



FCC TEST REPORT

DIGITAL MATTER EMBEDDEDSOUTH AFRICA

Barra-GPS-4G

Test Model: Barra-GPS-4G

Prepared for : DIGITAL MATTER EMBEDDEDSOUTH AFRICA
Address : Oval, St Georges Block, Cnr Meadowbrook Lane and
Sloane Street, Bryanston, Gauteng, South Africa

Prepared by : Shenzhen LCS Compliance Testing Laboratory Ltd.
Address : Room 101, 201, Building A and Room 301, Building C,
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Date of receipt of test sample : January 18, 2024
Number of tested samples : 2
Sample No. : A240116090-1, A240116090-2
Serial number : Prototype
Date of Test : January 18, 2024 ~ January 24, 2024
Date of Report : January 25, 2024





FCC TEST REPORT FCC 47 CFR Part 15 Subpart B, Class B, ANSI C63.4 -2014	
Report Reference No. : LCSA01174054E	
Date Of Issue..... : January 25, 2024	
Testing Laboratory Name..... : Shenzhen LCS Compliance Testing Laboratory Ltd.	
Address..... : Room 101, 201, Building A and Room 301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao'an District, Shenzhen, Guangdong, China	
Testing Location/ Procedure.... : Full application of Harmonised standards ■ Partial application of Harmonised standards □ Other standard testing method □	
Applicant's Name..... : DIGITAL MATTER EMBEDDEDSOUTH AFRICA	
Address..... : Oval, St Georges Block, Cnr Meadowbrook Lane and Sloane Street, Bryanston, Gauteng, South Africa	
Test Specification	
Standard..... : FCC 47 CFR Part 15 Subpart B, Class B, ANSI C63.4 -2014	
Test Report Form No..... : LCSEMC-1.0	
TRF Originator..... : Shenzhen LCS Compliance Testing Laboratory Ltd.	
Master TRF..... : Dated 2011-03	
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Test Item Description..... : Barra-GPS-4G	
Trade Mark..... : Digital Matter	
Test Model : Barra-GPS-4G	
Ratings..... : DC 3V by 2*AAA Batteries	
Result : Positive	

Compiled by:

Kevin Huang/ Administrator

Supervised by:

Cary Luo/ Technique principal

Approved by:

Gavin Liang/ Manager



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**FCC -- TEST REPORT****Test Report No. : LCSA01174054E**January 25, 2024

Date of issue

Test Model : Barra-GPS-4G

EUT..... : Barra-GPS-4G

Applicant..... : DIGITAL MATTER EMBEDDEDSOUTH AFRICAAddress..... : Oval, St Georges Block, Cnr Meadowbrook Lane and
Sloane Street, Bryanston, Gauteng, South Africa

Telephone..... : /

Fax..... : /

Manufacturer..... : DIGITAL MATTER EMBEDDEDSOUTH AFRICAAddress..... : Oval, St Georges Block, Cnr Meadowbrook Lane and
Sloane Street, Bryanston, Gauteng, South Africa

Telephone..... : /

Fax..... : /

Factory..... : DIGITAL MATTER EMBEDDEDSOUTH AFRICAAddress..... : Oval, St Georges Block, Cnr Meadowbrook Lane and
Sloane Street, Bryanston, Gauteng, South Africa

Telephone..... : /

Fax..... : /

Test Result according to the standards on page 6: **Positive**

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.



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Revision History

Report Version	Issue Date	Revision Content	Revised By
000	January 25, 2024	Initial Issue	---





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1. SUMMARY OF STANDARDS AND RESULTS

1.1. Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below.

EMISSION			
Description of Test Item	Standard	Limits	Results
Conducted disturbance at mains terminals	FCC 47 CFR Part 15 Subpart B, Class B, ANSI C63.4 -2014	Class B	N/A
Radiated disturbance	FCC 47 CFR Part 15 Subpart B, Class B, ANSI C63.4 -2014	Class B	PASS
N/A is an abbreviation for Not Applicable.			

Test mode:

Mode 1	Normal Operation	Record
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2. GENERAL INFORMATION

2.1. Description of Device (EUT)

EUT : Barra-GPS-4G

Trade Mark : Digital Matter

Test Model : Barra-GPS-4G

Power Supply : DC 3V by 2*AAA Batteries

Highest internal frequency (Fx) : Fx > 1 GHz

Highest internal frequency (Fx)	Highest measured frequency
Fx ≤ 108 MHz	1 GHz
108 MHz < Fx ≤ 500 MHz	2 GHz
500 MHz < Fx ≤ 1 GHz	5 GHz
Fx > 1 GHz	5 × Fx up to a maximum of 6 GHz

NOTE 1 For FM and TV broadcast receivers, Fx is determined from the highest frequency generated or used excluding the local oscillator and tuned frequencies. Where Fx is unknown, the radiated emission measurements shall be performed up to 6 GHz.





