



MPE Report

Applicant : Ring LLC
Product Type : Video Doorbell 4
Trade Name : Ring
Model Number : 5D22E9
Applicable Standard : IEEE Std.C95.1
47 CFR § 2.1091 / 47 CFR § 1.1310
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Taiwan Accreditation Foundation accreditation number: 1330
Test Firm MRA designation number: TW0010

Note:

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Revision History

Rev.	Issued Date	Revisions	Revised By
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1. Reference Applicable Standard

Standard	Description	Version
ANSI/IEEE C95.1	American National Standard safety levels with respect to human exposure to radio frequency electromagnetic fields, 300 KHz to 100 GHz, New York.	1992
47 CFR Part §2.1091	Radiofrequency radiation exposure evaluation: mobile devices.	-
47 CFR Part §1.1310	Radiofrequency radiation exposure limits.	-



2. Description of Equipment under Test (EUT)

Applicant	Ring LLC 1523 26th Street, Santa Monica United States 90404				
Manufacturer	Ring LLC 1523 26th Street, Santa Monica United States 90404				
Product Type	Video Doorbell 4				
Trade Name	Ring				
Model Number	5D22E9				
FCC ID	2AEUPBHARG071				
Frequency Range	Operate Band			Frequency Range (MHz)	
	IEEE 802.11b / 802.11g			2412 - 2462	
	IEEE 802.11n 2.4 GHz 20 MHz (256QAM)			2412 - 2462	
	IEEE 802.11a U-NII Band I			5180 - 5240	
	IEEE 802.11a U-NII Band II-A			5260 - 5320	
	IEEE 802.11a U-NII Band II-C			5500 - 5720	
	IEEE 802.11a U-NII Band III			5745 - 5825	
	IEEE 802.11n 5 GHz 20 MHz U-NII Band I			5180 - 5240	
	IEEE 802.11n 5 GHz 20 MHz U-NII Band II-A			5260 - 5320	
	IEEE 802.11n 5 GHz 20 MHz U-NII Band II-C			5500 - 5720	
	IEEE 802.11n 5 GHz 20 MHz U-NII Band III			5745 - 5825	
	Bluetooth LE			2402 - 2480	
Antenna Information	Antenna	Model Number	Type	Max. Gain (dBi)	
	ANT-0	RFPCA491914EMLB 301	PCB Antenna	Bluetooth	0.72
				WLAN 2.4 GHz	0.72
				WLAN 5 GHz	5.22
	ANT-1	RFPCA491910EMLB 303	PCB Antenna	Bluetooth	0.61
				WLAN 2.4 GHz	0.61
WLAN 5 GHz				5.26	
Antenna Delivery	IEEE 802.11b / 802.11g / 11n 2.4 GHz 20 MHz: 1TX / 1RX (Diversity) IEEE 802.11a / 11n 5 GHz 20 MHz : 2TX / 2RX (Diversity)				
RF Evaluation	0.0168 mW/cm ²				
Operate Temp. Range	-20 ~ +50°C				

The above equipment was tested by A Test Lab Techno Corp. For compliance with the requirements set forth in 47 CFR § 2.1091 / 47 CFR § 1.1310. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.



3. *Human Exposure Assessment*

Due to the design and installation of this product, it is not possible to conduct SAR evaluation. This is because client either manufactures or supplies the antenna(s) that will be used in the installation of this product. Therefore, this product will be evaluated as a mobile device per 47 CFR § 1.1310 titled "Radiofrequency radiation exposure limits", generally referred to as MPE limits.

In 47 CFR § 2.1091, paragraph (b) defines a mobile device as "a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 cm is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons. " This product is intended to be installed into a vehicle such that the unit is physically secured at one location. In the installation guide supplied with the product,

Client has made the following statement: "IMPORTANT: To meet the FCC's RF Exposure Guidelines, the antenna should be installed so there is at least 20 cm of separation between the body of the user and nearby persons and the antenna". Based on the installation of the transceiver and the antenna, the transmitters radiating structure is more than 20 cm from the user. Thus, this product is a "mobile device" as defined in section § 2.1091 paragraph (b).

Exposure evaluation

$$S_{eirp} = \frac{EIRP}{4\pi d^2} = \frac{PG}{4\pi d^2} (W / m^2)$$

Where

S: is the input power (W);

G: is the antenna gain;

d : is the distance between antennas and evaluation point (m).



4. Power Density Limit – RF Exposure Evaluation

Thv In 47 CFR § 1.1310, use of the device as based upon the user's awareness and ability to exercise control over human exposure. The two categories defined are Occupational / Controlled Exposure and General Population / Uncontrolled. These two categories are defined as follow:

Limits for General Population / Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
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 / 1,500	30
1,500-100,000	-	-	1.0	30
Limits for Occupational / Controlled Exposure				
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1,842 / f	4.89 / f	(900 / f ²)*	6
30-300	61.4	0.163	1.0	6
300-1,500	-	-	F / 300	6
1,500-100,000	-	-	5	6



