

FCC TEST REPORT

FCC ID : A7AG3100-R1
Applicant : TI Asahi Co., Ltd.
Address : 4-3-4, Ueno, Iwatsuki-ku, Saitama-shi, Saitama 339-0073 Japan

Equipment Under Test (EUT) :

Product Name : GNSS
 Model No. : SMT888-3G, G3100-R1

Standards : FCC Part 15 Section 15.109:2010

Date of Test : February 14 ~ February 17, 2012

Date of Issue : June 16, 2012

Test Engineer : Hunk yan / Engineer



Reviewed By : Philo zhong / Manager



Test Result	: PASS
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Prepared By:

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- ◆ The sample detailed above has been tested to the requirements of Council Directives ANSI C63.4:2003. The test results have been reviewed against the Directives above and found to meet their essential requirements.

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Reference No.: WT12064021-S-S-F

2 Test Summary

Test	Test Requirement	Test Method	Result
Radiated Emission for GNSS (30MHz to 2GHz)	FCC Part 15.109:2010	ANSI C63.4: 2003	PASS
Radiated Emission for Charger (30MHz to 1GHz)	FCC Part 15.109:2010	ANSI C63.4: 2003	PASS
Conducted Emission (150KHz to 30MHz)	FCC Part 15.107:2010	ANSI C63.4: 2003	PASS

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9 FCC LABEL.....

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4 General Information

4.1 Client Information

Applicant : TI Asahi Co., Ltd.

Address of Applicant : 4-3-4, Ueno, Iwatsuki-ku, Saitama-shi, Saitama 339-0073 Japan

Manufacturer : TI Precision Shanghai Co., Ltd.

Address of Manufacturer : No.158, Beiyang Road, Songjiang District, Shanghai

4.2 General Description of E.U.T.

Product Name : GNSS

Model No. : SMT888-3G, G3100-R1

Difference : The difference of two models is the appearance and the model name. the interfaces,connectors,working frequency bands,functions are the same and contain the same module and module's FCC ID.

Test sample : Two models were pretested, and the worse case was the model G3100-R1, so the data show was this model only in the report.

Operation Frequency :

Others Module :

Bluetooth Module : FCC ID:POOWML-C40.

Standard : FCC Rule :Part15 Subpart C Section 15.247

Quad-Band GPRS Module : FCCID:IHDT56HQ1.

Standard : FCC Part 22/24.

UHF Module : FCC ID:WJ4LMR400.

Standard : FCC Part 90.

Remark: the EUT was used the others module as above.

4.3 Details of E.U.T.

GNSS Technical Data : 2 * 7.4V Li-ion Battery

12.0VDC by lead-acid cell

Charger Technical Data : Input: 19VDC, 1.5A 25W

Output: 8.4VDC

Adapter Technical Data : Input: 100-240VAC, 50/60Hz, 1.7A

Output: 19.0VDC, 3.16A

4.4 Description of Support Units

The EUT has been tested as an independent unit.

4.5 Standards Applicable for Testing

The standards used were FCC Part15 Subpart B Section 15.107 and Section 15.109.

4.6 Test Facility

The test facility has a test site registered with the following organizations:

- **IC – Registration No.: 7760A**

Waltek Services(Shenzhen) Co., Ltd. has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files. Registration 7760A, August 3, 2010.

- **FCC – Registration No.: 880581**

Waltek Services(Shenzhen) Co., Ltd. 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 880581, May 26, 2011.

4.7 Test Location

All the tests were performed at:

Waltek Services(Shenzhen) Co., Ltd. at 1/F, Fukangtai Building, West Baima Rd., Songgang Street, Baoan District, Shenzhen, China