2.2. Support Equipment List

Manufacturer	Description	Model	Serial Number	Certificate
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2.3 External I/O Cable

I/O Port Description	Quantity	Cable
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2.4. Description of Test Facility

Site Description
EMC Lab. : NVLAP Accreditation Code is 600167-0.
FCC Designation Number is CN5024.
CAB identifier is CN0071.
CNAS Registration Number is L4595.





2.5. Statement of the Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16 – 4 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements” and is documented in the LCS quality system acc. To DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

2.6. Measurement Uncertainty

Test	Parameters	Expanded Uncertainty (Ulab)	Expanded Uncertainty (Ucisp)
Conducted Emission	Level accuracy (9kHz to 150kHz) (150kHz to 30MHz)	± 2.63 dB ± 2.35 dB	± 3.8 dB ± 3.4 dB
Radiated Emission	Level accuracy (9kHz to 30MHz)	± 3.68 dB	N/A
Radiated Emission	Level accuracy (30MHz to 1000MHz)	± 3.48 dB	± 5.3 dB
Radiated Emission	Level accuracy (above 1000MHz)	± 3.90 dB	± 5.2 dB

(1) Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus.

(2) The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor of $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.





3. TEST RESULTS

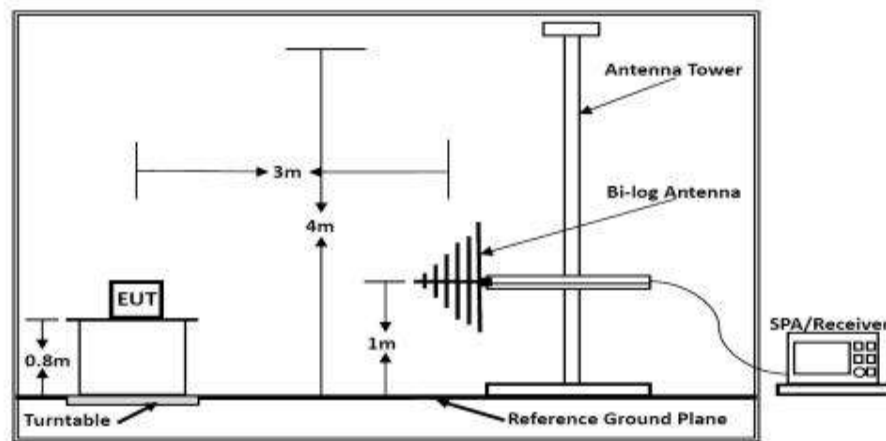
3.1. Radiated emission Measurement

3.1.1. Test Equipment

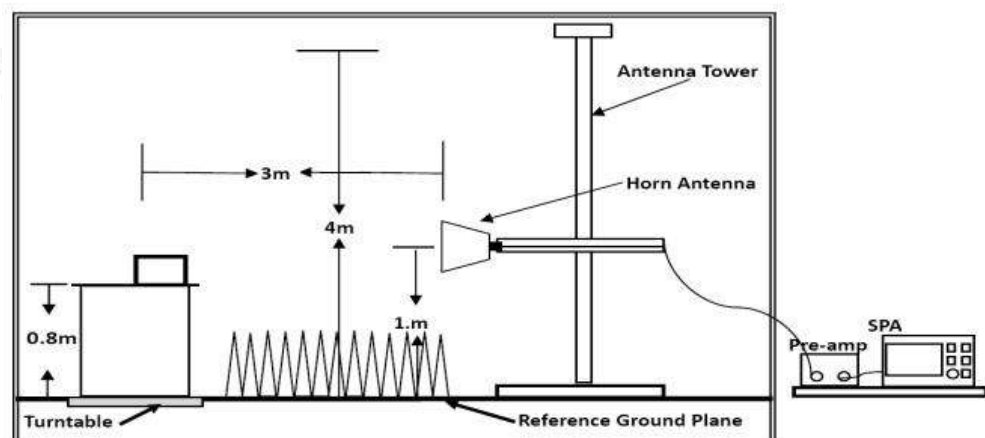
The following test equipments are used during the radiated emission measurement:

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	EMI Test Software	AUDIX	E3	/	N/A	N/A
2	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2021-09-12	2024-09-11
3	Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1925	2021-09-05	2024-09-04
4	EMI Test Receiver	R&S	ESPI	101940	2023-08-15	2024-08-14
5	Broadband Preamplifier	/	BP-01M18G	P190501	2023-06-09	2024-06-08
6	EMI Test Software	Farad	EZ	/	N/A	N/A
7	MXA Signal Analyzer	Agilent	N9020A	MY50510140	2023-10-18	2024-10-17
8	EMI Test Receiver	R&S	ESPI	101940	2023-08-15	2024-08-14

3.1.2. Block Diagram of Test Setup



Below 1GHz



Above 1GHz





3.1.3. Radiated Emission Limit (Class B)

Limits for Radiated Disturbance Below 1GHz

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		$\mu\text{V/m}$	$\text{dB}(\mu\text{V})/\text{m}$
30 ~ 88	3	100	40
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46
960 ~ 1000	3	500	54
Remark: (1) Emission level $(\text{dB})\mu\text{V} = 20 \log \text{Emission level } \mu\text{V/m}$ (2) The smaller limit shall apply at the cross point between two frequency bands. (3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.			
Limits for Radiated Emission Above 1GHz			
Frequency (MHz)	Distance (Meters)	Peak Limit ($\text{dB}\mu\text{V/m}$)	Average Limit ($\text{dB}\mu\text{V/m}$)
Above 1000	3	74	54
***Note: The lower limit applies at the transition frequency.			

