             | 802.11ac-VHT80 MCS0 | 155     | 5775               | 23.00                     |

### 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**

<Non-beamforming mode>

| 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 |
|-------------|-----------------|--------------------|---------------------|--------------------|------------------|-------------------|---------------------------------------------|-----------------------------|-----------------------|
| 2.4GHz WLAN | 2412.0          | 1.70               | 24.00               | 25.700             | 0.372            | 371.535           | 0.074                                       | 1.000                       | 0.0740                |
| 5GHz WLAN   | 5180.0          | 4.40               | 25.00               | 29.400             | 0.871            | 870.964           | 0.173                                       | 1.000                       | 0.1734                |
| Bluetooth   | 2402.0          | 1.60               | 1.50                | 3.100              | 0.002            | 2.042             | 0.000                                       | 1.000                       | 0.0004                |

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

<Beamforming mode>

| 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 |
|-------------|-----------------|--------------------|---------------------|--------------------|------------------|-------------------|---------------------------------------------|-----------------------------|-----------------------|
| 2.4GHz WLAN | 2412.0          | 0.91               | 21.00               | 21.910             | 0.155            | 155.239           | 0.031                                       | 1.000                       | 0.0309                |
| 5GHz WLAN   | 5180.0          | 1.00               | 23.00               | 24.000             | 0.251            | 251.189           | 0.050                                       | 1.000                       | 0.0500                |

**Note:**

- For conservativeness, the lowest uplink frequency of each band is used to determine the MPE limit of that band.
- This device supports Beamforming for WLAN 2.4GHz VHT20/VHT40 and WLAN 5GHz VHT20/VHT40/VHT80 only; therefore, in the table above which consider maximum directional Gain 0.91dBi for WLAN 2.4GHz Beamforming mode and 1dBi for WLAN 5GHz Beamforming mode.

### **4.2. Collocated Power Density Calculation**

| WLAN Power Density / Limit | Bluetooth Power Density / Limit | $\Sigma$ (Power Density / Limit) of WLAN+Bluetooth |
|----------------------------|---------------------------------|----------------------------------------------------|
| 0.1734                     | 0.0004                          | 0.1738                                             |

**Note:**

- $\Sigma$  (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 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 2 collocated transmitters is compliant

## **Conclusion:**

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