

JAPAN SPECIFIED RADIO TEST REPORT

Client Name : Anker Innovations Limited

Address : Room 1318-19, Hollywood Plaza, 610 Nathan Road,
Mongkok, Kowloon, Hongkong

Product Name : Nebula Cosmos

Date : Sept. 22, 2021

Shenzhen Anbotech Compliance Laboratory Limited



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TEST REPORT

Applicant : Anker Innovations Limited
Manufacturer : Anker Innovations Limited
Product Name : Nebula Cosmos
Model No. : D2140
Trade Mark : NEBULA
Rating(s) : Input: DC 19V, 6.32A(via adapter input: 100-240V~50/60Hz, 2A)

Test Standard(s) : **MIC Notice No.88 Annex43**
Certificate regulation article 2, paragraph 1, item 19

The device described above is tested by Shenzhen Anbotek Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotek Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the MIC Notice No.88 Annex43 and Certificate regulation article 2, paragraph 1, item 19 requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotek Compliance Laboratory Limited.

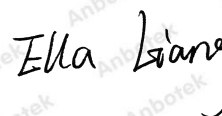
Date of Receipt

Jun. 26, 2021

Date of Test

Jun. 26~Sept. 06, 2021

Prepared By



(Ella Liang)

Approved & Authorized Signer



(Kingkong Jin)

1. General Information

1.1. Client Information

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

1.2. Description of Device (EUT)

Product Name	:	Nebula Cosmos
Model No.	:	D2140
Trade Mark	:	NEBULA
Test Power Supply	:	AC 100V
Test Sample No.	:	1-2-1(Normal Sample), 1-2-2(Engineering Sample)
Product Description	Operation Frequency:	BDR+EDR/ BLE: 2402~2480MHz WiFi 2.4G: 802.11b/g/n(HT20): 2412-2472MHz WiFi 5.2G: 5180MHz~5240MHz WiFi 5.3G: 5260MHz~5320MHz WiFi 5.6G: 5500MHz~5580MHz, 5660MHz~5700MHz
	Number of Channel:	BDR+EDR: 79 Channels BLE: 40 Channels WiFi 2.4G 802.11b/ g/ n(HT20): 13 Channels WiFi 5.2G: 4 Channels for 802.11a/n(HT20)/ac(HT20) 2 Channels for 802.11n(HT40)/ac(HT40) 1 Channels for 802.11ac(HT80) WiFi 5.3G: 4 Channels for 802.11a/n(HT20)/ac(HT20) 2 Channels for 802.11n(HT40)/ac(HT40) 1 Channels for 802.11ac(HT80) WiFi 5.6G: 8 Channels for 802.11a/n(HT20)/ac(HT20) 3 Channels for 802.11n(HT40)/ac(HT40) 1 Channels for 802.11ac(HT80)
	Modulation Type:	BDR+EDR: GFSK, $\pi/4$ -DQPSK, 8-DPSK BLE: GFSK WiFi 2.4G: CCK, DQPSK, DBPSK for DSSS; 64QAM, 16QAM, QPSK, BPSK for OFDM WiFi 5G: OFDM with BPSK/QPSK/16QAM/64QAM/256QAM
	Antenna Type:	BT+WiFi 2.4G ANT1+WiFi 5G ANT1: PIFA antenna WiFi 2.4G ANT2+WiFi 5G ANT2: PIFA antenna
	Antenna	BDR+EDR: 1.2dBi

	Gain(Peak):	BLE: 1.2dBi WiFi 2.4G ANT 1: 1.2dBi WiFi 2.4G ANT 2: 1.2dBi WiFi 5.2G ANT 1: 3.5dBi WiFi 5.2G ANT 2: 3.2dBi WiFi 5.3G ANT 1: 3.5dBi WiFi 5.3G ANT 2: 3.2dBi WiFi 5.6G ANT 1: 3.5dBi WiFi 5.6G ANT 2: 3.2dBi WiFi 5.8G ANT 1: 3.5dBi WiFi 5.8G ANT 2: 3.2dBi
	Rated output Power:	BDR+EDR: GFSK: 0.03mW/MHz Max. π/4-DQPSK: 0.03mW/MHz Max. 8-DPSK: 0.03mW/MHz Max. BLE: 10mW Max. WiFi 2.4G: 802.11b/g: 1mW/MHz Max. 802.11n(HT20): 2mW/MHz Max. WiFi 5.2G: 802.11a: 2mW/MHz Max. 802.11n(HT20): 4mW/MHz Max. 802.11ac(HT20): 4mW/MHz Max. 802.11n(HT40): 4mW/MHz Max. 802.11ac(HT40): 4mW/MHz Max. 802.11ac(HT80): 1mW/MHz Max. WiFi 5.3G: 802.11a: 2mW/MHz Max. 802.11n(HT20): 4mW/MHz Max. 802.11ac(HT20): 4mW/MHz Max. 802.11n(HT40): 4mW/MHz Max. 802.11ac(HT40): 4mW/MHz Max. 802.11ac(HT80): 1mW/MHz Max. WiFi 5.6G: 802.11a: 2mW/MHz Max. 802.11n(HT20): 4mW/MHz Max. 802.11ac(HT20): 4mW/MHz Max. 802.11n(HT40): 4mW/MHz Max. 802.11ac(HT40): 4mW/MHz Max. 802.11ac(HT80): 2mW/MHz Max.
	Hardware version :	V0.4
	Software version :	ATV9.0.2
	Adapter:	Model: NSA120EC-19063200 Input: 100-240V~50/60Hz, 20A Output: DC 19V, 6.32A, 120W

