



RF MEASUREMENT REPORT

FCC ID: 2A82LSPOT-V1
Application: Nova Labs, Inc.
Product: Spot Mapper
Model No.: Spot-US
Brand Name: Helium
FCC Rule Part(s): Part 96
Result: Complies
Test Date: 2022-09-27 ~ 2022-11-16

Reviewed By:

Sunny Sun

Sunny Sun

Approved By:

Robin Wu

Robin Wu



The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.26-2015. Test results reported herein relate only to the item(s) tested.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

Revision History

Report No.	Version	Description	Issue Date	Note
2209RSU059-U7	Rev. 01	Initial Report	2023-01-04	Invalid
2209RSU059-U7	Rev. 02	Modify the Product Name	2023-01-06	Valid

CONTENTS

Description	Page
1. General Information	4
1.1. Applicant	4
1.2. Manufacturer	4
1.3. Testing Facility	4
1.4. Product Information.....	5
1.5. Radio Specification under Test	6
1.6. EIRP and Emission Designator.....	6
1.7. Test Methodology	6
2. Test Configuration	7
2.1. Test System Connection Diagram.....	7
2.2. Test Environment Condition	7
3. Measuring Instrument	8
4. Decision Rules and Measurement Uncertainty.....	9
4.1. Decision Rules	9
4.2. Measurement Uncertainty	9
5. Test Result	10
5.1. Summary.....	10
5.2. Radiated Spurious Emissions Measurement.....	11
5.2.1. Test Limit	11
5.2.2. Test Procedure	11
5.2.3. Test Setting	11
5.2.4. Test Setup	12
5.2.5. Test Result	13
Appendix A - Test Result	14
A.1 Radiated Spurious Emissions Test Result	14
Appendix B - Test Setup Photograph	15
Appendix C - EUT Photograph	16

1.1. Applicant

2202 South Figueroa #408, Los Angeles, California, United States

Nova Labs, Inc.

2202 South Figueroa #408, Los Angeles, California, United States

☒	Test Site - MRT Suzhou Laboratory				
	Laboratory Location (Suzhou - Wuzhong)				
	D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China				
	Laboratory Location (Suzhou - SIP)				
	4b Building, Liando U Valley, No.200 Xingpu Rd., Shengpu Town, Suzhou Industrial Park, China				
	Laboratory Accreditations				
A2LA: 3628.01		CNAS: L10551			
FCC: CN1166		ISED: CN0001			
VCCI:	☐ R-20025	☐ G-20034	☐ C-20020	☐ T-20020	
	☐ R-20141	☐ G-20134	☐ C-20103	☐ T-20104	
☐	Test Site - MRT Shenzhen Laboratory				
	Laboratory Location (Shenzhen)				
	1G, Building A, Junxiangda Building, Zhongshanyuan Road West, Nanshan District, Shenzhen, China				
	Laboratory Accreditations				
	A2LA: 3628.02		CNAS: L10551		
	FCC: CN1284		ISED: CN0105		
☐	Test Site - MRT Taiwan Laboratory				
	Laboratory Location (Taiwan)				
	No. 38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)				
	Laboratory Accreditations				
	TAF: L3261-190725		FCC: 291082, TW3261		
ISED: TW3261					

1.4. Product Information

Product Name	Spot Mapper
Model No.	Spot-US
Brand Name	Helium
Test IMEI	Conducted measurement: 868692050102784 Radiated measurement: 868692050107718
E-UTRA Band	FDD Band: 2, 4, 5, 66, 71 TDD Band: 48
NR Band	TDD Band: n41, n48
Wi-Fi Specification	802.11 b/g/n/ac/ax
Bluetooth Specification	V5.1 dual mode
Lora Specification	902 ~ 928 MHz
Operating Temperature	-20 ~ 55 °C
Integrated WWAN Modular Information	
Model No.	RM505Q-AE
FCC ID	XMR2020RM505QAE
Brand Name	Quectel
Integrated BT & Wi-Fi Modular Information	
Model No.	FG50V
FCC ID	XMR202103FG50V
Brand Name	Quectel
Integrated Lora Modular Information	
Model No.	LoRa-E5-HF
FCC ID	Z4T-LORA-E5
Brand Name	Seeed
Accessories	
Rechargeable Li-ion Battery	Model No.: QDM044 Rated Voltage: 3.8V Rated Capacity: 4000mAh/15.2Wh Limited Charge Voltage: 4.35V
Remark:	
- The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer. - This device is based on certification module, FCC ID "XMR2020RM505QAE" to assessing the radiated spurious emission.	

