



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 2, 27
Result: Complies
Test Date: 2022-09-27 ~ 2022-11-15

Reviewed By:

Sunny Sun

Approved By:

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-U10	Rev. 01	Initial Report	2023-01-04	Invalid
2209RSU059-U10	Rev. 02	Modify the Product Name	2023-01-06	Valid

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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	n41: 2496 ~ 2690 MHz
SA/NSA Band	n41
UL MIMO Band	n41
Support Bandwidth	n41: 20MHz, 30MHz, 40MHz, 50MHz, 60MHz, 80MHz, 100MHz
Modulation	UL & DL up to 256QAM
Antenna Information	PIFA Antenna, 1dBi
Power Class	2 & 3
Remark: This device is based on Quectel "RM505Q-AE" module to assessing the radiated spurious emission.	

1.6. EIRP and Emission Designator

Technology	Frequency Band (MHz)	Max Conducted Power (dBm)	Antenna Gain (dBi)	Max EIRP (dBm)	Emission Designator
n41	2496 ~ 2690	23.58	1	23.58	96M1G7D
		23.60		23.60	76M8G7D
		23.17		23.17	96M3W7D
		23.49		23.49	35M7W7D
Remark: The Max conducted power extracted from the SAR test report and emission designator extracted from FCC ID “XMR2020RM505QAE”.					

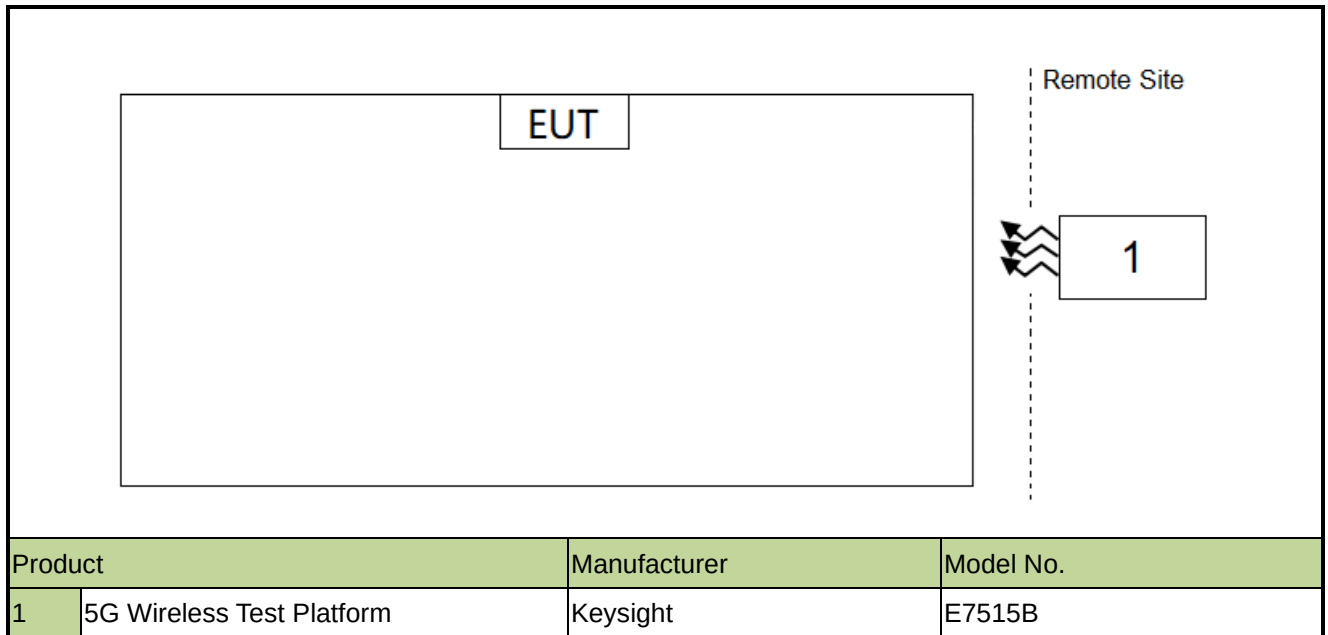
1.7. Test Methodology

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

- FCC CFR 47 Part 2, Part 27
- 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	Quietek	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, 27.53 (m)	Spurious Emissions	Radiated	Pass

Notes:

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

5.2. Radiated Spurious Emissions Measurement

5.2.1. Test Limit

For mobile digital stations, the attenuation factor shall be not less than $40 + 10 \log (P)$ dB on all frequencies between the channel edge and 5 megahertz from the channel edge, $43 + 10 \log (P)$ dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and $55 + 10 \log (P)$ dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth.