Remark: 1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
 2) This report is for BLE module.

1.3. Auxiliary Equipment Used During Test

N/A

1.4. Description of Test Modes

The EUT has been tested under operating condition.

Software used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Channel Low(2402MHz), Channel Middle(2440MHz) and Channel High(2480MHz) are chosen for the final testing.

1.5. Test Conditions

	Normal Test Conditions	Extreme Test Conditions
Temperature	15°C - 30°C	-10°C ~ 35°C
Relative Humidity	20% - 75%	N/A
Pressure Range	86-106kPa	N/A

1.6. Test Voltage

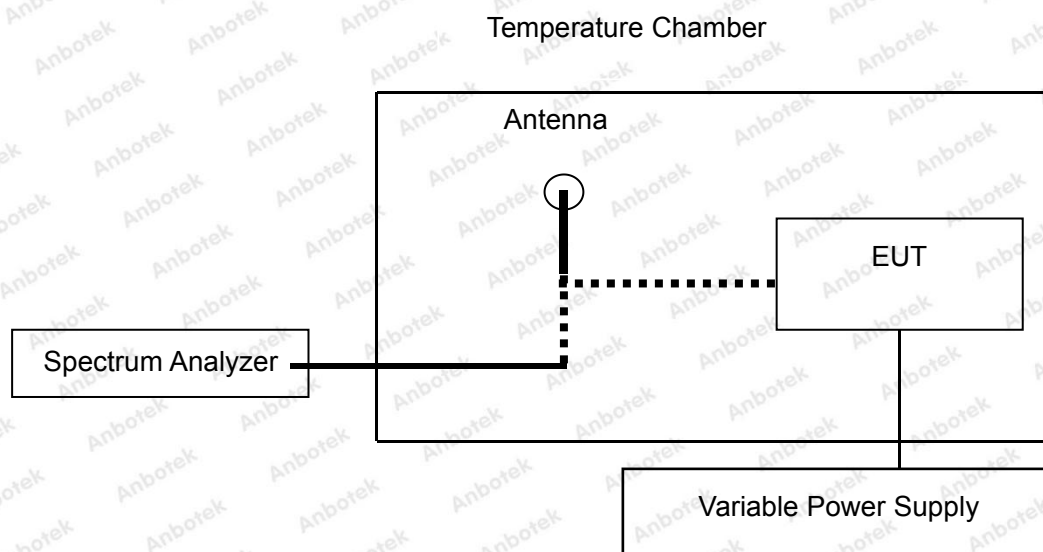
Power Supply Voltage Fluctuation Test

Voltage Fluctuation Test	Normal Voltage	High Voltage +10% of Normal Voltage	Low Voltage -10% of Normal Voltage
Input To EUT	AC 100V	AC 110V	AC 90V
Output To RF Module	DC 3.30V	DC 3.30V	DC 3.30V
Voltage Variation (%)	--	0.00%	0.00%

Note: Voltage Variation (%)=(Output high or Low Voltage - Output Normal Voltage)/ Output Normal Voltage* 100

For extreme voltage test, we have tested the relationship between the external power supply and RF IC power supply. Base on the test results, only the normal voltage was selected to perform all items.

