




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

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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

**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 WLAN 5.2GHz Band: 5180 MHz ~ 5240 MHz WLAN 5.3GHz Band: 5260 MHz ~ 5320 MHz WLAN 5.5GHz Band: 5500 MHz ~ 5720 MHz WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz Bluetooth: 2402 MHz ~ 2480 MHz
Mode	802.11a/b/g/n/ac HT20/HT40/VHT20/VHT40/VHT80 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)
5.5GHz WLAN	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)
5.8GHz WLAN	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 (MHz)	Ant 1+2
				Tune-Up Limit (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 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

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 ²)	Limit (mW/cm ²)	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 ²)	Limit (mW/cm ²)	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	Σ (Power Density / Limit) of WLAN+Bluetooth
0.1734	0.0004	0.1738

Note:

- 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 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.