

Global United Technology Services Co., Ltd.

Report No.: GTS2023110098F03

TEST REPORT

Applicant: Allied Universal Electronic Monitoring US, Inc.

Address of Applicant: 1838 Gunn Highway, Odessa, Florida 33556, United States

Manufacturer: Allied Universal Electronic Monitoring US, Inc.

Address of Manufacturer: 1838 Gunn Highway, Odessa, Florida 33556, United States

Equipment Under Test (EUT)

Product Name: Tracker 100

Model No.: TRC-100-NA-9-00

FCC ID: NC3TRACKER-100

Applicable standards: FCC CFR Title 47 Part 2
FCC CFR Title 47 Part 24
FCC CFR Title 47 Part 27

Date of sample receipt: November 10, 2023

Date of Test: November 10, 2023-December 22, 2023

Date of report issued: December 25, 2023

Test Result : PASS *

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:



Robinson Luo

Laboratory Manager

This results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.



2 Version

Version No.	Date	Description
00	December 25, 2023	Original

Prepared By:

Jason Liu

Date:

December 25, 2023

Project Engineer

Check By:

Robinson Liu

Date:

December 25, 2023

Reviewer

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4 Test Summary

Test Item	Section in CFR 47	Result
RF Output Power	Part 2.1033 Part 2.1046 Part 2.1055 Part 24.232 Part 27.50 Part 27.54	Pass
Peak-to-Average Ratio	Part 2.1046 Part 24.232 Part 27.50	Pass
Modulation Characteristics	Part 2.1047	N/A
99% & -26 dB Occupied Bandwidth	Part 2.1033 Part 2.1046 Part 2.1049 Part 27.50	Pass
Spurious Emissions at Antenna Terminal	Part 2.1053 Part 24.238 Part 27.53	Pass
Spurious Radiation Emissions	Part 2.1053 Part 24.238 Part 27.53	Pass
Out of band emission, Band Edge	Part 24.238 Part 27.53	Pass
Frequency stability vs. temperature	Part 2.1055	Pass
Frequency stability vs. voltage	Part 2.1055	Pass

Remarks:

1. Pass: The EUT complies with the essential requirements in the standard.
2. N/A: Not applicable.

5 General Information

5.1 General Description of EUT

Product Name:	Tracker 100
Model No.:	TRC-100-NA-9-00
S/N:	1PC1039B03110227230003
Tested Sample(s) ID:	GTS2023110098-1
Sample(s) Status:	Engineer sample
Support Networks:	LTE
Support Bands:	LTE Band 2/12
Channel Bandwidth:	LTE Band 2: 1.4MHz; 3MHz; 5MHz; 10MHz; 15MHz; 20MHz LTE Band 12: 1.4MHz; 3MHz; 5MHz; 10MHz
TX Frequency:	LTE band 2: 1850~1910MHz LTE band 12: 699~716MHz
Modulation type:	QPSK, 16QAM
Antenna type:	Ceramic Antenna
Antenna gain:	LTE band 2: 3.2dBi LTE band 12: 1dBi
Power supply:	DC 3.6V, 1230mAh for Li-ion battery

Note:

1. Antenna gain information provided by the customer.
2. The relevant information of the sample is provided by the entrusting company, and the laboratory is not responsible for its authenticity.

Test Frequency

Test Mode	Channel Bandwidth	Frequency [MHz]		
		Lowest channel	Middle channel	Highest channel
LTE Band 2	1.4M	1850.7	1880.0	1909.3
	3M	1851.5	1880.0	1908.5
	5M	1852.5	1880.0	1907.5
	10M	1855.0	1880.0	1905.0
	15M	1857.5	1880.0	1902.5
	20M	1860.0	1880.0	1900.0

Test Mode	Channel Bandwidth	Frequency [MHz]		
		Lowest channel	Middle channel	Highest channel
LTE Band 12	1.4M	699.7	707.5	715.3
	3M	700.5	707.5	714.5
	5M	701.5	707.5	713.5
	10M	704.0	707.5	711.0

5.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is filing to comply with Section Part 22/24/27 of the FCC CFR 47 Rules.

5.3 Test Methodology

Both conducted and radiated testing were performed according to the procedures document on ANSI C63.26:2015 and FCC CFR 47.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055 and 2.1057

5.4 Test Facility

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

- **FCC —Registration No.: 381383**

Designation Number: CN5029

Global United Technology Services Co., Ltd., Shenzhen 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 files.

