RF Exposure Report

Report No.:	SA180830E03C
FCC ID:	2APLE18300398
Test Model:	VMB5000
Revision:	Rev 5
Received Date:	Feb. 13, 2019
Test Date:	Mar. 05, 2019
Issued Date:	June 12, 2019
Applicant:	Arlo Technologies, Inc.
Address:	2200 Faraday Ave. Suite 150, Carlsbad, CA 92008, United States
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
Lab Address:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.
Test Location:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.
FCC Registration / Designation Number:	723255 / TW2022

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Release Control Record

Issue No.	Description	Date Issued
SA180830E03C	Original release.	June 12, 2019

1 Certificate of Conformity

Product:	Alro Gen5 Entry Hub
Brand:	Arlo
Test Model:	VMB5000
Revision:	Rev 5
Sample Status:	Pre Production Unit
Applicant:	Arlo Technologies, Inc.
Test Date:	Mar. 05, 2019
Standards:	FCC Part 2 (Section 2.1091) KDB 447498 D01 General RF Exposure Guidance v06 IEEE C95.1-1992

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by : _____ , **Date:** June 12, 2019
Wendy Wu / Specialist

Approved by : _____ , **Date:** June 12, 2019
May Chen / Manager

2 RF Exposure

2.1 Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Average Time (minutes)
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

f = Frequency in MHz ; *Plane-wave equivalent power density

2.2 MPE Calculation Formula

$Pd = (Pout*G) / (4*pi*r^2)$

where

Pd = power density in mW/cm^2

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

R = distance between observation point and center of the radiator in cm

2.3 Classification

The antenna of this product, under normal use condition, is at least 20cm away from the body of the user. So, this device is classified as **Mobile Device**.

2.4 Antenna Gain

Sub-GHz						
Ant No.	Brand	Model	Antenna Gain (dBi)	Frequency rang (MHz)	Antenna type	Connector type
1	NA	902P00214N0	1.5	860~930	PIFA	NA

Z-Wave						
Ant No.	Brand	Model	Antenna Gain (dBi)	Frequency rang (MHz)	Antenna type	Connector type
1	NA	902P00213N0	2.5	860~930	PIFA	NA

Zigbee						
Ant No.	Brand	Model	Antenna Gain (dBi)	Frequency rang (GHz)	Antenna type	Connector type
1	INPAQ TECHNOLOGY CO., LTD.	ACA-5036-A2-CC-S	3.5	2.4~2.4835	CHIP	NA

WLAN							
Ant No.	Brand	Model	Antenna Net Gain (dBi)	Frequency rang (GHz)	Antenna type	Connector type	Cable Length (mm)
1	NA	9 07X01052X0	2.5	2.4~2.4835	Dipole	i-pex	75
			1.8	5.15~5.25			
			2	5.25~5.35			
			2.2	5.47~5.725			
			1.6	5.725~5.85			
2	NA	9 07X00747X19	2.5	2.4~2.4835	Dipole	i-pex	90
			2.2	5.15~5.25			
			1.2	5.25~5.35			
			3.2	5.47~5.725			
			3.5	5.725~5.85			

2.5 Calculation Result

For 5GHz (U-NII-1, U-NII-3), Zigbee, Z-Wave and Sub-GHz data was copied from the original test report (Report No.: SA180830E03)

For 2.4GHz: The Maximum power was refer to the FCC test report (Report No.: RF180830E03E)

Operation Mode	Evaluation Frequency (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
WLAN 2.4GHz	2437	966.14	5.51	22	0.56492	1
WLAN U-NII-1	5200	571.179	5.01	22	0.29766	1
WLAN U-NII-2A	5320	249.483	4.62	22	0.11885	1
WLAN U-NII-2C	5550	249.543	5.72	22	0.15314	1
WLAN U-NII-3	5745	490.624	5.61	22	0.29356	1
Zigbee	2405	90.991	3.5	22	0.03349	1
Sub-GHz	915	92.89	1.5	22	0.02157	0.61

Note:
2.4GHz: Directional gain = 2.5dBi + 10log(2) = 5.51dBi
5GHz:
For U-NII-1 band: Directional gain = 10 log[($10^{Chain0/20}$ + $10^{Chain1/20}$)^2 / 2] = 5.01dBi
For U-NII-2A band: Directional gain = 10 log[($10^{Chain0/20}$ + $10^{Chain1/20}$)^2 / 2] = 4.62dBi
For U-NII-2C band: Directional gain = 10 log[($10^{Chain0/20}$ + $10^{Chain1/20}$)^2 / 2] = 5.72dBi
For U-NII-3 band: Directional gain = 10 log[($10^{Chain0/20}$ + $10^{Chain1/20}$)^2 / 2] = 5.61dBi

Z-Wave Field Strength Conversion:

Frequency (MHz)	Field Strength of Fundamental (dBuV/m) @3m	EIRP (dBm)	EIRP (mW)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
908.4	93.9	-1.33	0.7362	22	0.00012	0.6056

Note: 1. Pout EIRP (dBm) = Field Strength of Fundamental (dBuV/m) - 95.23 (dB)
2. Power Density Limit = F/1500

NOTE: 1. The Max. Power = Max. tune up power including tolerance.

Conclusion:

The formula of calculated the MPE is:

CPD1 / LPD1 + CPD2 / LPD2 + ……etc. < 1

CPD = Calculation power density

LPD = Limit of power density

WLAN 2.4GHz + WLAN 5GHz + Zigbee + Sub-GHz + Z-Wave = 0.56492 / 1 + 0.29766 / 1 + 0.03349 / 1 + 0.02157 / 0.61 + 0.00012 / 0.6056 = 0.93163

Therefore the maximum calculations of above situations are less than the "1" limit.

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