3.1.4. EUT Configuration on Measurement

The following equipment are installed on Radiated Emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

3.1.5. Operating Condition of EUT

3.1.5.1. Setup the EUT as shown in Section 3.1.2.

3.1.5.2. Let the EUT work in test Mode 1 and measure it.

3.1.6. Test Procedure

EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on a antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated by-log antenna) is used as receiving antenna. Both horizontal and vertical polarization of the antenna is set on measurement. In order to find the maximum emission levels, all of the interface cables must be manipulated according to ANSI C63.4-2014 on radiated emission measurement.

3.1.7. Measuring Instruments and Setting

Please refer to equipment list in this report. The following table is the setting of spectrum analyzer and receiver





Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB/VB 200Hz/1KHz for QP/AVG
Start ~ Stop Frequency	150kHz~30MHz / RB/VB 9kHz/30KHz for QP/AVG
Start ~ Stop Frequency	30MHz~1000MHz / RB/VB 120kHz/1MHz for QP

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (Emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 1/B kHz for Average
RB / VB (Emission in non-restricted band)	1MHz / 1MHz for Peak, 1 MHz / 1/B kHz for Average

The frequency range from 30MHz to 1000MHz and above 1000MHz is checked.

3.1.8. Radiated Emission Noise Measurement Result

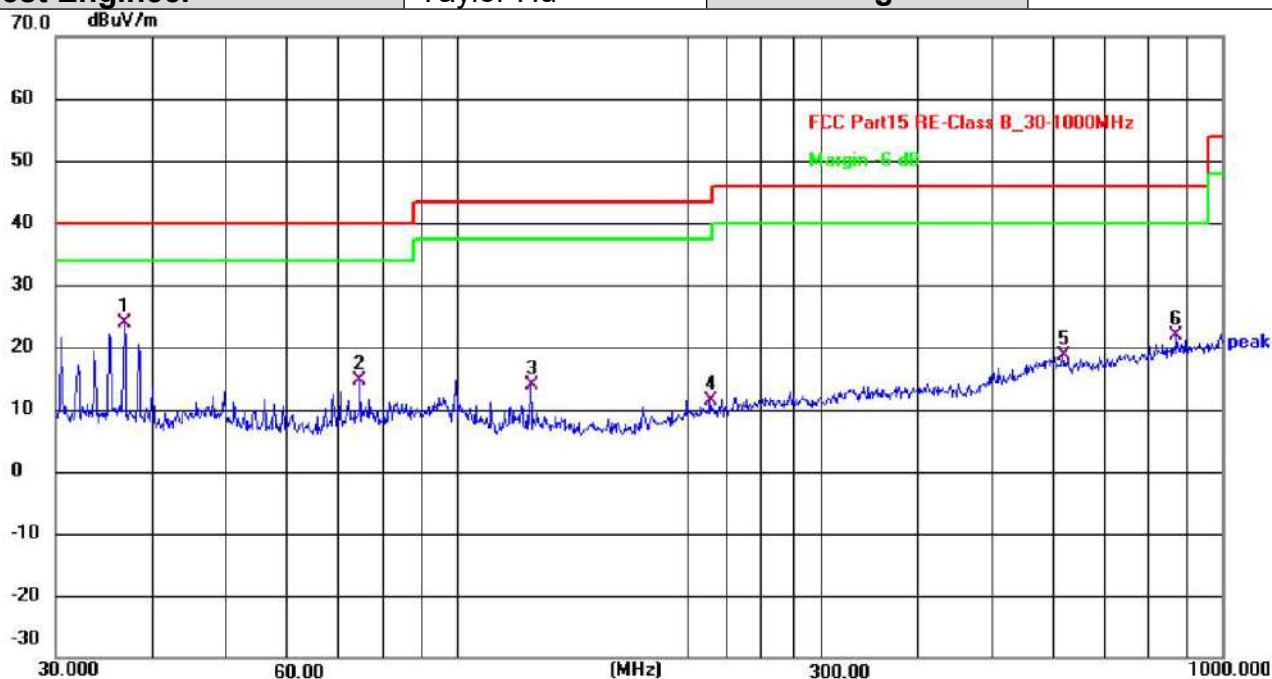
PASS.

The scanning waveforms please refer to the next page.





