

RF Exposure Evaluation Report

APPLICANT : Ring LLC
EQUIPMENT : Video Doorbell Pro 2
BRAND NAME : Ring
MODEL NAME : 5AT2S2
FCC ID : 2AEUPBHALP032
STANDARD : 47 CFR Part 2.1091
FCC KDB 447498 D01 v06

We, Sporton International Inc. (Kunshan), would like to declare that the device has been evaluated in accordance with 47 CFR Part 2.1091 and FCC KDB 447498 D01 v06, and pass the limit. Without written approval of Sporton International Inc. (Kunshan), the test report shall not be reproduced except in full.



Approved by: Si Zhang



Sporton International Inc. (Kunshan)

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People's Republic of China**



Table of Contents

1. ADMINISTRATION DATA	4
1.1. Testing Laboratory	4
2. DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)	5
3. MAXIMUM RF AVERAGE OUTPUT POWER AMONG PRODUCTION UNITS	6
4. RF EXPOSURE LIMIT INTRODUCTION	8
5. RADIO FREQUENCY RADIATION EXPOSURE EVALUATION	9
5.1. Standalone Power Density Calculation	9
5.2. Collocated Power Density Calculation.....	10



1. Administration Data

1.1. Testing Laboratory

Sporton International Inc. (Kunshan) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Testing Laboratory			
Test Firm	Sporton International Inc. (Kunshan)		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158 FAX : +86-512-57900958		
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.
	SAR01-KS	CN1257	314309

Applicant	
Company Name	Ring LLC
Address	12515 Cerise Ave, Hawthorne, CA 90250, USA

Manufacturer	
Company Name	Goertek Inc.
Address	No.268 Dongfang Road High-Tech Industrial Development District, Weifang Shandong, China



2. Description of Equipment Under Test (EUT)

Product Feature & Specification			
EUT Type	Video Doorbell Pro 2		
Brand Name	Ring		
Model Name	5AT2S2		
FCC ID	2AEUPBHALP032		
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 LoRa DTS: 902.5 MHz ~ 926.5 MHz LoRa FHSS: 902.2 MHz ~ 927.8 MHz FSK FHSS: 902.2 MHz ~ 927.8 MHz Radar: 24050 MHz ~ 24250 MHz		
Mode	WLAN 2.4GHz : 802.11b/g/n/ HT20 WLAN 5GHz : 802.11a/n/ac HT20/HT40/VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE LoRa DTS/LoRa FHSS/FSK FHSS Radar		
Antenna Function Description	Mode	Ant. 1	Ant. 2
	Bluetooth BR/EDR/LE	√	-
	LoRa	√	-
	Radar	√	-
	WLAN 2.4GHz 802.11 b/g/n SISO/MIMO	√	√
	WLAN 5GHz 802.11 a/n/ac SISO/MIMO	√	√
Antenna Type	LoRa : IFA Antenna Radar: patch Antenna Bluetooth: LOOP Antenna WLAN: LOOP Antenna		
Antenna gain	<Ant. 1> WLAN 2.4GHz: gain 1.75 dBi WLAN 5.2GHz: gain 4.22 dBi WLAN 5.3GHz: gain 4.79 dBi WLAN 5.5GHz: gain 4.36 dBi WLAN 5.8GHz: gain 4.07 dBi Bluetooth: gain 1.75 dBi LoRa: gain -1.01 dBi Radar: gain 2 dBi <Ant. 2> WLAN 2.4GHz: gain 2.46 dBi WLAN 5.2GHz: gain 4.15 dBi WLAN 5.3GHz: gain 4.24 dBi WLAN 5.5GHz: gain 4.98 dBi WLAN 5.8GHz: gain 4.18 dBi		
HW Version	R6		
SW Version	8.0.60		
EUT Stage	Production Unit		
Remark:			
1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description. 2. WLAN2.4GHz n-HT40MHz is not supported. 3. WLAN2.4GHz and WLAN5GHz supports SISO/MIMO mode, for MIMO mode power is higher than SISO mode, So only chose MIMO mode power to perform MPE calculation. 4. WLAN2.4GHz and WLAN5GHz chose the higher SISO gain as MIMO gain to perform MPE calculation. 5. This is a variant report for 5AT2S2. The difference between current project and previous project was enabled LoRa			



FHSS SF8 and DTS SF8/9/10 by software. According to the difference, and all the others test data in this report were leveraged from original report which can be refer to Sporton Report Number FA090815-03.