1.5. Radio Specification under Test

TDD Tx & Rx Frequency Range	B48: 3550 ~ 3700 MHz
Modulation	UL & DL up to 256QAM
Device Type	End User Device
Antenna Information	PIFA Antenna, 3.8dBi

1.6. EIRP and Emission Designator

Technology	Bandwidth (MHz)	Max Conducted Power (dBm)	Antenna Gain (dBi)	Max EIRP (dBm)	Emission Designator
LTE Band 48	5	18.38	3.8	22.18	4M44G7D
		18.07		21.87	4M46W7D
	10	18.38		22.18	8M95G7D
		17.96		21.76	8M95W7D
	15	18.29		22.09	13M5G7D
		18.27		22.07	13M4W7D
	20	18.37		22.17	17M9G7D
		17.68		21.48	17M9W7D
Remark: The Max conducted power extracted from the SAR test report and emission designator extracted from FCC ID “XMR2020RM505QAE”.					

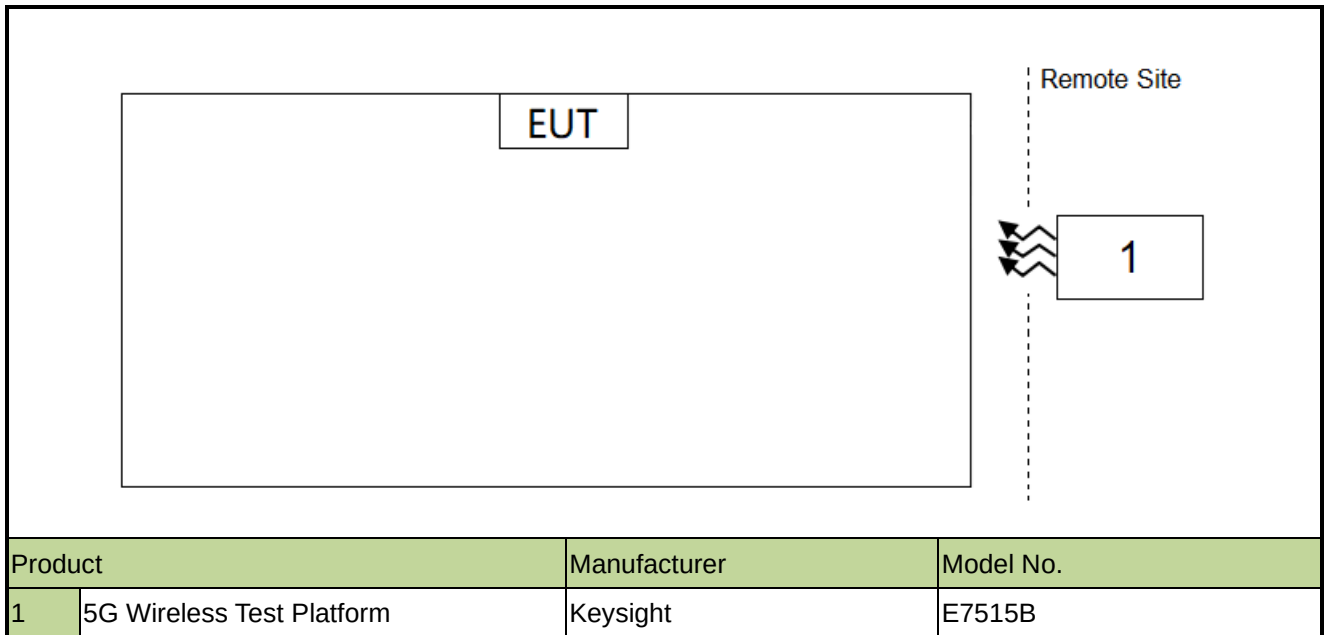
1.7. Test Methodology

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC CFR 47 Part Part 96
- ANSI C63.26:2015