Test Model	Barra-GPS-4G	Test Mode	Mode 1
Environmental Conditions	23.8°C, 52.3% RH	Detector Function	Quasi-peak
Pol	Vertical	Distance	3m
Test Engineer	Taylor Hu	Test Voltage	DC 3.0V



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	36.8953	41.61	-17.69	23.92	40.00	-16.08	QP
2	74.9191	34.25	-19.67	14.58	40.00	-25.42	QP
3	125.0066	34.10	-20.26	13.84	43.50	-29.66	QP
4	214.5143	28.30	-17.01	11.29	43.50	-32.21	QP
5	618.5369	29.64	-10.91	18.73	46.00	-27.27	QP
6	872.1832	30.63	-8.72	21.91	46.00	-24.09	QP



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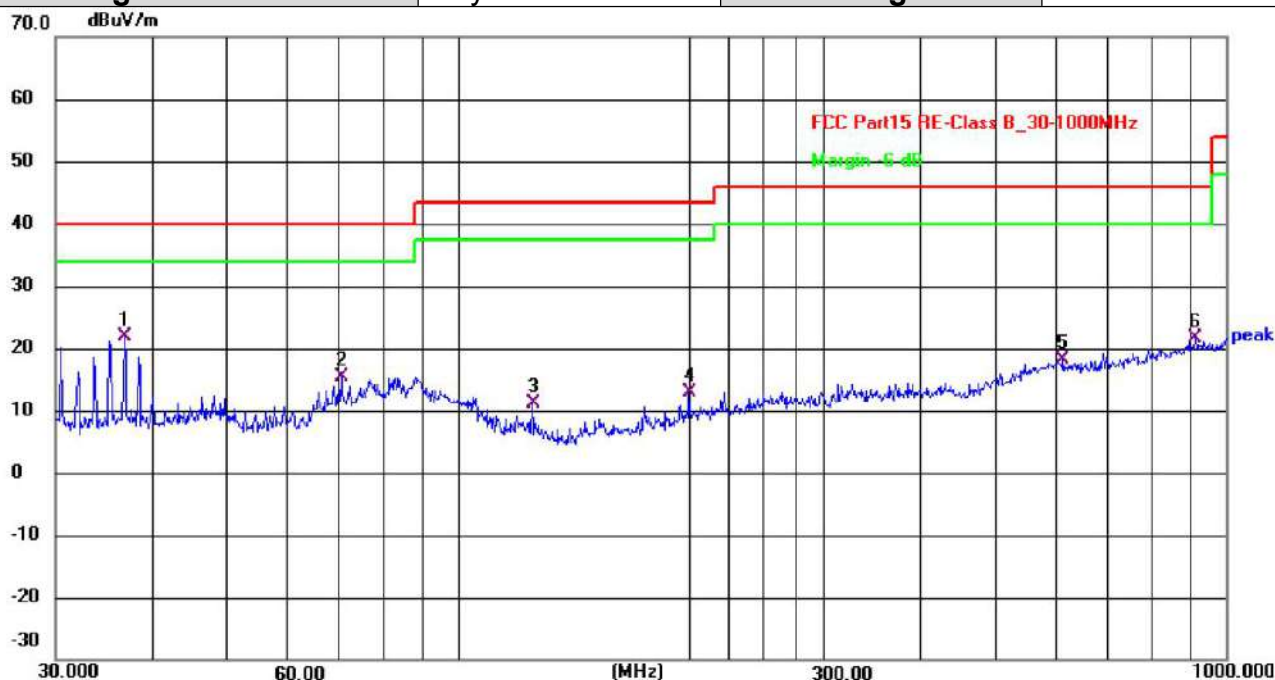
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Test Model	Barra-GPS-4G	Test Mode	Mode 1
Environmental Conditions	23.8°C, 52.3% RH	Detector Function	Quasi-peak
Pol	Horizontal	Distance	3m
Test Engineer	Taylor Hu	Test Voltage	DC 3.0V



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	36.8953	39.66	-17.69	21.97	40.00	-18.03	QP
2	70.5836	34.98	-19.49	15.49	40.00	-24.51	QP
3	125.0066	31.37	-20.26	11.11	43.50	-32.39	QP
4	199.9856	30.33	-17.39	12.94	43.50	-30.56	QP
5	614.2142	28.82	-10.80	18.02	46.00	-27.98	QP
6	912.8620	29.67	-8.12	21.55	46.00	-24.45	QP