4.1 Conducted Power

【2.4 GHz】

Band	Data Rate or Sub-test	CH	Frequency (MHz)	Average power (dBm)	
				ANT-0	ANT-1
802.11b	1M	1	2412	17.18	17.28
		6	2437	17.14	17.42
		11	2462	17.25	17.32
802.11g	6M	1	2412	15.58	15.62
		6	2437	17.04	17.09
		11	2462	14.87	14.96
802.11n_HT20	6.5M	1	2412	14.55	14.61
		6	2437	16.76	16.83
		11	2462	14.01	14.06

【5 GHz】

Band	Data Rate or Sub-test	CH	Frequency (MHz)	Average power (dBm)	
				ANT-0	ANT-1
802.11a	6M	36	5180	13.08	13.12
		40	5200	13.26	13.33
		44	5220	13.22	13.29
		48	5240	13.05	13.13
		52	5260	13.47	13.53
		56	5280	13.36	13.41
		60	5300	13.31	13.37
		64	5320	13.19	13.29
		100	5500	13.56	13.62
		104	5520	13.11	13.15
		108	5540	13.14	13.19
		112	5560	13.17	13.24
		116	5580	13.09	13.17
		120	5600	13.19	13.22
		124	5620	13.17	13.20
		128	5640	13.18	13.21
		132	5660	13.08	13.15
		136	5680	13.10	13.13
		140	5700	13.05	13.11
		144	5720	11.45	11.51
		144	5720	4.98	5.00
		149	5745	13.11	13.17
		153	5765	13.20	13.26
		157	5785	13.24	13.31
		161	5805	13.22	13.28
		165	5825	13.43	13.47

【 5 GHz 】

Band	Data Rate or Sub-test	CH	Frequency (MHz)	Average power (dBm)	
				ANT-0	ANT-1
802.11n_5G_HT20	6.5M	36	5180	13.23	13.27
		40	5200	13.28	13.30
		44	5220	13.22	13.25
		48	5240	13.27	13.31
		52	5260	13.05	13.14
		56	5280	13.27	13.28
		60	5300	13.20	13.25
		64	5320	13.29	13.35
		100	5500	13.23	13.36
		104	5520	13.20	13.30
		108	5540	13.32	13.36
		112	5560	13.40	13.41
		116	5580	13.26	13.31
		120	5600	13.27	13.32
		124	5620	13.26	13.33
		128	5640	13.31	13.36
		132	5660	13.05	13.13
		136	5680	13.17	13.20
		140	5700	13.10	13.26
		144	5720	11.59	11.66
		144	5720	5.64	5.68
		149	5745	13.06	13.22
		153	5765	13.00	13.02
		157	5785	13.02	13.07
		161	5805	13.01	13.05
		165	5825	13.00	13.14

【 Bluetooth LE 】

Band	Antenna	Frequency (MHz)	Packet Type	Average Conducted power (dBm)
Bluetooth LE	ANT-0	2402	---	-0.53
		2440		-0.42
		2480		-0.27
Bluetooth 2LE		2402	---	-0.52
		2440		-0.42
		2480		-0.29
Bluetooth LE	ANT-1	2402	---	-0.62
		2440		-0.48
		2480		-0.38
Bluetooth 2LE		2402	---	-0.59
		2440		-0.48
		2480		-0.39

5. Test Result

Antenna	Band	Frequency (MHz)	Limit (mW)/cm ²	Distance	Tune-up Power	ANT Gain	Numeric Gain	Duty Cycle	Power with Duty cycle	Power Density
				(cm)	(dBm)				(mW)	(mW)/cm ²
				[R]	[P]				[P]x[G]	[S]
Bluetooth Ant 0	Bluetooth	2402-2480	1.0	20	0.00	0.72	1.18	1	1.18	0.0002
Wi-Fi Ant 0	2.4GHz	2412-2462	1.0	20	17.50	0.72	1.18	1	66.36	0.0132
	5GHz	5150-5250	1.0	20	14.00	5.26	3.36	1	84.40	0.0168
		5250-5350	1.0	20	14.00	5.26	3.36	1	84.40	0.0168
		5470-5725	1.0	20	14.00	5.26	3.36	1	84.40	0.0168
		5725-5850	1.0	20	14.00	5.26	3.36	1	84.40	0.0168
Bluetooth Ant 1	Bluetooth	2402-2480	1.0	20	0.00	0.61	1.15	1	1.15	0.0002
Wi-Fi Ant 1	2.4GHz	2412-2462	1.0	20	17.50	0.61	1.15	1	64.67	0.0129
	5GHz	5150-5250	1.0	20	14.00	5.26	3.36	1	84.40	0.0168
		5250-5350	1.0	20	14.00	5.26	3.36	1	84.40	0.0168
		5470-5725	1.0	20	14.00	5.26	3.36	1	84.40	0.0168
		5725-5850	1.0	20	14.00	5.26	3.36	1	84.40	0.0168

Note:

1. Mobile or fixed location transmitters, minimum separation distance is 20 cm, even if calculations indicate MPE distance is less.
2. We used the maximum power and gain to provide MPE results.
3. The Numeric Gain calculated by $10^{(\text{ant. Gain(dBi)} / 10)}$.
4. The MPE results are evaluated by lowest data rate for WLAN.
5. The device not support simultaneous transmission.

$$\text{MPE} = 0.0168 \text{ (mW)/cm}^2 < 1 \text{ (mW)/cm}^2$$

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