Comments and Explanations:

1. The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.
2. The maximum RF output tune up power, antenna gain also the safe distance used for evaluate RF exposure were declared by manufacturer.

3. Maximum RF average output power among production units

<Bluetooth>

Mode	Maximum Average Power (dBm)
Bluetooth BR/EDR	10.0
Bluetooth LE	10.0

<WLAN 2.4GHz MIMO Mode>

Mode		Maximum Average Power (dBm) MIMO
2.4GHz	802.11b	22.00
	802.11g	22.00
	802.11n-HT20	22.00

<WLAN 5GHz MIMO Mode >

Mode		Maximum Average Power (dBm) MIMO
WLAN 5.2GHz	802.11a	21.00
	802.11n-HT20	21.00
	802.11n-HT40	22.00
	802.11ac-VHT20	21.00
	802.11ac-VHT40	22.00
	802.11ac-VHT80	16.00
WLAN 5.3GHz	802.11a	21.00
	802.11n-HT20	21.00
	802.11n-HT40	22.00
	802.11ac-VHT20	21.00
	802.11ac-VHT40	22.00
	802.11ac-VHT80	16.00
WLAN 5.5GHz	802.11a	21.00
	802.11n-HT20	21.00
	802.11n-HT40	22.00
	802.11ac-VHT20	21.00
	802.11ac-VHT40	22.00



WLAN 5.8GHz	802.11ac-VHT80	22.00
	802.11a	21.00
	802.11n-HT20	20.00
	802.11n-HT40	20.00
	802.11ac-VHT20	20.00
	802.11ac-VHT40	20.00
	802.11ac-VHT80	18.00

Note: WLAN2.4GHz/WLAN5GHz all support SISO/MIMO mode, we only chose MIMO tune up power to perform MPE calculation conservatively for MIMO power is higher.

<LoRa>

Mode	Maximum Average Power (dBm)
DTS	16.00
FHSS	16.00
FSK FHSS	16.00



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 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	2.46	22	24.46	0.28	279.25	0.056	1.000	0.056
WLAN 5.2GHz	5180	4.22	22	26.22	0.42	418.79	0.083	1.000	0.083
WLAN 5.3GHz	5260	4.79	22	26.79	0.48	477.53	0.095	1.000	0.095
WLAN 5.5GHz	5500	4.98	22	26.98	0.50	498.88	0.099	1.000	0.099
WLAN 5.8GHz	5745	4.18	21	25.18	0.33	329.61	0.066	1.000	0.066
Bluetooth	2402	1.75	10	11.75	0.01	14.96	0.003	1.000	0.003
LoRa	902.2	-1.01	16	14.99	0.03	31.55	0.006	0.601	0.010
Radar	24050			1.88	0.00	1.43	0.0003	1.000	0.0003

Note:

1. For conservativeness, the lowest frequency of each band is used to determine the MPE limit of that band.
2. Chose the maximum power to do MPE analysis.
3. According to the EUT characteristic, WLAN 2.4GHz and WLAN 5GHz cannot transmit simultaneously.
4. 24G Radar maximum EIRP power calculate from 24G Radar E-Field level from RF test report which Sproton No: FR093009-01.
5. This device maximum E-Field level is 97.11dBuV/m at 3m, so the EIRP power is 1.88dBm (1.43mW).
6. Pout EIRP (dBm) = Field Strength of Fundamental (dBuV/m) - 95.23 (dB)



5.2. Collocated Power Density Calculation

Maximum WLAN 2.4GHz Power Density / Limit	Maximum Bluetooth Power Density / Limit	Maximum LoRa Power Density / Limit	Maximum Radar Power Density / Limit	Σ (Power Density / Limit) of WLAN 2.4GHz + Bluetooth + LoRa + Radar
0.056	0.003	0.010	0.0003	0.069

Maximum WLAN 5GHz Power Density / Limit	Maximum Bluetooth Power Density / Limit	Maximum LoRa Power Density / Limit	Maximum Radar Power Density / Limit	Σ (Power Density / Limit) of WLAN 5GHz + Bluetooth + LoRa + Radar
0.099	0.003	0.010	0.0003	0.112

Note:

1. Σ (Power Density / Limit): This is a summation of [(power density for each transmitter/antenna included in the simultaneous transmission)/ (corresponding MPE limit)], for WLAN + Bluetooth + LoRa + Radar.
2. The worst of case WLAN5 GHz or WLAN2.4 GHz or Bluetooth or LoRa or Radar MPE for each configuration was used for MPE summation.

Conclusion:

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

-----THE END-----