

RF Exposure Evaluation Report

APPLICANT : Ring LLC
EQUIPMENT : Battery Doorbell Pro
BRAND NAME : ring
MODEL NAME : 5F79E9
FCC ID : 2AEUPBHARG091
STANDARD : 47 CFR Part 2.1091

The product evaluation date was started from Sep. 06, 2023 and completed on Sep. 06, 2023. 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**



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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA330811-01	Rev. 01	Initial issue of report.	Nov. 15, 2023



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		
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

2. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	Battery Doorbell Pro
Brand Name	ring
Model Name	5F79E9
FCC ID	2AEUPBHARG091
Wireless Technology and Frequency Range	WLAN 2.4GHz Band: 2412 MHz ~ 2472 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 Radar: 24050 MHz ~ 24250 MHz
Mode	WLAN 2.4GHz 802.11b/g/n/ax HT20/HE20 WLAN 5GHz 802.11a/n/ac/ax HT20/VHT20/HE20 Bluetooth BR/EDR/LE Radar: FMCW
Antenna Gain	Radar: 2.00 dBi
Antenna Type	WLAN/Bluetooth: IFA Antenna Radar: Patch Antenna
HW Version	DVT 4
SW Version	1.2.118
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. There are two samples under test, sample 1 is original Radar PCB board, sample 2 is new Radar PCB board, the detailed difference could be referred to "5F79E9_Operational Description of Product Equality Declaration" which is exhibit separately.
3. Chose the maximum RF output tune up power of all antennas among same frequency WLAN bands and the maximum antenna gain to perform MPE calculation conservatively.

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.

WLAN/BT Antenna Gain table:

Frequency Bands	Ant 1 Gain (dBi)	Ant 2 Gain (dBi)
Bluetooth	1.9	2.2
WLAN 2.4GMHz	1.9	2.2
WLAN 5.2GMHz	3.9	3.3
WLAN 5.3GMHz	3.9	3.3
WLAN 5.5GMHz	3.9	3.3
WLAN 5.8GMHz	3.9	3.3



3. Maximum RF average output tune up power among production units

<2.4GHz WLAN >

Mode		Maximum Average Power (dBm)	
		ANT1	ANT2
2.4GHz	802.11b	20.0	20.0
	802.11g	20.0	20.0
	802.11n-HT20	20.0	20.0
	802.11ax-HE20	20.0	20.0

<Bluetooth>

Mode		Maximum Average power(dBm)	
		ANT1	ANT2
Bluetooth	LE	15.0	15.0

<5GHz WLAN >

Mode		Maximum Average Power (dBm)	
		ANT1	ANT2
5.2GHz	802.11a	20.0	20.0
	802.11n-HT20	20.0	20.0
	802.11ac-VHT20	20.0	20.0
	802.11ax-HE20	20.0	20.0
5.3GHz	802.11a	20.0	20.0
	802.11n-HT20	20.0	20.0
	802.11ac-VHT20	20.0	20.0
	802.11ax-HE20	20.0	20.0
5.5GHz	802.11a	20.0	20.0
	802.11n-HT20	20.0	20.0
	802.11ac-VHT20	20.0	20.0
	802.11ax-HE20	20.0	20.0
5.8GHz	802.11a	19.0	19.0
	802.11n-HT20	19.0	19.0
	802.11ac-VHT20	19.0	19.0
	802.11ax-HE20	19.0	19.0

Note: WLAN2.4GHz/WLAN5GHz all support SISO mode only.

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

Table with 9 columns: Band, Frequency (MHz), Antenna Gain (dBi), Maximum Power (dBm), Maximum EIRP (dBm), Average EIRP (mW), Power Density at 20cm (mW/cm^2), Limit (mW/cm^2), Power Density / Limit. Rows include Bluetooth, 2.4GHz WLAN, 5.2GHz WLAN, 5.3GHz WLAN, 5.5GHz WLAN, 5.8GHz WLAN, and Radar.

Note:

- 1. For conservativeness, the lowest frequency of each band is used to determine the MPE limit of that band.
2. Chose the maximum RF output tune up power of all antennas among same frequency WLAN bands and the maximum antenna gain to perform MPE calculation conservatively.
3. 24G Radar maximum EIRP power calculate from 24G Radar E-Field level from RF test report which can be referred to Sporton No: FR330817.
4. This device maximum E-Field level is 98.31 dBuV/m at 3m, so the EIRP power is 3.08dBm (2.03mW).
5. Pout EIRP (dBm) = Field Strength of Fundamental (dBuV/m) - 95.23 (dB)



5.2. Collocated Power Density Calculation

Radar Power Density / Limit	Bluetooth Power Density / Limit	Σ (Power Density / Limit) of Radar + Bluetooth
0.0004	0.010	0.010
Radar Power Density / Limit	WLAN 2.4GHz Power Density / Limit	Σ (Power Density / Limit) of Radar + WLAN 2.4GHz
0.0004	0.033	0.033
Radar Power Density / Limit	WLAN 5GHz Power Density / Limit	Σ (Power Density / Limit) of Radar + WLAN 5GHz
0.0004	0.049	0.049

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 Radar + Bluetooth/WLAN.
- Considering the Radar module collocation with the WLAN/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.

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