- **ISED—Registration No.: 9079A**

CAB identifier: CN0091

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of ISED for radio equipment testing.

- **NVLAP (LAB CODE:600179-0)**

Global United Technology Services Co., Ltd., is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP).

5.5 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.

Address: No. 123-128, Tower A, Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China 518102

Tel: 0755-27798480

Fax: 0755-27798960

6 Test Instruments list

Radiated Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	June 23, 2021	June 22, 2024
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	April 14, 2023	April 13, 2024
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9168	GTS640	March 19, 2023	March 18, 2025
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	GTS208	April 17, 2023	April 16, 2025
6	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
7	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS575	April 14, 2023	April 13, 2024
8	Loop Antenna	ZHINAN	ZN30900A	GTS534	Nov. 13, 2023	Nov.12, 2024
9	Broadband Preamplifier	SCHWARZBECK	BBV9718	GTS535	April 14, 2023	April 13, 2024
10	Amplifier(1GHz-26.5GHz)	HP	8449B	GTS601	April 14, 2023	April 13, 2024
11	Horn Antenna (18-26.5GHz)	/	UG-598A/U	GTS664	Oct. 29, 2023	Oct. 28, 2024
12	FSV-Signal Analyzer (10Hz-40GHz)	Keysight	FSV-40-N	GTS666	March 13, 2023	March 12, 2024
13	Thermo meter	JINCHUANG	GSP-8A	GTS643	April 19, 2023	April 18, 2024
14	RE cable 1	GTS	N/A	GTS675	July 31. 2023	July 30. 2024
15	RE cable 2	GTS	N/A	GTS676	July 31. 2023	July 30. 2024
16	RE cable 3	GTS	N/A	GTS677	July 31. 2023	July 30. 2024
17	RE cable 4	GTS	N/A	GTS678	July 31. 2023	July 30. 2024
18	RE cable 5	GTS	N/A	GTS679	July 31. 2023	July 30. 2024
19	RE cable 6	GTS	N/A	GTS680	July 31. 2023	July 30. 2024
20	RE cable 7	GTS	N/A	GTS681	July 31. 2023	July 30. 2024
21	RE cable 8	GTS	N/A	GTS682	July 31. 2023	July 30. 2024

General used equipment:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Barometer	KUMAO	SF132	GTS647	April 19, 2023	April 18, 2024