5 Equipment Used during Test

Equipment Name	Manufacturer Model	Equipment No.	Internal No.	Specification	Cal. Date	Due Date	Uncertainty
EMC Analyzer	Agilent/ E7405A	MY4511494 3	W200800 1	9k-26.5GHz	Aug.2, 2011	Aug.1, 2012	±1dB
Trilog Broadband Antenne 30-3000 MHz	SCHWARZBECK MESS-ELEKTROM/VULB9163	336	W200800 2	30-3000 MHz	Aug.2, 2011	Aug.1, 2012	±1dB
Broad-band Horn Antenna 11-18 GHz	SCHWARZBECK MESS-ELEKTROM/BBHA9120D	667	W200800 3	1-18GHz	Aug.2, 2011	Aug.1, 2012	f < 10 GHz : ±1dB 10GHz < f < 18GHz : ±1.5dB
Broadband Preamplifier 0.5-18 GHz	SCHWARZBECK MESS-ELEKTROM/BBV 9718	9718-148	W200800 4	0.5-18GHz	Aug.2, 2011	Aug.1, 2012	±1.2dB
10m Coaxial Cable with N-male Connectors usable up to 18GHz,	SCHWARZBECK MESS-ELEKTROM/A K 9515 H				Aug.2, 2011	Aug.1, 2012	
10m 50 Ohm Coaxial Cable with N-plug, individual length, usable up to 3(5)GHz, Connector	SCHWARZBECK MESS-ELEKTROM/A K 9513				Aug.2, 2011	Aug.1, 2012	
Positioning Controller	C&C LAB/ CC-C-IF				N/A	N/A	
Color Monitor	SUNSPO/ SP-14C				N/A	N/A	
Test Receiver	ROHDE&SCHWARZ/ ESPI	101155	W200500 1	9k-3GHz	Aug.2, 2011	Aug.1, 2012	±1dB
Two-Line V-Network	ROHDE&SCHWARZ/ ENV216	100115	W200500 2	50Ω/50μH	Aug.2, 2011	Aug.1, 2012	±10%
V-LISN	SCHWARZBECK MESS-ELEKTRONIK	NSLK 8128	8128-259	9k-30MHz	Aug.2, 2011	Aug.1, 2012	
PC	Lenovo	T2900D	-		Aug.2, 2011	Aug.1, 2012	±1dB
Display	ViewSonic	S27996-1W	-		Aug.2, 2011	Aug.1, 2012	±0.5dB
K/B	Dell	L100	-		Aug.2, 2011	Aug.1, 2012	±0.5dB
Mouse	Acer	M-UVACR1	-		Aug.2, 2011	Aug.1, 2012	±0.5dB

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6 Conducted Emission Data

Test Requirement:	FCC Part 15 Section 15.107
Test Method:	ANSI C63.4:2003
Test Result:	PASS
Frequency Range:	150kHz to 30MHz
Class:	Class B
Limit:	66-56 dB μ V between 0.15MHz & 0.5MHz 56 dB μ V between 0.5MHz & 5MHz 60 dB μ V between 5MHz & 30MHz
Detector:	Peak for pre-scan (9kHz Resolution Bandwidth) Quasi-Peak & Average if maximised peak within 6dB of Average Limit

6.1 E.U.T. Operation

Operating Environment:

Temperature: 25.5 °C
Humidity: 51 % RH
Atmospheric Pressure: 1012 mbar

EUT Operation:

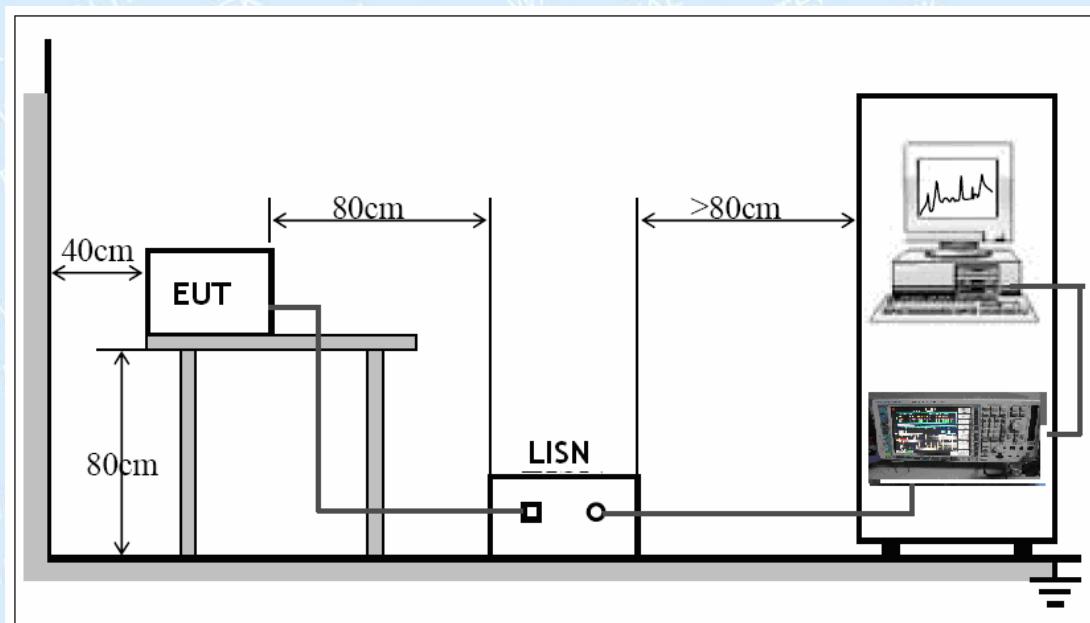
This test is not applicable for GNSS, and the compliance test for charger was performed in charging mode.

The EUT was tested according to ANSI C63.4:2003. The frequency spectrum from 150kHz to 30MHz was investigated.