$E \text{ (dB}\mu\text{V/m)} = \text{EIRP (dBm)} - 20 \log D + 104.8$; where D is the measurement distance in meters. The emission limit equal to 70.3dB μ V/m.

5.2.2. Test Procedure

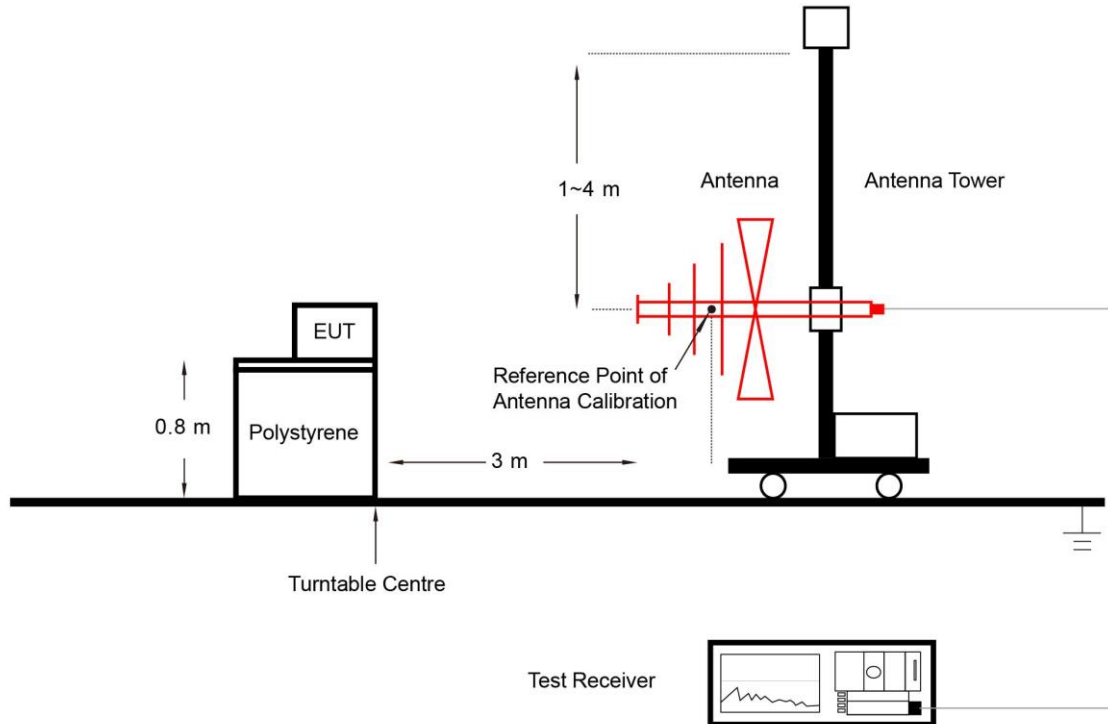
ANSI C63.26-2015 - Section 5.2.7 & 5.5

5.2.3. Test Setting

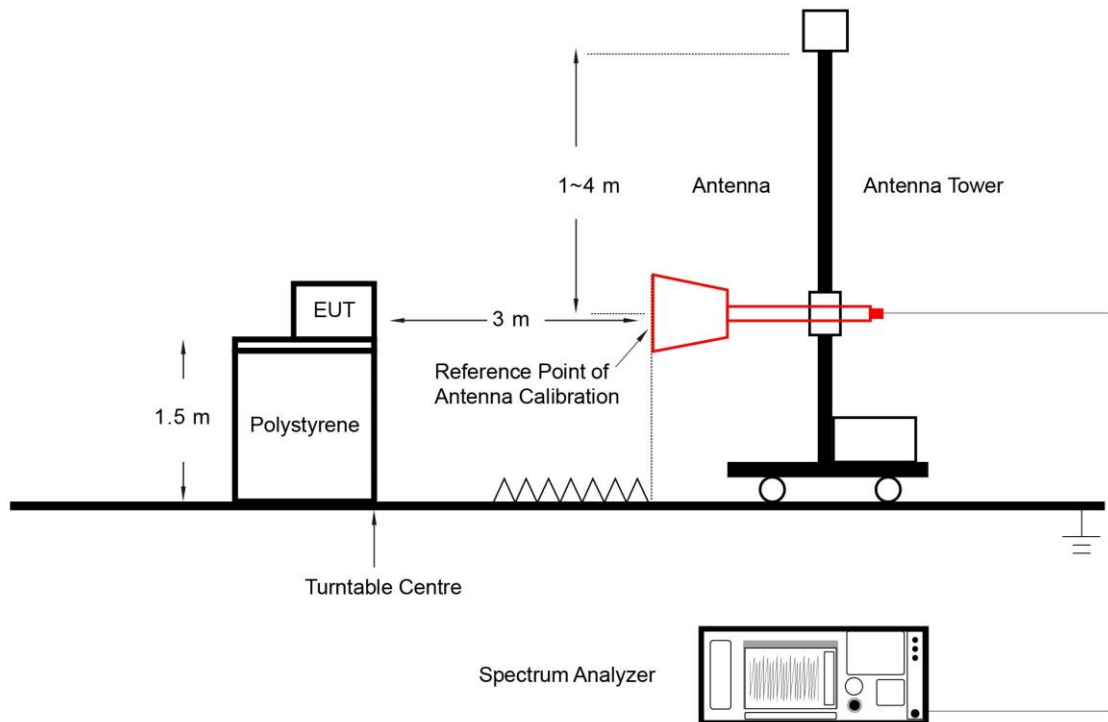
1. RBW = 1MHz
2. VBW $\geq 3 \times$ RBW
3. Sweep time $\geq 10 \times$ (number of points in sweep) $\times$ (transmission symbol period)
4. Detector = Peak
5. Trace mode = max hold
6. The trace was allowed to stabilize

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	n41, 1RB, QPSK

Frequency (MHz)	Reading Level (dBμV)	Factor (dB/m)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
Low Channel							
55.7	1.5	20.2	21.7	70.3	-48.6	Peak	Horizontal
106.6	0.3	18.4	18.7	70.3	-51.6	Peak	Horizontal
55.2	8.6	20.2	28.8	70.3	-41.5	Peak	Vertical
94.0	1.3	17.6	18.9	70.3	-51.4	Peak	Vertical
7205.0	32.4	11.4	43.8	70.3	-26.5	Peak	Horizontal