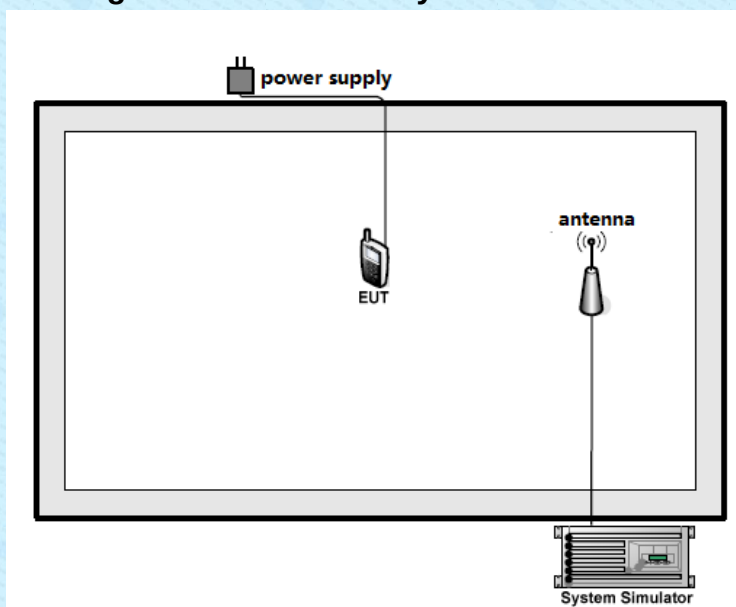
7 System test configuration

7.1 Test mode

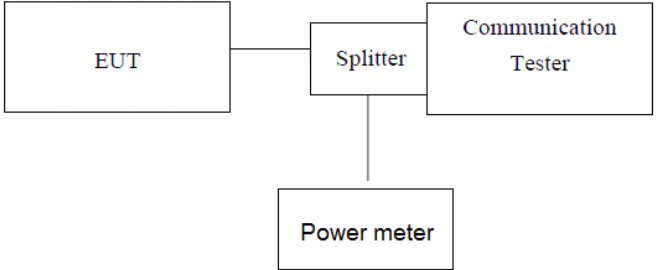
During all testing, EUT is in link mode with base station emulator at maximum power level. The spurious emission measurements were carried out in semi-anechoic chamber with 3-meter test range, and EUT is rotated on three test planes to find out the worst emission. For 16QAM modulation with 10/15/20MHz bandwidth, the maximum RB supported by the product is:27.

Test modes		
Band	Radiated	Conducted
LTE Band 2	■ QPSK and 16QAM link	■ QPSK and 16QAM link
LTE Band 12	■ QPSK and 16QAM link	■ QPSK and 16QAM link

7.2 Configuration of Tested System

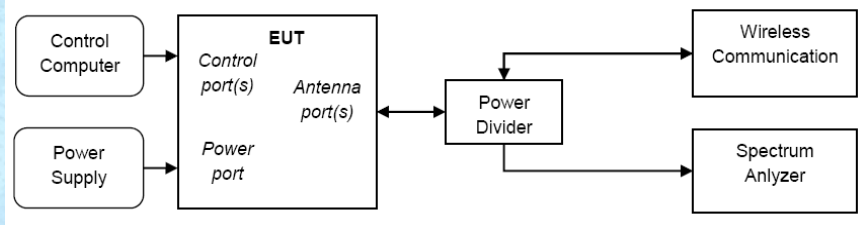


7.3 Conducted Output Power

Test Requirement:	FCC part2.1033 & part2.1046 & Part2.1055 & Part24.232, Part27.50
Test Method:	FCC KDB 971168 D01 V03r01 & ANSI C63.26
Limit:	LTE Band 2: 2W LTE Band 12: 3W
Test setup:	 <i>Note: Measurement setup for testing on Antenna connector</i>
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 7.1 for details
Test results:	Pass

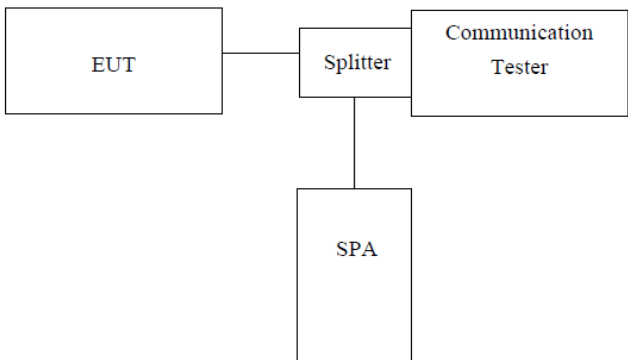
Measurement Data: The detailed test data see Appendix

7.4 Peak-to-Average Ratio

Test Requirement:	FCC part2.1046 & part & 24.232 & Part 27.50
Test Method:	FCC KDB 971168 D01 V03r01 & ANSI C63.26
Limit:	13db
Test setup:	 <pre> graph LR CC[Control Computer] --> EUT[EUT] PS[Power Supply] --> EUT subgraph EUT direction TB CP[Control port(s)] AP[Antenna port(s)] PP[Power port] end AP <--> PD[Power Divider] PD --> WC[Wireless Communication] PD --> SA[Spectrum Analyzer] </pre>
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 7.1 for details
Test results:	Pass

Measurement data: The detailed test data see Appendix

7.5 Occupy Bandwidth

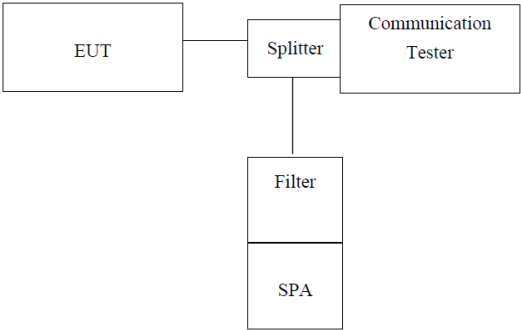
Test Requirement:	FCC Part 24.238 & Part 27.53 & part2.1049
Test Method:	FCC KDB 971168 D01 V03r01
Test setup:	 <i>Note: Measurement setup for testing on Antenna connector</i>
Test Procedure:	1. The EUT's output RF connector was connected with a short cable to the spectrum analyzer 2. RBW was set to about 1% of emission BW, VBW= 3 times RBW. 3. -26dBc display line was placed on the screen (or 99% bandwidth), the occupied bandwidth is the delta frequency between the two points where the display line intersects the signal trace.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 7.1 for details
Test results:	Pass