1.7. Test Configuration



1.8. Test Equipment List

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	L.I.S.N. Artificial Mains Network	Rohde & Schwarz	ENV216	100055	Oct. 26, 2020	1 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Oct. 26, 2020	1 Year
3.	EMI Test Receiver	Rohde & Schwarz	ESR26	101481	Oct. 26, 2020	1 Year
4.	RF Switching Unit	Compliance Direction	RSU-M2	38303	Oct. 26, 2020	1 Year
5.	MAX Spectrum Analysis	Agilent	N9020A	MY51170037	Oct. 26, 2020	1 Year
6.	Preamplifier	SKET Electronic	BK1G18G30 D	KD17503	Oct. 26, 2020	1 Year
7.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Nov. 02, 2020	2 Year
8.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Nov. 02, 2020	2 Year
9.	Loop Antenna	Schwarzbeck	FMZB1519B	00053	Nov. 02, 2020	2 Year
10.	Horn Antenna	A-INFO	LB-180400- KF	J211060628	Nov. 02, 2020	2 Year
11.	Pre-amplifier	SONOMA	310N	186860	Oct. 26, 2020	1 Year
12.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A
13.	RF Test Control System	YIHENG	YH3000	2017430	Oct. 26, 2020	1 Year
14.	Power Sensor	DAER	RPR3006W	15100041SN045	Oct. 26, 2020	1 Year
15.	Power Sensor	DAER	RPR3006W	15100041SN046	Oct. 26, 2020	1 Year
16.	MXA Spectrum Analysis	Agilent	N9020A	MY51170037	Oct. 26, 2020	1 Year
17.	MXG RF Vector Signal Generator	Agilent	N5182A	MY48180656	Oct. 26, 2020	1 Year
18.	Signal Generator	Agilent	E4421B	MY41000743	Oct. 26, 2020	1 Year
19.	DC Power Supply	IVYTECH	IV3605	1804D360510	Oct. 26, 2020	1 Year
20.	Constant Temperature Humidity Chamber	ZHONGJIAN	ZJ-KHWS80 B	N/A	Oct. 26, 2020	1 Year

1.9. Description of Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

FCC-Registration No.: 184111

Shenzhen Anbotech Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No. 184111, September 30, 2020.

ISED-Registration No.: 8058A

Shenzhen Anbotech Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (ISED) Innovation, Science and Economic Development Canada. The acceptance letter from the ISED is maintained in our files. Registration 8058A, September 30, 2020.

Test Location

Shenzhen Anbotech Compliance Laboratory Limited.

1/F, Building D, Sogood Science and Technology Park, Sanwei community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.518102



2. Summary of Test Results

Test Items	Subclause	Required	Results
General Provisions			
Frequency Tolerance	5	Yes	Complies
Occupied Bandwidth	6	Yes	Complies
Spurious Emissions	7	Yes	Complies
Transmitting equipment			
Antenna power	14	Yes	Complies
SAR	14.2	N/A	N/A
Frequency stabilization	15	Yes	Complies
Transmitter antenna			
Type, configuration, etc. of transmitting antenna	20	Yes	Complies
Directional pattern of transmitting antenna	22	Yes	Complies
Receiving equipment			
Spurious emission of receiver	24	Yes	Complies
Refer to all articles for transmitter antenna	26	Yes	Complies
Operating frequency 2400-2483.5MHz			
High Frequency/modulation section cannot be opened easily	49.20(1); a	Yes	Complies
Communication method	49.20(1); b	N/A	N/A
Modulation method	49.20(1); c	Yes	Complies
Spread spectrum method	49.20(1); d	N/A	N/A
Antenna power	49.20(1); e	Yes	Complies
Absolute gain of transmitting antenna	49.20(1); f(1)	N/A	N/A
Angular width of principal radiation (AWPR)	49.20(1); f(2)	N/A	N/A
Number of carriers within 1 MHz bandwidth in OFDM	49.20(1); g	N/A	N/A
Diffusion bandwidth	49.20(1); h	Yes	Complies
Spreading factor	49.20(1); i	N/A	N/A
Frequency retention time (FH employed)	49.20(1); j	N/A	N/A
Carrier sensing function	--	N/A	N/A
interference prevention function	--	Yes	Complies
Note: "N/A" denotes test is not applicable in this Test Report.			

3. Frequency Tolerance Test

3.1. Test Limit

Test Limit	±50 ppm
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3.2. Test Equipment

Same as 1.7.

3.3. Test Configuration

Same as 1.6.

3.4. Test Data

PASS

Please refer to Appendix A of the Appendix Test Data.

4. Occupied Bandwidth (99%) Test

4.1. Test Limit

Under all test conditions	FH: 83.5 MHz
	FH + DS: 83.5 MHz
	FH + OFDM: 83.5MHz
	OFDM, DS: 26MHz
	Others: 26MHz
	OFDM equipment with 40MHz channel separation: 38MHz

4.2. Test Equipment

Same as 1.7 Frequency tolerance measurement.

4.3. Test Configuration

Same as 1.6 Frequency tolerance measurement.

4.4. Test Data

PASS

Please refer to Appendix C of the Appendix Test Data.

5. Spread-Spectrum Bandwidth (90%) And Factor Test

5.1. Test Limit

Test Limit	Spreading Factor: N/A
	Spread bandwidth: 500KHz or more(DSSS, FHSS, FHSS+DSSS, FHSSS +OFDM)

5.2. Test Equipment

Same as 1.7 Frequency tolerance measurement.