The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

6.2 EUT Setup

The conducted emission tests were performed using the setup accordance with the ANSI C63.4:2003, The specification used in this report was the FCC Part15 Subpart B Section 15.107 limits.



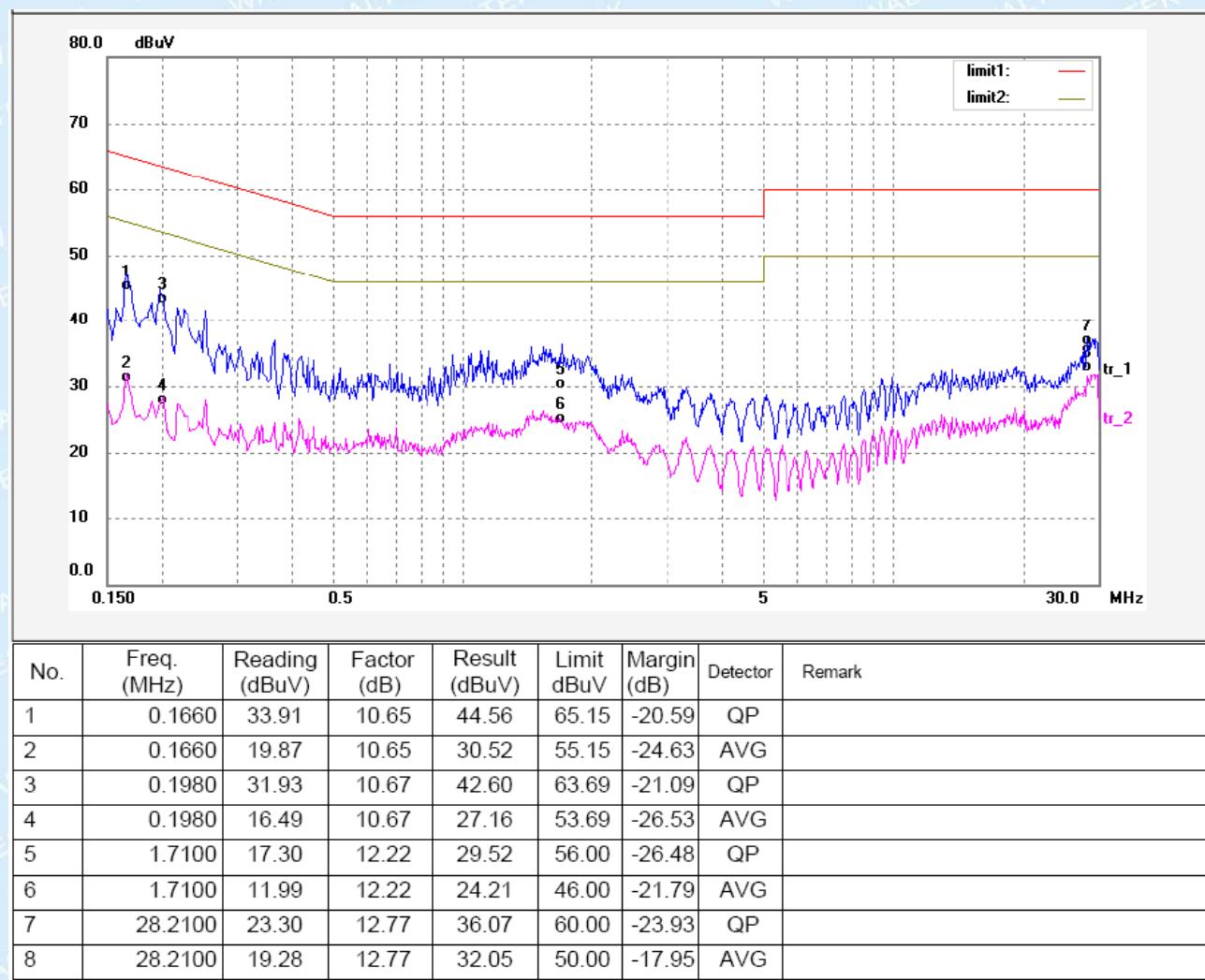
The EUT was placed on the test table in shielding room.

6.3 Conducted Emission Test Result

An initial pre-scan was performed on the live and neutral lines.

Refer to the spectrum analyzer data chart on the following pages.