2. Test Configuration

2.1. Test System Connection Diagram



2.2. Test Environment Condition

Ambient Temperature	15 ~ 35°C
Relative Humidity	20% ~ 75%RH

3. Measuring Instrument

Instrument	Manufacturer	Model No.	Asset No.	Cali. Interval	Cali. Due Date	Test Site
5G Wireless Test Platform	Keysight	E7515B	MRTSUE06942	1 year	2023-03-03	WZ
Radio Communication Analyzer	Anritsu	MT8821C	MRTSUE06960	1 year	2023-07-08	WZ
TRILOG Antenna	Schwarzbeck	VULB 9162	MRTSUE06022	1 year	2023-05-20	WZ-AC2
EMI Test Receiver	Agilent	N9038A	MRTSUE06125	1 year	2023-06-04	WZ-AC2
Thermohygrometer	Mingle	ETH529	MRTSUE06170	1 year	2022-12-01	WZ-AC2
Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06171	1 year	2023-10-13	WZ-AC2
Preamplifier	Schwarzbeck	BBV 9718	MRTSUE06176	1 year	2023-05-08	WZ-AC2
Anechoic Chamber	RIKEN	WZ-AC2	MRTSUE06213	1 year	2023-04-21	WZ-AC2
Thermohygrometer	testo	608-H1	MRTSUE11038	1 year	2023-11-01	WZ-AC2

Software	Version	Manufacturer	Function	Date	Location
EMI V3	V 3.0.0	QuiTek	EMI Test Software	2010.01	EMC-WZ
Controller_MF 7802	1.02	MF	RE Antenna & Turntable	2015-07-05	EMC-WZ-AC2

4. Decision Rules and Measurement Uncertainty

4.1. Decision Rules

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4: 2012 Clause 8.2.

(Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

4.2. Measurement Uncertainty

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k = 2$.

Radiated Spurious Emissions

Measurement Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$):

Horizontal: 9kHz ~ 300MHz: 5.04dB

300MHz ~ 1GHz: 4.95dB

1GHz ~ 40GHz: 6.40dB

Vertical: 9kHz ~ 300MHz: 5.24dB

300MHz ~ 1GHz: 6.03dB

1GHz ~ 40GHz: 6.40dB

5. Test Result

5.1. Summary

FCC Part Section(s)	Test Description	Test Condition	Verdict
2.1053, 96.41(e)	Spurious Emissions	Radiated	Pass

Notes:

- 1) The worst-case emission of modulation was selected. Radiated SpuriousEmission were presented worst case in the test report.

5.2. Radiated Spurious Emissions Measurement

5.2.1. Test Limit

Out of band emissions: The power of any emissions below 3530 MHz or above 3720 MHz shall not exceed -40dBm/MHz.

$E \text{ (dB}\mu\text{V/m)} = \text{EIRP (dBm)} - 20 \log D + 104.8$; where D is the measurement distance in meters. The emission limit equal to 55.3dB μ V/m.

