

RF EXPOSURE EVALUATION REPORT

APPLICANT: Anker Innovations Limited

PRODUCT NAME: Nebula Mars II

MODEL NAME : D2322

BRAND NAME: Nebula

FCC ID : 2AOKB-D2322

STANDARD(S) : 47CFR 2.1091

KDB 447498 D01 General RF Exposure Guidance v06

ISSUE DATE : 2018-05-25

Tested by:

Gan Yueming

Gan Yueming(Test engineer)

Approved by:

Peng Huarui (Supervisor)

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Change History					
Issue Date Reason for change					
1.0	2018-05-25	First edition			



1. Technical Information

Note: Provide by manufacturer.

1.1. Applicant and Manufacturer Information

Applicant:	Anker Innovations Limited				
Applicant Address	Room	1318-19,Hollywood	Plaza,610	Nathan	
Applicant Address:	Road,Mongkok,Kowloon,Hong Kong				
Manufacturer:	Anker Innovations Limited				
Manufacturer Address.	Room	1318-19,Hollywood	Plaza,610	Nathan	
Manufacturer Address:	Road,Mongkok,Kowloon,Hong Kong				

1.2. Equipment Under Test (EUT) Description

EUT Type:	Nebula Mars II		
Hardware Version:	V0.3		
Software Version:	NBUI_P2_V1.0.6		
Frequency Bands:	802.11b/g/n-20/n-40MHz: 2.412GHz - 2.462GHz;		
	802.11a/g/n-20/n-40MHz: 5150 MHz ~ 5250 MHz;		
	802.11a/g/n-20/n-40MHz: 5725 MHz ~ 5850 MHz;		
	Bluetooth 2.1+EDR ,Bluetooth4.0; 2402-2480 MHz;		
Modulation Mode: 802.11b :DSSS;			
	802.11ag/n-20/n-40:OFDM;		
	Bluetooth 2.1+EDR: GFSK/π/4-DQPSK/8-DPSK;		
	Bluetooth4.0: GFSK		
Antenna type:	monopole		
Antenna Gain:	0 dBi		





1.3. Photographs of the EUT

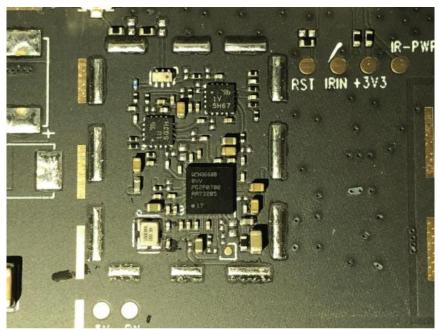
















1.3.1. Identification of all used EUT

The EUT identity consists of numerical and letter characters, the letter character indicates the test sample, and the following two numerical characters indicate the software version of the test sample.

EUT Identity	Hardware Version	Software Version
1#	V0.3	NBUI_P2_V1.0.6

1.4. Applied Reference Documents

Leading reference documents for testing:

No.	Identity	Document Title		
1	47 CFR§2.1091	Radiofrequency Radiation Exposure Evaluation: mobile		
		devices		
2	KDB 447498 D01v06	General RF Exposure Guidance		



2. Device Category And RF Exposure Limit

Per user manual, Based on 47CFR 2.1091, this device belongs to mobile device category with General Population/Uncontrolled exposure.

Mobile Devices:

47CFR 2.1091(b)

For purposes of this section, a mobile device is defined 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 centimeters is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons. In this context, the term "fixed location" means that the device is physically secured at one location and is not able to be easily moved to another location. Transmitting devices designed to be used by consumers or workers that can be easily re-located, such as wireless devices associated with a personal computer, are considered to be mobile devices if they meet the 20 centimeter separation requirement.

GENERAL POPULATION / UNCONTROLLED EXPOSURE

The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity. Warning labels placed on low-power consumer devices such as cellular telephones are not considered sufficient to allow the device to be considered under the occupational/controlled category, and the general population/uncontrolled exposure limits apply to these devices.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

TABLE 1—LIMITS FOR MAXIMUM 1 ERMISSIBLE EXPOSORE (MILE)					
Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm²)	Averaging time (minutes)	
(E	3) Limits for General	Population/Uncontro	lled 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



3. Measurement Of conducted Peak Output Power

1. Bluetooth Average output power

Mode	Channel	Frequency	Aver	age power (c	dBm)
Mode	Chame	(MHz)	1Mbps	2Mbps	3Mbps
	CH 00	2402	11.52	11.92	11.82
BR / EDR	CH 39	2441	12.51	12.63	12.70
	CH 78	2480	12.93	13.29	13.34

Mode	Channal	Frequency	Average power (dBm)
Mode	Channel	(MHz)	GFSK
	CH 00	2402	2.01
LE	CH 19	2440	2.19
	CH 39	2480	2.08

2. 2.4G WLAN Average output power

	Mode	Channel	Frequency (MHz)	Average power (dBm)
	902 11h	CH 1	2412	19.72
	802.11b 1Mbps	CH 6	2437	21.81
	HVIDPS	CH 11	2462	21.59
2.4GHz	802.11g 6Mbps	CH 1	2412	18.02
WLAN		CH 6	2437	17.77
VVLAIN		CH 11	2462	17.43
		CH 1	2412	17.86
	802.11n-HT20 MCS0	CH 6	2437	17.73
	IVICSO	CH 11	2462	17.41
	802.11n-HT40 MCS0	CH 3	2422	17.10
		CH 6	2437	17.02
		CH 9	2452	16.86



3. 5G WLAN Average output power

	Mode	Channel	Frequency (MHz)	Average power (dBm)
	200.44	CH 36	5180	8.77
5.2GHz	802.11a 6Mbps 802.11n-HT20 MCS0	CH 44	5220	8.40
WLAN		CH 48	5240	8.69
VVLAIN		CH 36	5180	12.49
		CH 44	5220	12.18
		CH 48	5240	12.51
	802.11n-HT40	CH 38	5190	11.89
	MCS0	CH 46	5230	11.28

	Mode	Channel	Frequency (MHz)	Average power (dBm)
	902.446	CH 149	5745	12.05
5.8GHz	802.11a MCS0	CH 157	5785	13.52
WLAN	MCSU	CH 165	5825	11.71
	802.11n-HT20	CH 157	5785	16.29
	MCS0	CH 165	5825	15.98
	802.11n-HT40	CH 151	5755	15.69
	MCS0	CH 159	5795	16.15



4. RF Exposure Evaluation

Standalone transmission MPE evaluation

Bands	Frequency (MHz)	Antenna Gain (dBi)	Conducted Average Power (dBm)	Time-averaging EIRP (mW)	Power density (mW/cm²)	Limit for MPE (mW/cm²)
2.4GHz WLAN	2437	0	21.81	151.705	0.030	1.0
5.2GHz WLAN	5240	0	12.51	17.824	0.004	1.0
5.8GHz WLAN	5785	0	16.29	42.560	0.008	1.0
BT2.1+EDR	2480	0	13.34	21.577	0.004	1.0
BLE	2440	0	2.19	1.656	0.000	1.0

1. MPE calculation method

Power Density = EIRP/ 4π R²

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Where: EIRP = P·G

P = Peak out power

G = Antenna gain

R = Separation distance (20cm)





Annex A General Information

1. Identification of the Responsible Testing Laboratory

<u> </u>		
Shenzhen Morlab Communications Technology Co., Ltd.		
Morlab Laboratory		
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2. Identification of the Responsible Testing Location

Name:	Shenzhen Morlab Communications Technology Co., Ltd.
	Morlab Laboratory
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