Live line:

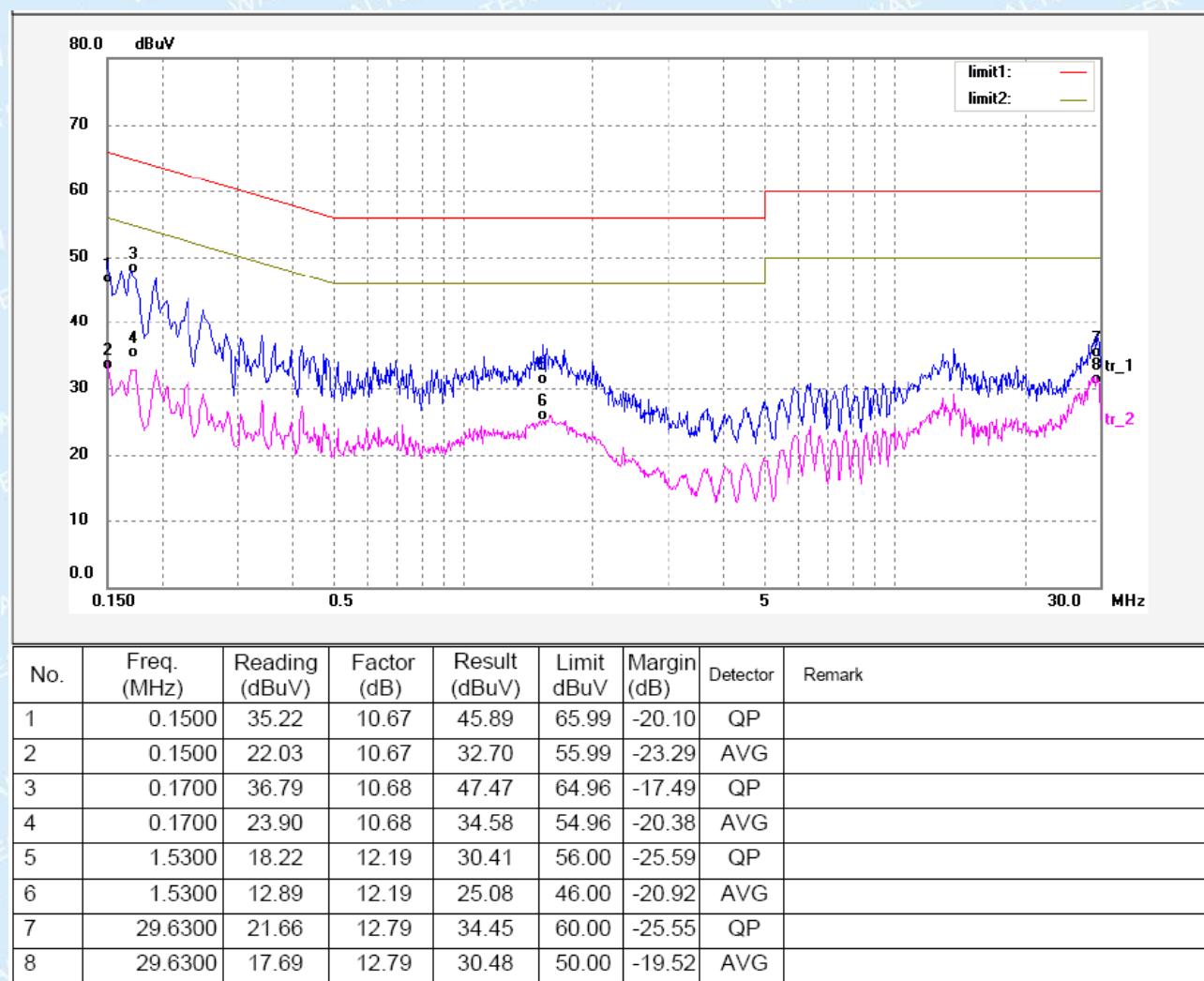


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Neutral line:

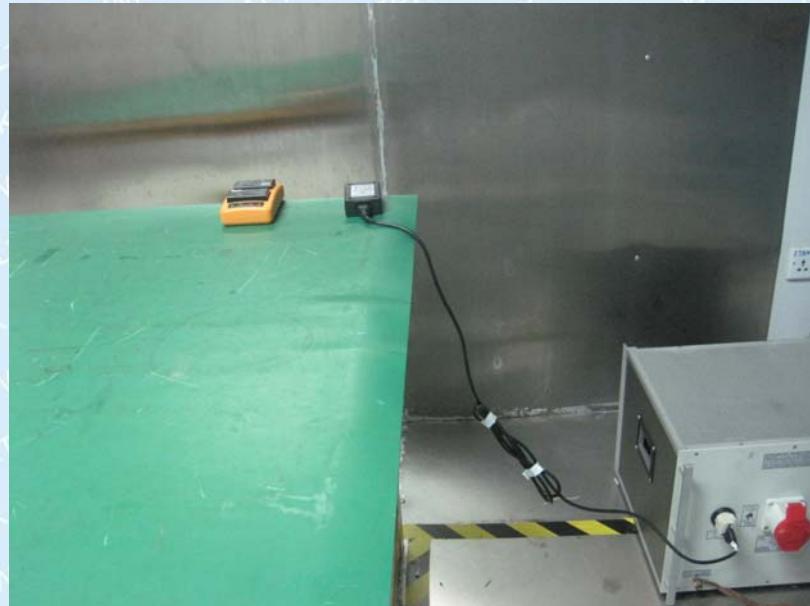


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6.4 Photograph – Conducted Emission Test Setup