14209.0	31.8	19.6	51.4	70.3	-18.9	Peak	Horizontal
7349.5	33.3	11.5	44.8	70.3	-25.5	Peak	Vertical
14149.5	30.8	19.2	50.0	70.3	-20.3	Peak	Vertical
Middle Channel							
53.3	1.5	20.4	21.9	70.3	-48.4	Peak	Horizontal
100.3	-0.1	18.5	18.4	70.3	-51.9	Peak	Horizontal
55.7	9.1	20.2	29.3	70.3	-41.0	Peak	Vertical
94.5	2.1	17.7	19.8	70.3	-50.5	Peak	Vertical
7970.0	33.8	11.8	45.6	70.3	-24.7	Peak	Horizontal
11208.5	31.3	17.8	49.1	70.3	-21.2	Peak	Horizontal
7978.5	33.1	11.8	44.9	70.3	-25.4	Peak	Vertical
11438.0	31.6	17.7	49.3	70.3	-21.0	Peak	Vertical
High Channel							
58.6	1.1	19.8	20.9	70.3	-49.4	Peak	Horizontal
107.6	1.1	18.4	19.5	70.3	-50.8	Peak	Horizontal
55.7	9.1	20.2	29.3	70.3	-41.0	Peak	Vertical
196.4	2.4	18.8	21.2	70.3	-49.1	Peak	Vertical
8029.5	33.0	12.0	45.0	70.3	-25.3	Peak	Horizontal
14812.5	30.9	19.8	50.7	70.3	-19.6	Peak	Horizontal
4842.0	35.2	3.8	39.0	70.3	-31.3	Peak	Vertical
10741.0	32.5	16.7	49.2	70.3	-21.1	Peak	Vertical

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m).