5.2.2. Test Procedure

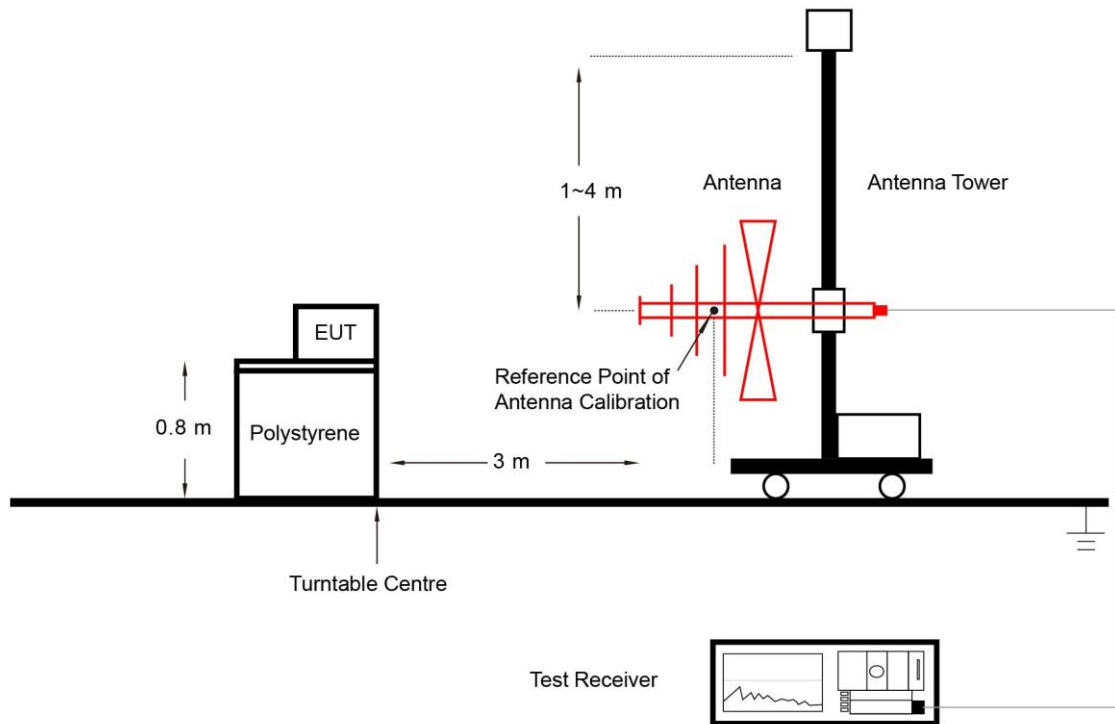
ANSI C63.26-2015 - Section 5.2.7 & 5.5

5.2.3. Test Setting

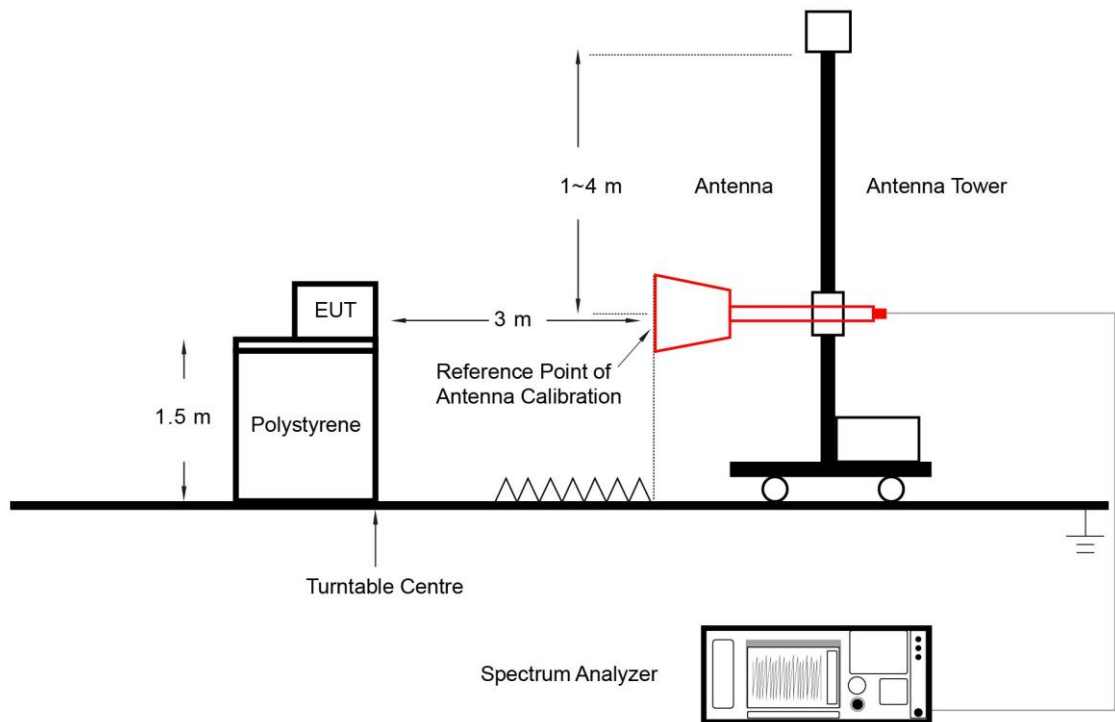
1. RBW = 1MHz
2. VBW $\geq 3 \times$ RBW
3. Sweep time $\geq 10 \times$ (number of points in sweep) $\times$ (transmission symbol period)
4. Detector = Peak
5. Trace mode = max hold
6. The trace was allowed to stabilize

