RF EXPOSURE EVALUATION REPORT

FCC ID	:	**2AUWW-HALOWA1**
Equipment	:	**Halo Collar**
Brand Name	:	**Halo**
Model Name	:	**Halo ONE**
Applicant	:	**Protect Animals with Satellites, LLC 7950 Legacy Dr., Suite 400, Plano, Texas 75024, United States**
Manufacturer	:	**RoyalTek Company Ltd. 4F, No.188, Wenhua 2nd Rd., Guishan, Taoyuan City 33383, Taiwan, R.O.C**
Standard	:	**47 CFR Part 2.1091**

We, SPORTON INTERNATIONAL INC has been evaluated this product in accordance with 47 CFR Part 2.1091 and it complies with applicable 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 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.

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code: 1190) and the FCC designation No. TW1190 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC evaluation.

Cona Huang

Approved by: Cona Huang / Deputy Manager

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History of this test report

Report No.	Version	Description	Issued Date
FA9O1415	Rev. 01	Initial issue of report	May 07, 2020
FA9O1415	Rev. 02	Update applicant company name	May 14, 2020

1. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	Halo Collar
Brand Name	Halo
Model Name	Halo ONE
FCC ID	2AUWW-HALOWA1
Wireless Technology and Frequency Range	LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 12: 699 MHz ~ 716 MHz LTE Band 13: 777 MHz ~ 787 MHz WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz Bluetooth: 2402 MHz ~ 2480 MHz
Mode	LTE: QPSK, 16QAM WLAN: 802.11b/g/n HT20 Bluetooth LE
EUT Stage	Production Unit

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: Wan Liu

2. Maximum RF average output power among production units

Mode		Maximum Average power(dBm)
LTE	Band 2	22
	Band 4	22.5
	Band 5	22.5
	Band 12	23
	Band 13	22.5

Mode	Maximum Average power(dBm)	
	LE	
	1M	2M
Bluetooth	-1.5	-0.5

Mode		Maximum Average power(dBm)
2.4GHz WLAN	11b	-1.5
	11n	4.5
	11n-HT20	4.5

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/f2)	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/f2)	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

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
LTE Band 2	1850.7	1.65	22.00	23.650	0.232	231.739	0.0461	1.000	0.0461
LTE Band 4	1710.7	1.50	22.50	24.000	0.251	251.189	0.0500	1.000	0.0500
LTE Band 5	824.7	-1.80	22.50	20.700	0.117	117.490	0.0234	0.550	0.0425
LTE Band 12	699.7	-1.80	23.00	21.200	0.132	131.826	0.0262	0.466	0.0563
LTE Band 13	779.5	-1.80	22.50	20.700	0.117	117.490	0.0234	0.520	0.0450
2.4GHz WLAN	2412.0	1.50	4.50	6.000	0.004	3.981	0.0008	1.000	0.0008
Bluetooth	2402.0	1.50	-0.50	1.000	0.001	1.259	0.0003	1.000	0.0003

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

4.2. Collocated Power Density Calculation

WWAN Power Density / Limit	WLAN Power Density / Limit	Bluetooth Power Density / Limit	Σ(Power Density / Limit) of WWAN+WLAN+Bluetooth
0.0563	0.0008	0.0003	0.0673

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 WWAN + WLAN + Bluetooth.
2. Considering the WWAN module 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 3 collocated transmitters is compliant

Conclusion:

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