Test Site	WZ-AC2	Test Engineer	Messiah Li
Test Date	2022-11-09 ~ 2022-11-16	Test Band	n41 HPUE MIMO, 1RB, QPSK

Frequency (MHz)	Reading Level (dBμV)	Factor (dB/m)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
Low Channel							
51.8	0.6	20.4	21.0	70.3	-49.3	Peak	Horizontal
662.9	3.6	27.9	31.5	70.3	-38.8	Peak	Horizontal
55.7	8.5	20.2	28.7	70.3	-41.6	Peak	Vertical
702.7	4.3	28.5	32.8	70.3	-37.5	Peak	Vertical
7757.5	33.8	11.2	45.0	70.3	-25.3	Peak	Horizontal
14906.0	31.0	19.8	50.8	70.3	-19.5	Peak	Horizontal
7511.0	32.7	11.5	44.2	70.3	-26.1	Peak	Vertical
10902.5	31.3	17.3	48.6	70.3	-21.7	Peak	Vertical
Middle Channel							
52.8	0.4	20.4	20.8	70.3	-49.5	Peak	Horizontal
724.0	3.7	28.8	32.5	70.3	-37.8	Peak	Horizontal
55.7	10.0	20.2	30.2	70.3	-40.1	Peak	Vertical
62.0	6.1	19.1	25.2	70.3	-45.1	Peak	Vertical
4833.5	35.8	3.8	39.6	70.3	-30.7	Peak	Horizontal
14175.0	30.1	20.4	50.5	70.3	-19.8	Peak	Horizontal
7944.5	32.3	11.8	44.1	70.3	-26.2	Peak	Vertical
14251.5	31.1	19.6	50.7	70.3	-19.6	Peak	Vertical
High Channel							
55.7	1.7	20.2	21.9	70.3	-48.4	Peak	Horizontal
614.9	3.4	27.0	30.4	70.3	-39.9	Peak	Horizontal
55.7	8.5	20.2	28.7	70.3	-41.6	Peak	Vertical
544.1	2.7	26.0	28.7	70.3	-41.6	Peak	Vertical
4825.0	35.5	3.8	39.3	70.3	-31.0	Peak	Horizontal
10987.5	31.3	17.3	48.6	70.3	-21.7	Peak	Horizontal
6015.0	34.1	6.5	40.6	70.3	-29.7	Peak	Vertical
11072.5	31.8	17.2	49.0	70.3	-21.3	Peak	Vertical

Note: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB/m).

Test Site	WZ-AC2	Test Engineer	Messiah Li
Test Date	2022-11-09 ~ 2022-11-16	Test Band	ENDC_n41, 1RB, QPSK

Frequency (MHz)	Reading Level (dBμV)	Factor (dB/m)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
Low Channel							
51.8	0.7	20.4	21.1	70.3	-49.2	Peak	Horizontal
330.2	2.3	21.7	24.0	70.3	-46.3	Peak	Horizontal
45.5	4.4	20.0	24.4	70.3	-45.9	Peak	Vertical
55.2	9.4	20.2	29.6	70.3	-40.7	Peak	Vertical
5743.0	48.4	5.6	54.0	70.3	-16.3	Peak	Horizontal
7936.0	34.8	11.8	46.6	70.3	-23.7	Peak	Horizontal
5751.5	51.1	5.5	56.6	70.3	-13.7	Peak	Vertical
14166.5	32.6	19.9	52.5	70.3	-17.8	Peak	Vertical
Middle Channel							
50.9	0.8	20.4	21.2	70.3	-49.1	Peak	Horizontal
673.1	3.9	28.0	31.9	70.3	-38.4	Peak	Horizontal
55.2	10.2	20.2	30.4	70.3	-39.9	Peak	Vertical
582.9	3.9	26.7	30.6	70.3	-39.7	Peak	Vertical
4825.0	35.5	3.8	39.3	70.3	-31.0	Peak	Horizontal
14302.5	32.0	19.5	51.5	70.3	-18.8	Peak	Horizontal
7426.0	32.1	11.9	44.0	70.3	-26.3	Peak	Vertical
14175.0	30.7	20.4	51.1	70.3	-19.2	Peak	Vertical
High Channel							
53.8	1.3	20.4	21.7	70.3	-48.6	Peak	Horizontal
644.0	4.3	27.5	31.8	70.3	-38.5	Peak	Horizontal
55.2	10.2	20.2	30.4	70.3	-39.9	Peak	Vertical
644.0	4.3	27.5	31.8	70.3	-38.5	Peak	Vertical
4825.0	35.8	3.8	39.6	70.3	-30.7	Peak	Horizontal
14481.0	32.2	19.6	51.8	70.3	-18.5	Peak	Horizontal
4833.5	35.5	3.8	39.3	70.3	-31.0	Peak	Vertical
14345.0	31.9	18.9	50.8	70.3	-19.5	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.