7 Radiation Emission Data

Test Requirement:	FCC Part 15 Subpart B Section 15.109
Test Method:	ANSI C63.4:2003
Test Result:	PASS
Frequency Range:	30MHz to 2GHz
Measurement Distance:	3m
Limit:	40.0 dB μ V/m between 30MHz & 88MHz 43.5 dB μ V/m between 88MHz & 216MHz 46.0 dB μ V/m between 216MHz & 960MHz 54.0 dB μ V/m above 960MHz 74.0 dB μ V/m between 1GHz ~ 2GHz for peak 54.0 dB μ V/m between 1GHz ~ 2GHz for AVG Peak for pre-scan (120kHz resolution bandwidth)
Detector:	

7.1 E.U.T Operation:

Operating Environment:

Temperature: 25.5 °C
Humidity: 51 % RH
Atmospheric Pressure: 1012 mbar

EUT Operation:

The pre-test for GNSS was performed in working mode and communication with PC mode, for each mode, the test was performed in GNSS powered by Li-ion battery and by 12V lead-acid cell mode. The worst mode is communication with PC and powered by 12V lead-acid cell mode. So the data show is that mode's only.

The Charger was tested in charging mode.

7.2 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at Waltek EMC Lab is ± 5.03 dB.

7.3 EUT Setup

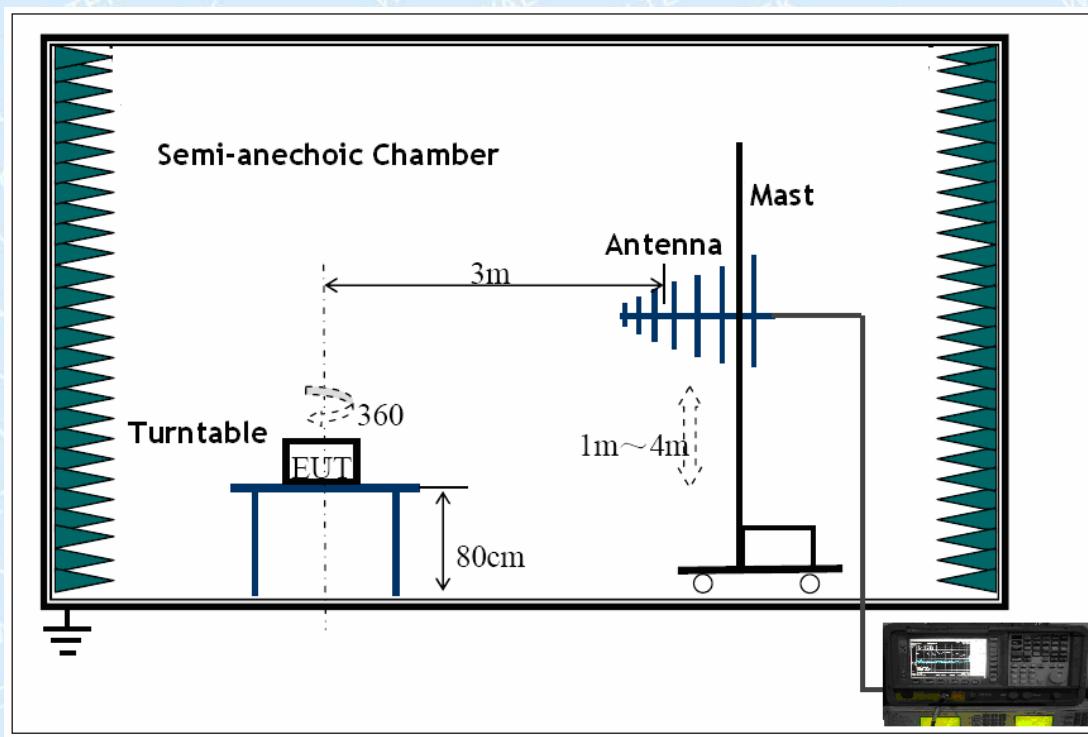
The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site,

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using the setup accordance with the ANSI C63.4:2003, The specification used in this report was the FCC Part 15 Subpart B Section 15.109limits.



The EUT was placed on the test table in shielding room.

7.4 Spectrum Analyzer Setup

According to FCC Part15 Subpart B Rules, the GNSS was tested from 30MHz to 26.5GHz and the Charger was tested from 30MHz to 1000MHz.