Note: Margin= Reading level + Correct factor – Limit

Correct Factor=Antenna Factor+Cable Factor- Pre-amplifier Factor



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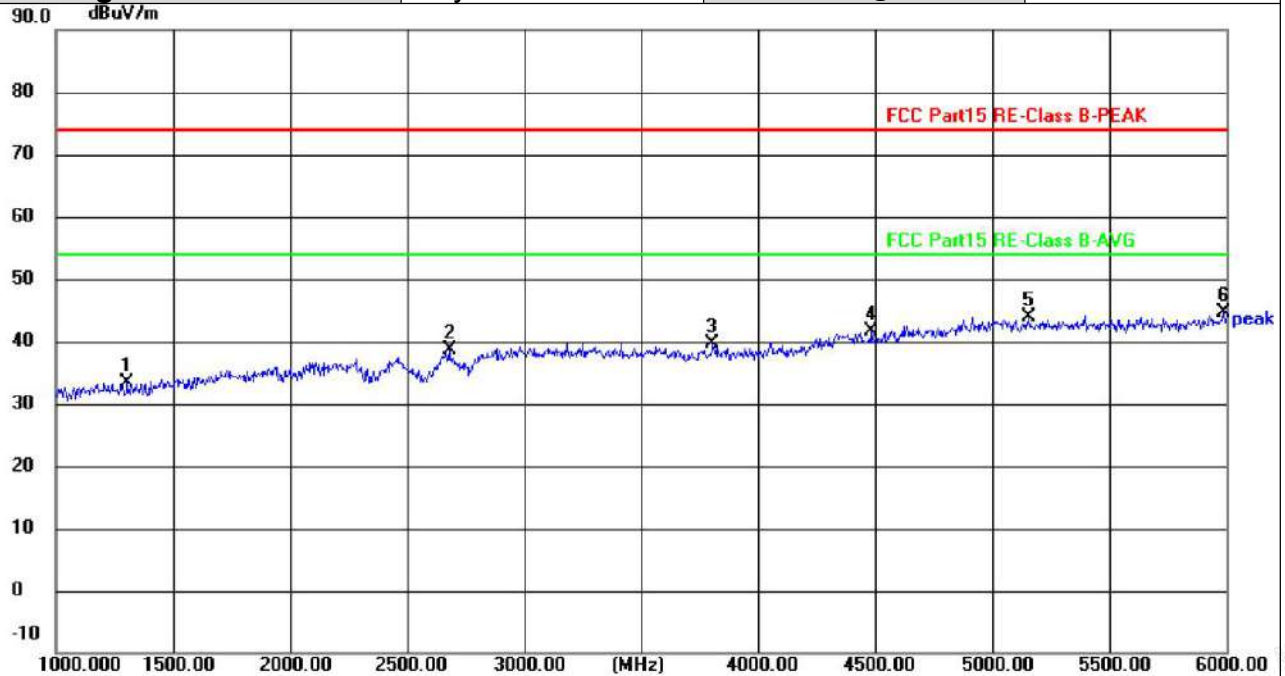
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Test Model	Barra-GPS-4G	Test Mode	Mode 1 (Above 1GHz)
Environmental Conditions	23.9°C, 52.0% RH	Detector Function	Peak + AV
Pol	Vertical	Distance	3m
Test Engineer	Taylor Hu	Test Voltage	DC 3.0V



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1305.000	48.72	-15.23	33.49	74.00	-40.51	peak
2	2680.000	49.26	-10.72	38.54	74.00	-35.46	peak
3	3805.000	48.48	-8.88	39.60	74.00	-34.40	peak
4	4485.000	48.26	-6.64	41.62	74.00	-32.38	peak
5	5155.000	47.72	-3.84	43.88	74.00	-30.12	peak
6	5990.000	48.24	-3.68	44.56	74.00	-29.44	peak



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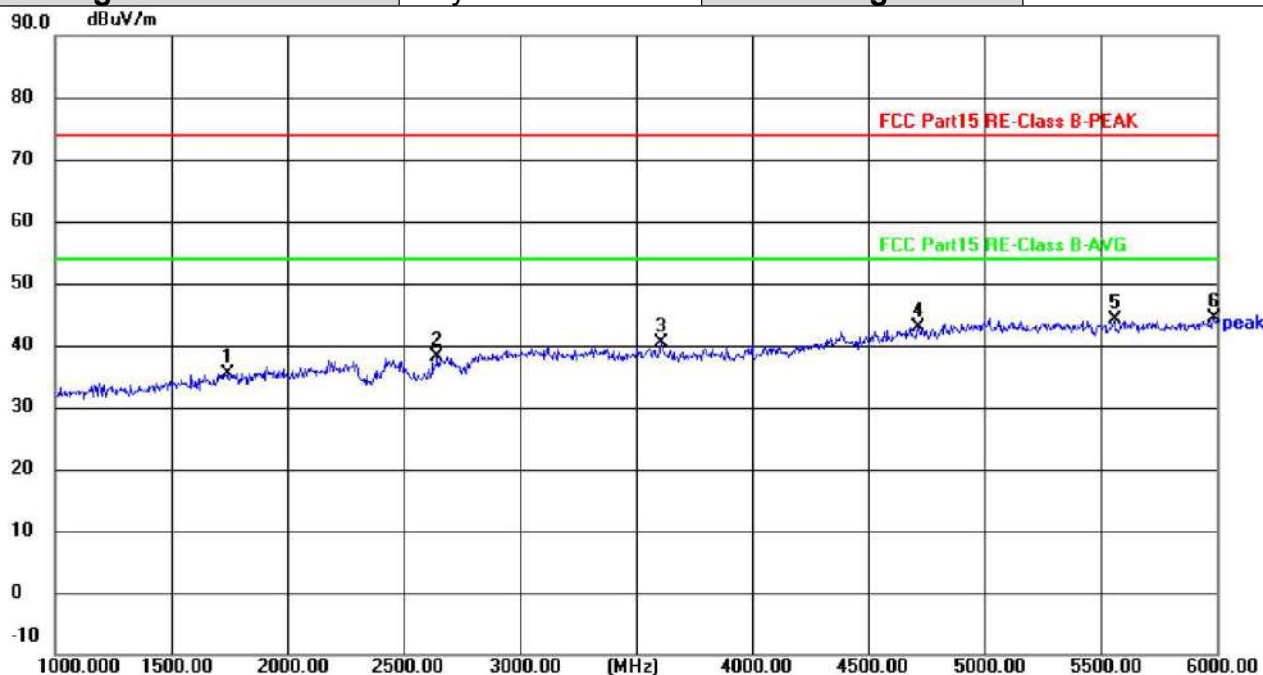
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Test Model	Barra-GPS-4G	Test Mode	Mode 1 (Above 1GHz)
Environmental Conditions	23.9℃, 52.0% RH	Detector Function	Peak + AV
Pol	Horizontal	Distance	3m
Test Engineer	Taylor Hu	Test Voltage	DC 3.0V