5.3. Test Configuration

Same as 1.6 Frequency tolerance measurement.

5.4. Test Data

PASS

Please refer to Appendix D of the Appendix Test Data.



6. Spurious Emissions Intensity Test

6.1. Test Equipment

Same as 1.7 Frequency tolerance measurement.

6.2. Test Configuration

Same as 1.6 Frequency tolerance measurement.

6.3. Test Data

Scanning Bandwidth	:	30~ 1000MHz
		1000~ 2387MHz
		2387~ 2400MHz
		2483.5~ 2496.5MHz
		2496.5~ 12500MHz

Pass

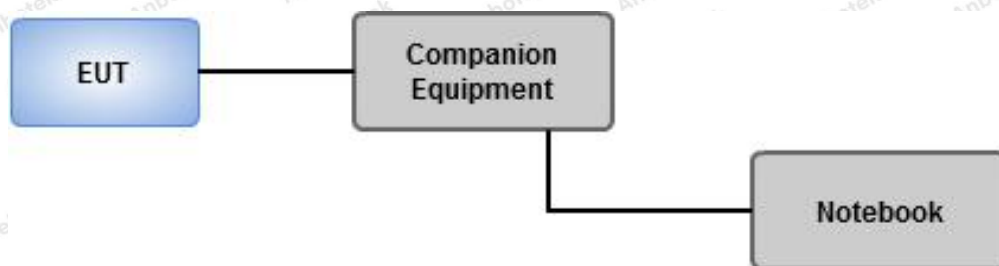
Please refer to Appendix E of the Appendix Test Data.

7. Interference prevention function

7.1. Test Limit

Test Limit	The identification code shall be 48 bits long
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7.2. Test Setup



7.3. Test Configuration

1. Set EUT under operating mode and link up with companion equipment
2. Check communication status between EUT and companion equipment is normal
3. Record the max. reading.
4. Confirm the MAC address of EUT

7.4. Test Data

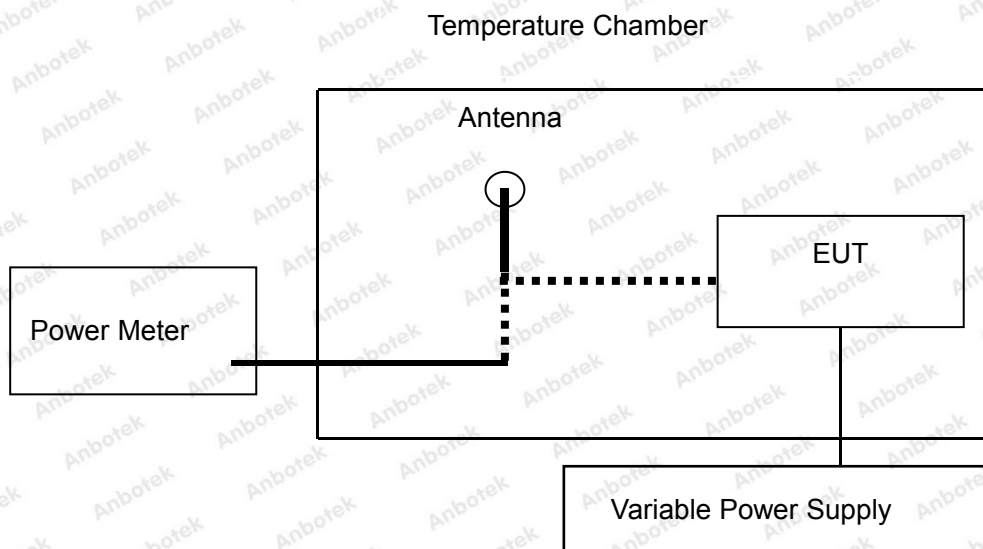
Test Mode	ID Code	Test Results
BLE	A3:07:3C:54:A6:B2	Pass

8. Antenna Power Test

8.1. Test Equipment

Same as 1.7 Frequency tolerance measurement.

8.2. Test Setup



8.3. Test Data

Pass

Please refer to Appendix B of the Appendix Test Data.

9. Limitation Of Collateral Emissions Of Receiver Test

9.1. Test Equipment

Same as 1.7 Frequency tolerance measurement.

9.2. Test Configuration

Same as 1.6 Frequency tolerance measurement.

9.3. Test Data

Scanning Bandwidth	:	30~ 1000MHz
		1000~ 12750MHz

Pass

Please refer to Appendix F of the Appendix Test Data.

APPENDIX I -- TEST SETUP PHOTOGRAPH



APPENDIX II -- EXTERNAL PHOTOGRAPH

Reference to the test report 18220WC10141501.

APPENDIX III -- INTERNAL PHOTOGRAPH

Reference to the test report 18220WC10141501.

APPENDIX IV – Appendix Test Data