Below 1GHz

Start Frequency	30 MHz
Stop Frequency	1000MHz
Sweep Speed	Auto
IF Bandwidth.....	120 KHz
Video Bandwidth.....	100KHz
Quasi-Peak Adapter Bandwidth	120 KHz
Quasi-Peak Adapter Mode	Normal
Resolution Bandwidth	100KHz

Above 1GHz

Start Frequency	1000 MHz
Stop Frequency	26.5GHz
Sweep Speed	Auto
IF Bandwidth.....	120 KHz
Video Bandwidth.....	3MHz
Quasi-Peak Adapter Bandwidth	120 KHz
Quasi-Peak Adapter Mode	Normal
Resolution Bandwidth	1MHz

7.5 Test Procedure

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

7.6 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit for Class B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{Class B Limit}$$

7.7 Summary of Test Results

According to the data in this section, the EUT complied with the FCC Part15 Subpart B Section 15.109 Rules.

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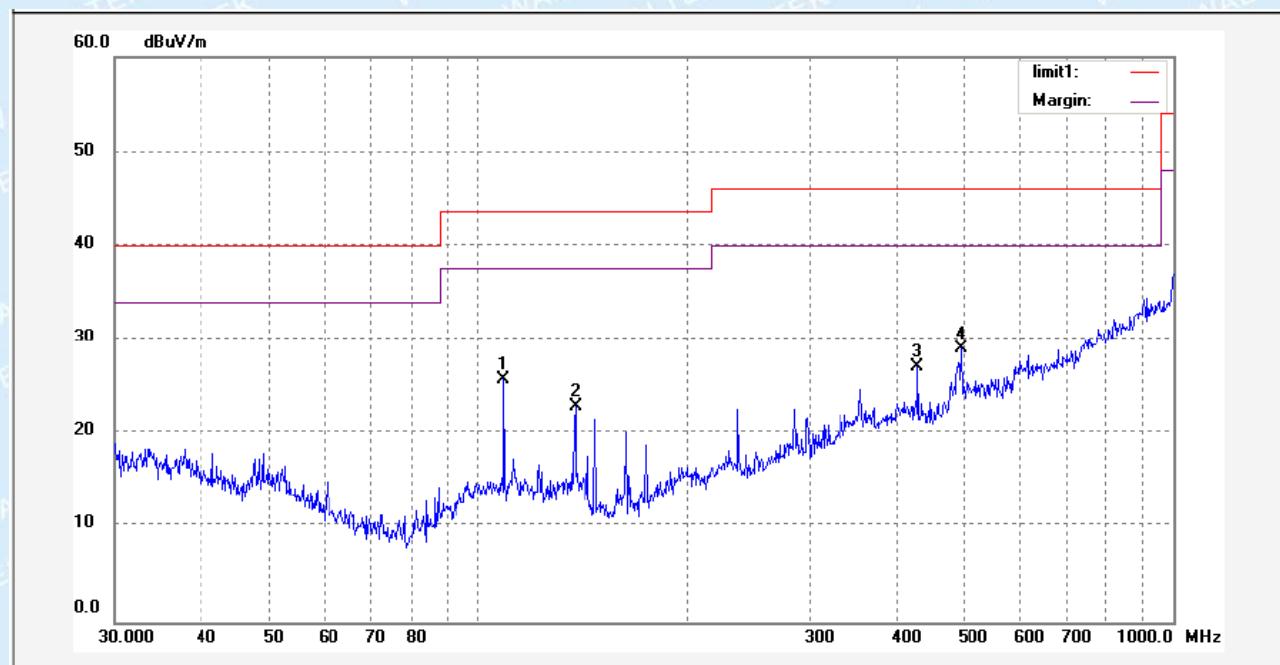
Reference No.: WT12064021-S-S-F