Measurement Data: The detailed test data see Appendix

7.6 MODULATION CHARACTERISTIC

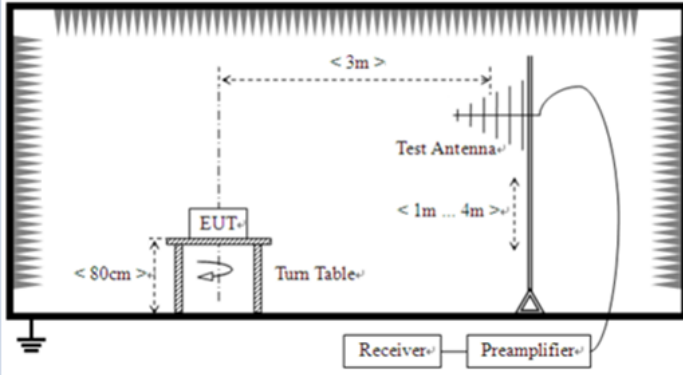
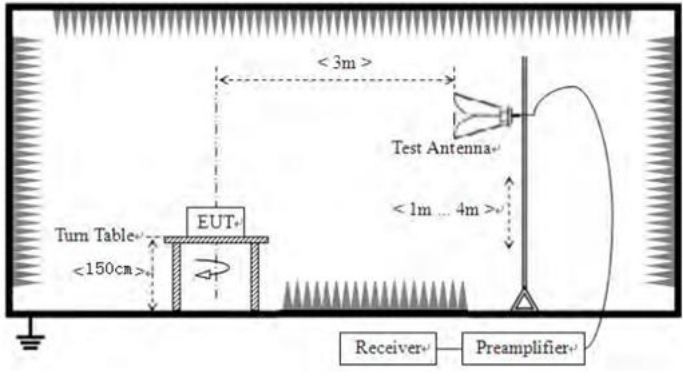
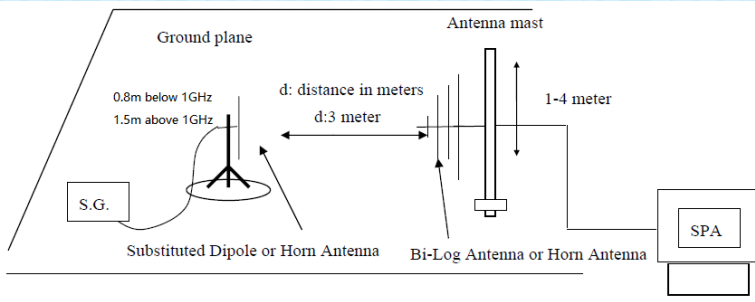
According to FCC § 2.1047(d), Part 27 there is no specific requirement for digital modulation, therefore modulation characteristic is not presented.

7.7 Out of band emission at antenna terminals

Test Requirement:	FCC Part 24.238; Part 27.53
Test Method:	FCC part2.1051 & FCC KDB 971168 D01 V03r01
Test setup:	 <i>Note: Measurement setup for testing on Antenna connector</i>
Test Procedure:	1 The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. 2 The resolution bandwidth of the spectrum analyzer was set at 1MHz, sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic. 3 For the out of band: Set the RBW, VBW = 1MHz, Start=30MHz, Stop= 10th harmonic. 4 Band Edge Requirements: In the 1 MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 1 percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to measure the out of band Emissions.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 7.1 for details
Test results:	Pass

Measurement Data: The detailed test data see Appendix

7.8 Spurious Radiation Emissions

Test Requirement:	Part 24.238; Part 27.53
Test Method:	FCC part 2.1053 and ANSI C63.26:2015
Test setup:	Below 1GHz  Above 1GHz  Substituted method: 
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 7.1 for details
Test results:	Pass

Measurement Data:

Pre-scan all test modes, found worst case at Band 2@10M Lowest channel, Band 12@10M Middle channel, and so only show the test result of worst case

Below 1GHz

Band 2 (Lowest channel)

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarity
77.05	-60.63	21.65	1.00	30.00	-67.98	-13.00	-54.98	Vertical
88.03	-59.97	25.13	1.09	30.00	-63.75	-13.00	-50.75	Vertical
106.39	-65.97	25.13	1.25	30.00	-69.59	-13.00	-56.59	Vertical
145.86	-63.41	21.23	1.54	30.00	-70.64	-13.00	-57.64	Vertical
167.82	-58.37	22.36	1.67	30.00	-64.34	-13.00	-51.34	Vertical
183.84	-60.76	22.36	1.76	30.00	-66.64	-13.00	-53.64	Vertical
78.14	-65.95	21.65	1.01	30.00	-73.29	-13.00	-60.29	Horizontal
88.03	-67.97	25.13	1.09	30.00	-71.75	-13.00	-58.75	Horizontal
169.01	-52.63	22.36	1.68	30.00	-58.59	-13.00	-45.59	Horizontal
261.06	-65.60	25.13	2.18	30.00	-68.29	-13.00	-55.29	Horizontal
416.18	-74.15	28.55	2.93	30.00	-72.67	-13.00	-59.67	Horizontal
595.13	-77.60	31.51	3.70	30.00	-72.39	-13.00	-59.39	Horizontal

Band 12 (Middle channel)

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarity
77.05	-60.37	21.65	1.00	30.00	-67.72	-13.00	-54.72	Vertical
87.42	-55.26	21.65	1.09	30.00	-62.52	-13.00	-49.52	Vertical
100.58	-65.64	25.13	1.19	30.00	-69.32	-13.00	-56.32	Vertical
142.82	-65.65	21.23	1.52	30.00	-72.90	-13.00	-59.90	Vertical
167.82	-59.09	22.36	1.67	30.00	-65.06	-13.00	-52.06	Vertical
216.02	-68.91	24.55	1.93	30.00	-72.43	-13.00	-59.43	Vertical
83.82	-66.06	21.65	1.06	30.00	-73.35	-13.00	-60.35	Horizontal
167.24	-53.37	22.36	1.67	30.00	-59.34	-13.00	-46.34	Horizontal
183.84	-58.12	22.36	1.76	30.00	-64.00	-13.00	-51.00	Horizontal
261.98	-62.88	25.13	2.18	30.00	-65.57	-13.00	-52.57	Horizontal
413.27	-75.54	28.55	2.92	30.00	-74.07	-13.00	-61.07	Horizontal
651.94	-76.95	31.82	3.92	30.00	-71.21	-13.00	-58.21	Horizontal

Above 1GHz

Band 2 (Lowest channel)

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarity
2292.50	-61.28	41.45	10.51	38.52	-47.84	-13.00	-34.84	Vertical
3737.75	-64.50	43.19	14.61	38.35	-45.05	-13.00	-32.05	Vertical
5136.00	-64.74	45.62	18.02	38.46	-39.56	-13.00	-26.56	Vertical
6217.00	-64.26	48.06	22.41	38.75	-32.54	-13.00	-19.54	Vertical
7650.50	-62.88	50.71	25.26	41.10	-28.01	-13.00	-15.01	Vertical
8849.00	-60.37	52.09	27.91	42.46	-22.83	-13.00	-9.83	Vertical
2104.50	-61.44	41.21	9.95	38.45	-48.73	-13.00	-35.73	Horizontal
3526.25	-61.87	42.91	14.23	38.48	-43.21	-13.00	-30.21	Horizontal
4266.50	-64.20	44.00	15.82	38.25	-42.63	-13.00	-29.63	Horizontal
5218.25	-65.40	45.85	18.29	38.49	-39.75	-13.00	-26.75	Horizontal
6745.75	-64.29	48.93	22.73	38.85	-31.48	-13.00	-18.48	Horizontal
7309.75	-63.41	50.05	23.94	39.97	-29.39	-13.00	-16.39	Horizontal