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1740.000	49.62	-14.29	35.33	74.00	-38.67	peak
2	2645.000	48.84	-10.83	38.01	74.00	-35.99	peak
3	3610.000	49.49	-9.22	40.27	74.00	-33.73	peak
4	4715.000	48.44	-5.52	42.92	74.00	-31.08	peak
5	5560.000	47.44	-3.26	44.18	74.00	-29.82	peak
6	5990.000	48.00	-3.68	44.32	74.00	-29.68	peak

Note:

1. Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
2. Measurements above show only up to 6 maximum emissions noted.
3. Data of measurement within this frequency range shown "--" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
4. Factor = Antenna Factor + Cable Loss + Amplifier Factor
Emission Level = Reading level + Factor
Margin = Emission Level - Limit





4. PHOTOGRAPH



Photo of Radiated Measurement



Photo of Radiated Measurement (Above 1GHz)





5. EXTERNAL AND INTERNAL PHOTOS OF THE EUT



Fig. 1

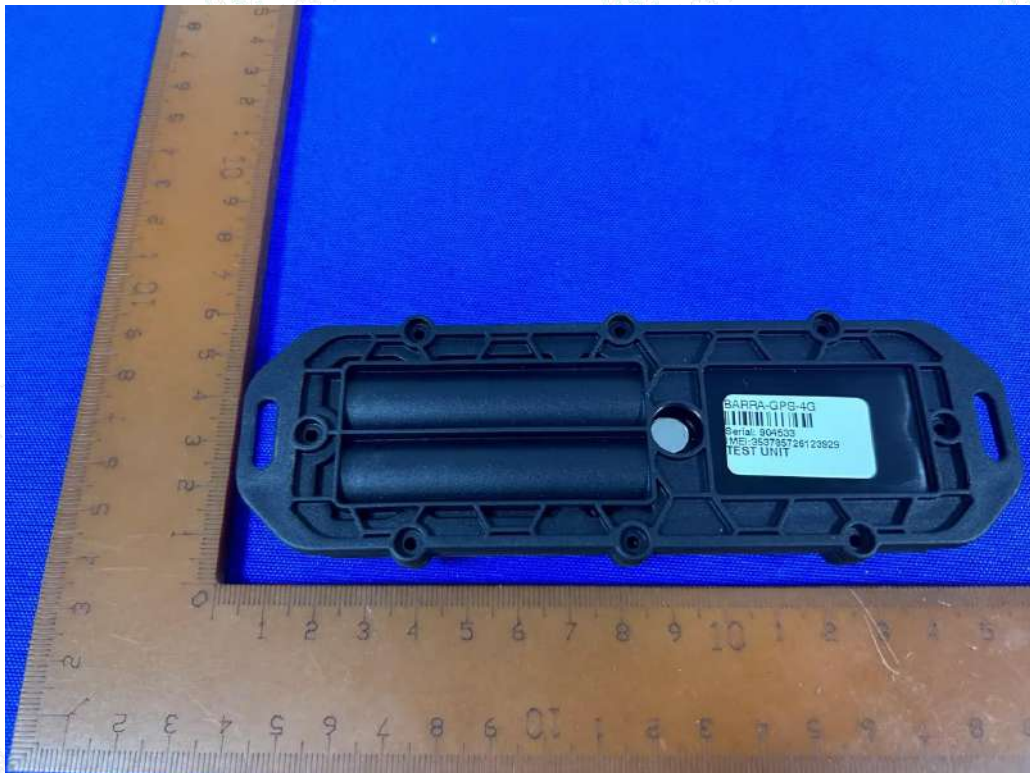


Fig. 2





Fig. 3



Fig. 4





Fig. 5



Fig. 6





Fig. 7



Fig. 8





Fig. 9

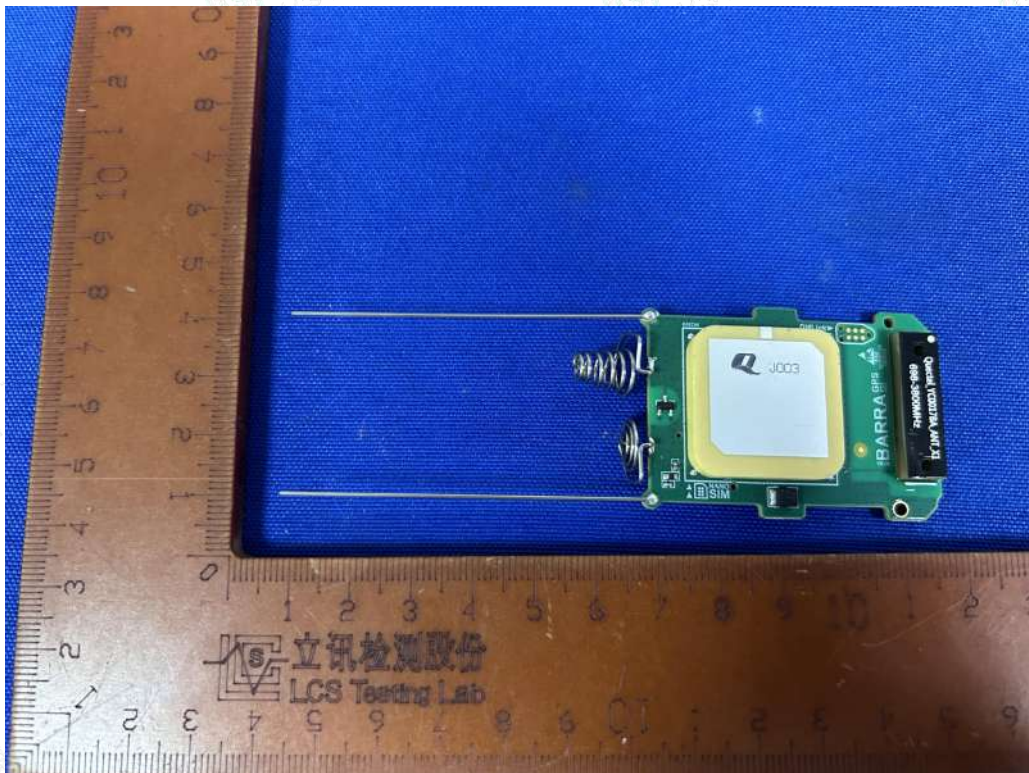


Fig. 10



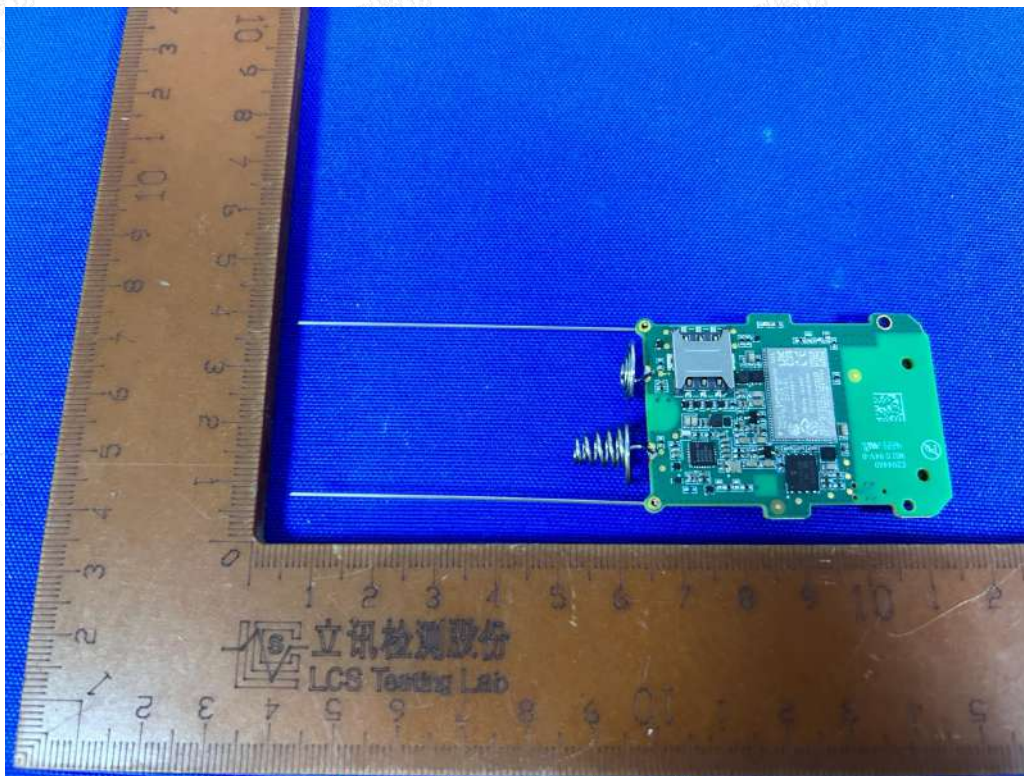


Fig. 11

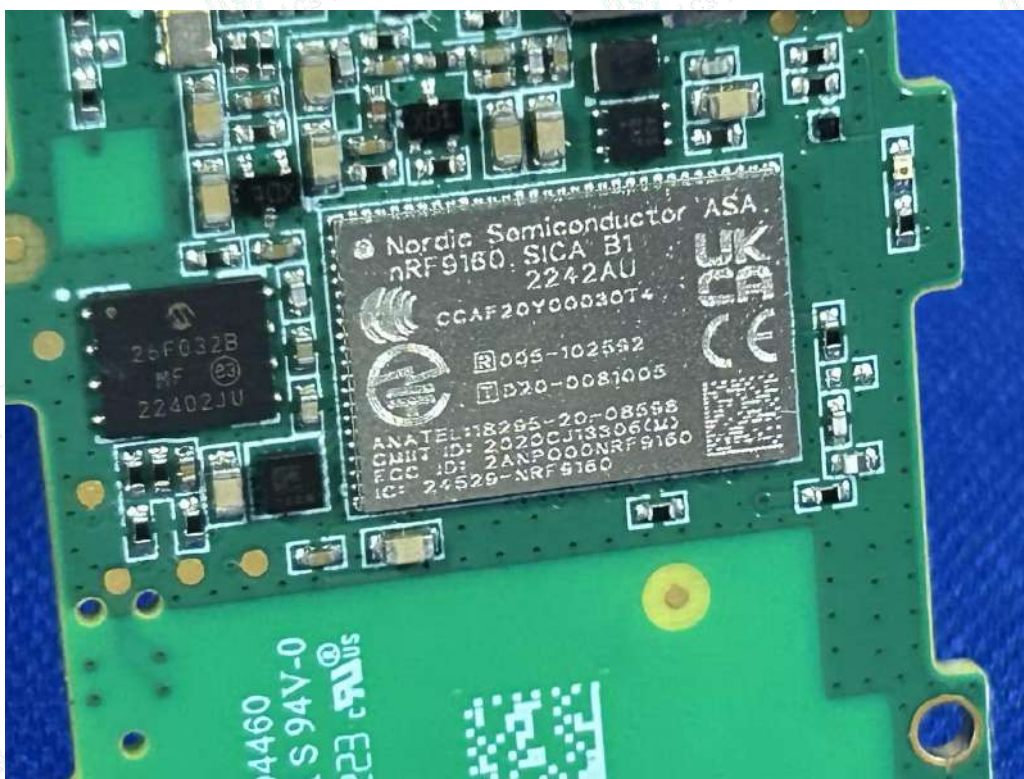


Fig. 12



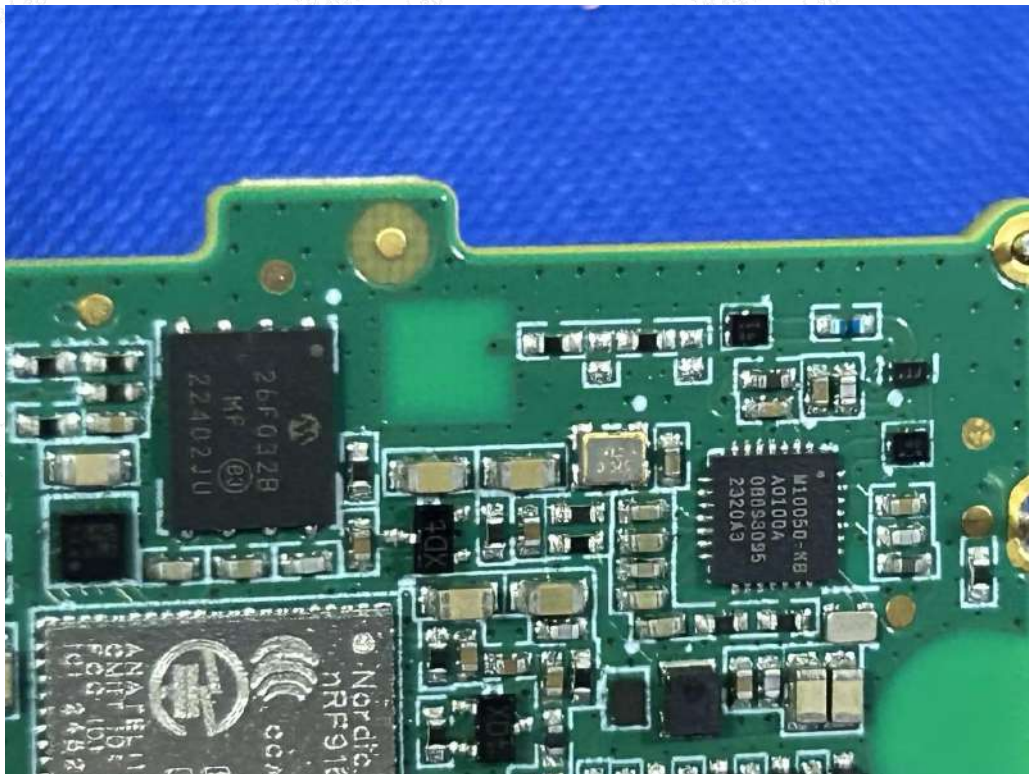


Fig. 13

-----THE END OF TEST REPORT-----



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