Measurement Data of GNSS

Test Mode: Communicating with PC and powered by 12V lead-acid cell

Frequency Range: 30MHz ~ 1GHz

Antenna polarization: Vertical



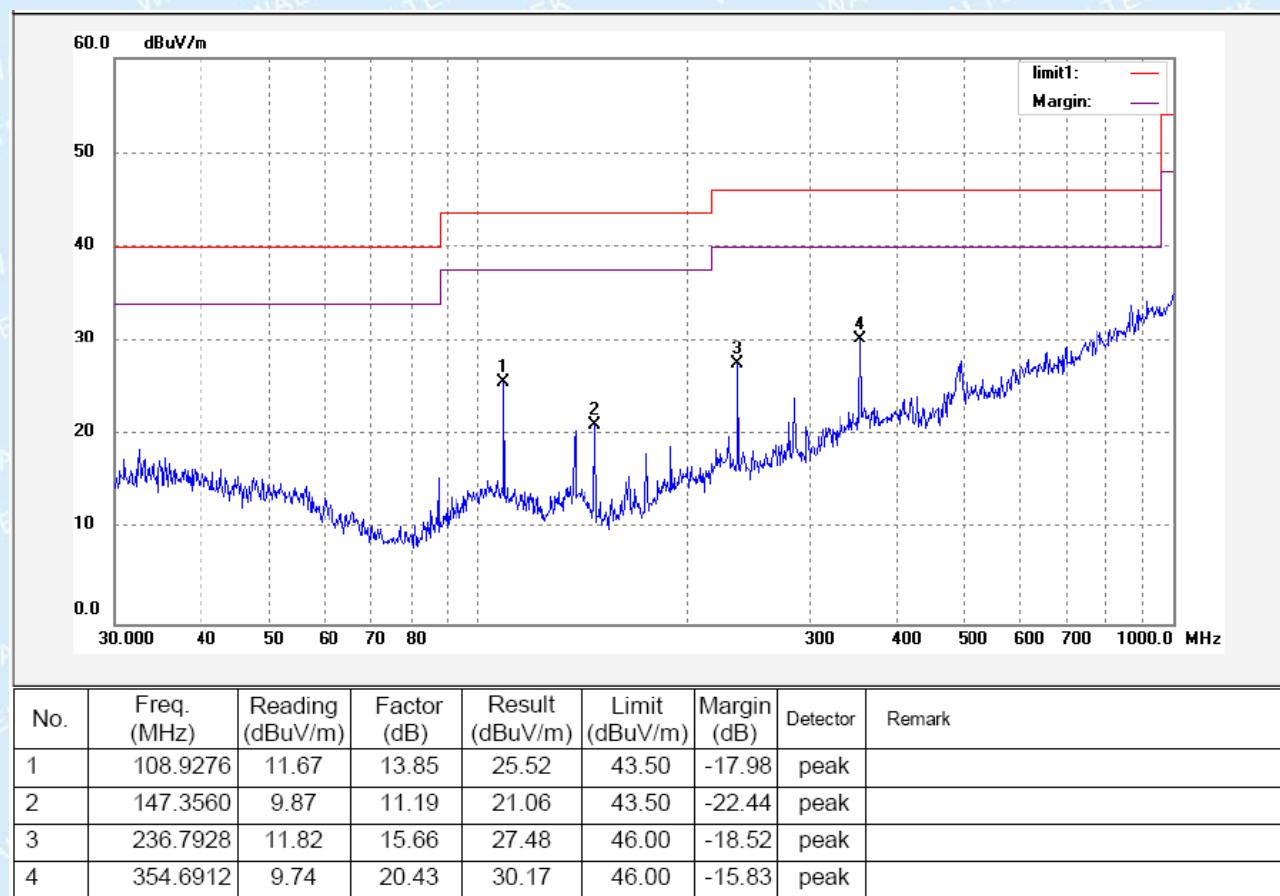
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	108.9276	11.81	13.85	25.66	43.50	-17.84	peak	
2	137.8400	11.06	11.86	22.92	43.50	-20.58	peak	
3	428.7960	6.58	20.50	27.08	46.00	-18.92	peak	
4	495.2379	4.62	24.38	29.00	46.00	-17.00	peak	

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Antenna polarization: Horizontal



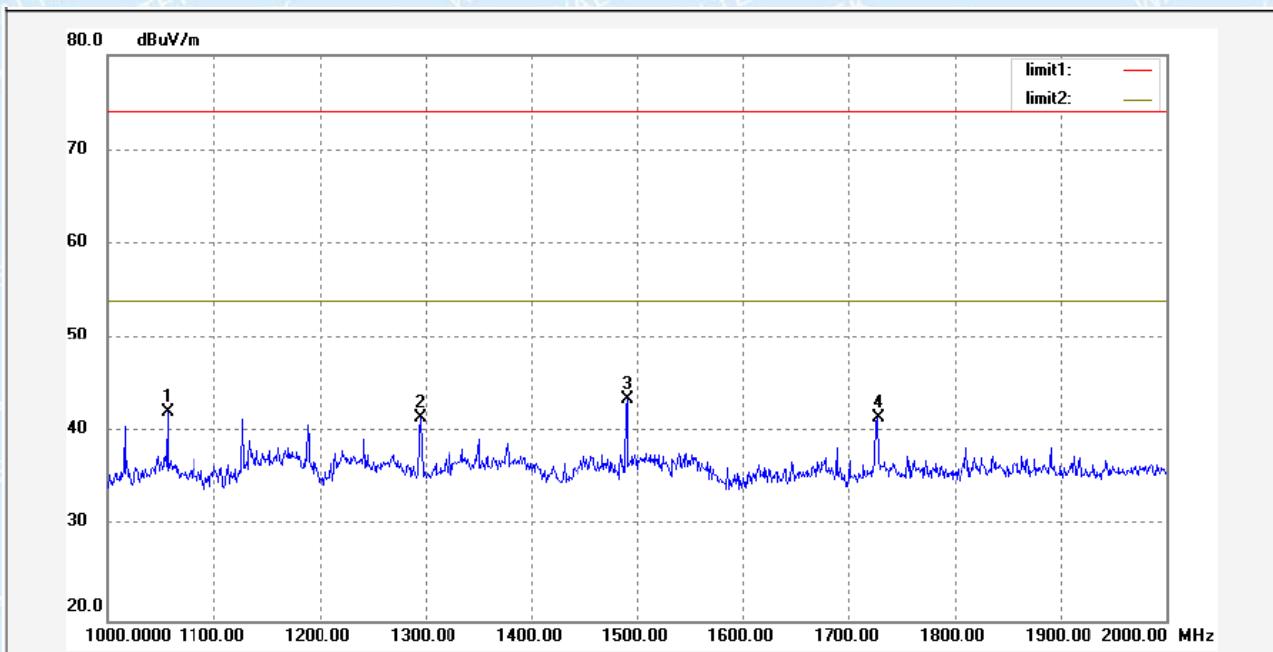
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Frequency Range: 1GHz ~ 2GHz