5.2.4. Test Setup

Below 1GHz Test Setup:



Above 1GHz Test Setup:



5.2.5. Test Result

Refer to Appendix A.1.

Appendix A - Test Result

A.1 Radiated Spurious Emissions Test Result

Test Site	WZ-AC2	Test Engineer	Messiah Li
Test Date	2022-11-09 ~ 2022-11-16	Test Band	Band 48, 5MHz, 1RB

Frequency (MHz)	Reading Level (dBμV)	Factor (dB/m)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
Bottom Channel							
60.1	2.4	19.6	22.0	55.3	-33.3	Peak	Horizontal
575.1	3.6	26.4	30.0	55.3	-25.3	Peak	Horizontal
35.3	11.1	17.3	28.4	55.3	-26.9	Peak	Vertical
659.5	3.1	27.8	30.9	55.3	-24.4	Peak	Vertical
9738.0	32.7	14.1	46.8	55.3	-8.5	Peak	Horizontal
11064.0	32.0	17.3	49.3	55.3	-6.0	Peak	Horizontal
8140.0	32.5	12.1	44.6	55.3	-10.7	Peak	Vertical
10851.5	31.3	17.1	48.4	55.3	-6.9	Peak	Vertical
Middle Channel							
49.9	1.6	20.4	22.0	55.3	-33.3	Peak	Horizontal
552.8	3.6	26.2	29.8	55.3	-25.5	Peak	Horizontal
56.2	11.0	20.1	31.1	55.3	-24.2	Peak	Vertical
585.8	4.9	26.8	31.7	55.3	-23.6	Peak	Vertical
8191.0	33.3	11.7	45.0	55.3	-10.3	Peak	Horizontal
10783.5	31.9	17.0	48.9	55.3	-6.4	Peak	Horizontal
7349.5	33.6	11.5	45.1	55.3	-10.2	Peak	Vertical
11115.0	30.8	17.5	48.3	55.3	-7.0	Peak	Vertical
Top Channel							
55.7	1.5	20.2	21.7	55.3	-33.6	Peak	Horizontal
629.9	4.2	27.2	31.4	55.3	-23.9	Peak	Horizontal
56.2	9.0	20.1	29.1	55.3	-26.2	Peak	Vertical
835.1	7.4	30.2	37.6	55.3	-17.7	Peak	Vertical
7970.0	32.1	11.8	43.9	55.3	-11.4	Peak	Horizontal
10979.0	31.0	17.4	48.4	55.3	-6.9	Peak	Horizontal
8021.0	32.7	12.0	44.7	55.3	-10.6	Peak	Vertical
10851.5	31.4	17.1	48.5	55.3	-6.8	Peak	Vertical
Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m).							

Appendix B - Test Setup Photograph

Refer to “2209RSU059-UT” file.

Appendix C - EUT Photograph

Refer to “2209RSU059-UE” file.