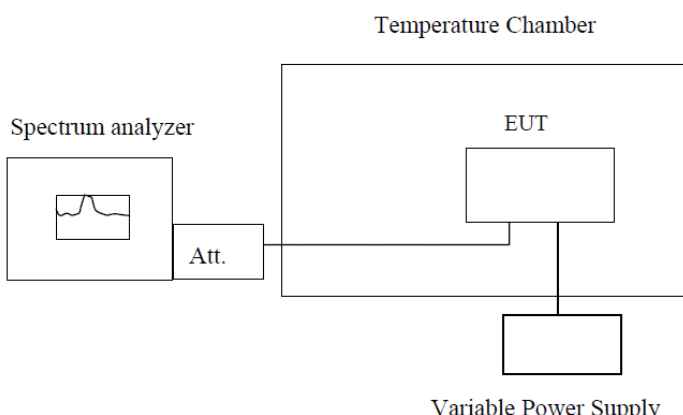
Band 12 (Middle channel)

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarity
2045.75	-60.48	41.15	9.58	38.42	-48.17	-13.00	-35.17	Vertical
3373.50	-60.49	42.72	13.89	38.52	-42.40	-13.00	-29.40	Vertical
4184.25	-64.36	43.89	15.57	38.24	-43.14	-13.00	-30.14	Vertical
5958.50	-64.39	47.61	20.37	38.69	-35.10	-13.00	-22.10	Vertical
6792.75	-64.79	49.00	22.76	38.86	-31.89	-13.00	-18.89	Vertical
7627.00	-64.03	50.65	25.28	41.02	-29.12	-13.00	-16.12	Vertical
2022.25	-60.74	41.12	9.43	38.41	-48.60	-13.00	-35.60	Horizontal
3549.75	-61.50	42.94	14.26	38.47	-42.77	-13.00	-29.77	Horizontal
4466.25	-63.40	44.38	16.33	38.29	-40.98	-13.00	-27.98	Horizontal
5324.00	-64.97	46.07	18.45	38.53	-38.98	-13.00	-25.98	Horizontal
6158.25	-64.30	47.95	22.04	38.73	-33.04	-13.00	-20.04	Horizontal
6640.00	-63.51	48.78	22.66	38.83	-30.90	-13.00	-17.90	Horizontal

Note:

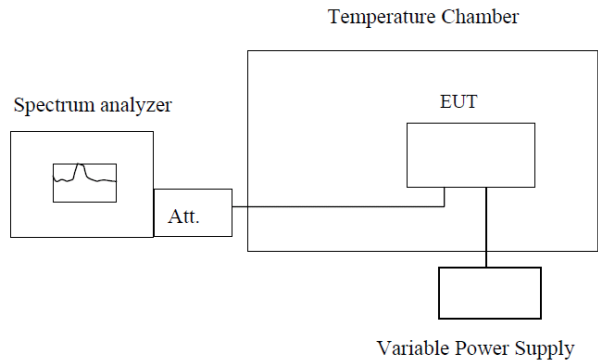
1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

7.9 Frequency stability V.S. Temperature measurement

Test Requirement:	FCC Part2.1055
Test Method:	FCC Part2.1055
Limit:	2.5ppm
Test setup:	 Note : Measurement setup for testing on Antenna connector
Test procedure:	1. The equipment under test was connected to an external DC power supply and input rated voltage. 2. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. 3. The EUT was placed inside the temperature chamber. 4. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 25°C operating frequency as reference frequency. 5. Turn EUT off and set the chamber temperature to –20°C. After the temperature stabilized for approximately 30 minutes recorded the frequency. 6. Repeat step measure with 10°C increased per stage until the highest temperature of +50°C reached.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 7.1 for details
Test results:	Pass

Measurement Data: The detailed test data see Appendix

7.10 Frequency stability V.S. Voltage measurement

Test Requirement:	FCC Part2.1055(d)
Test Method:	FCC Part2.1055(d)
Limit:	2.5ppm
Test setup:	 Note : Measurement setup for testing on Antenna connector
Test procedure:	1. Set chamber temperature to 25°C. Use a variable DC power source to power the EUT and set the voltage to rated voltage. 2. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency. 3. Reduce the input voltage to specified extreme voltage variation (+/- 15%) and endpoint, record the maximum frequency change.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 7.1 for details
Test results:	Pass

Measurement Data: The detailed test data see Appendix

8 Test Setup Photo

Reference to the **appendix I** for details.

9 EUT Constructional Details

Reference to the **appendix II** for details.

-----End-----