Antenna polarization: Vertical



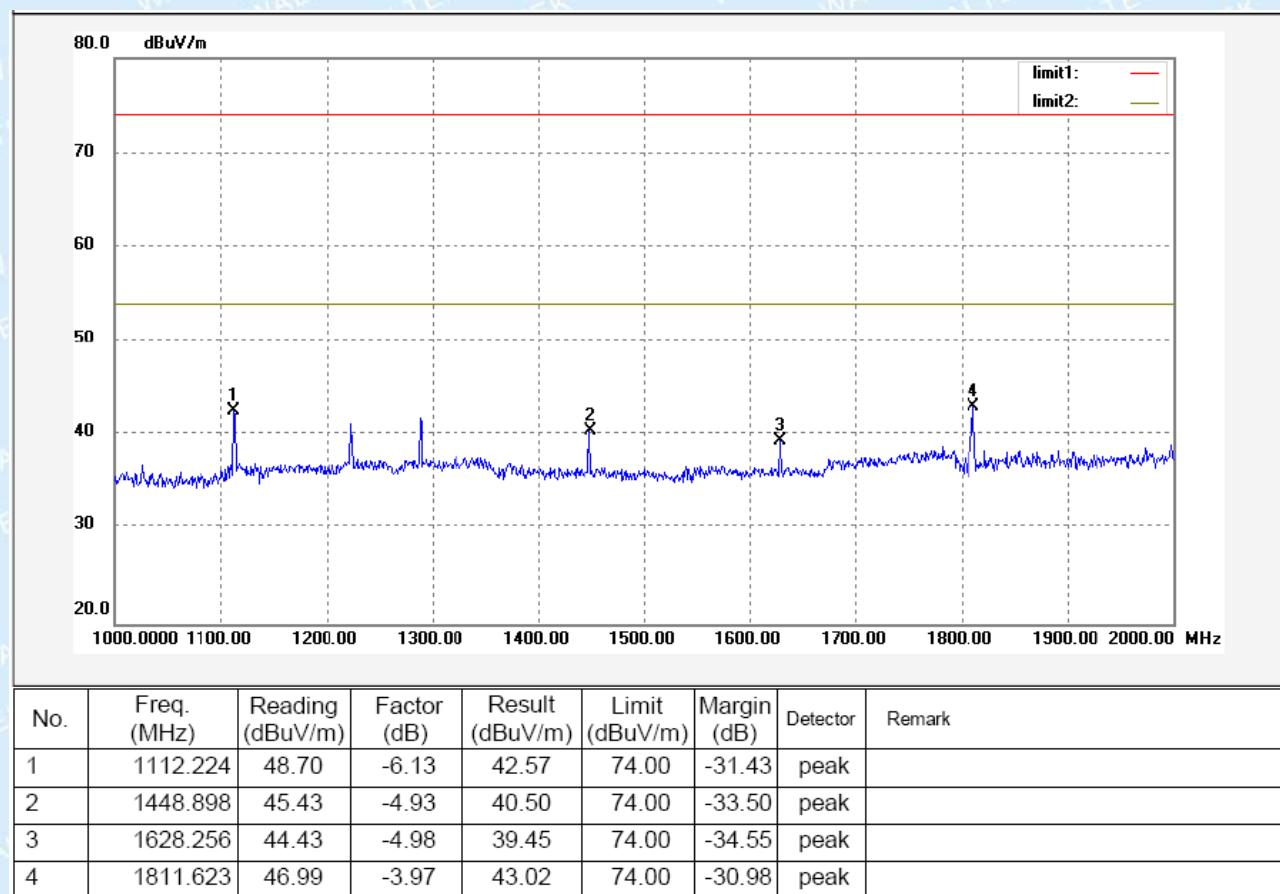
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	1056.112	48.82	-6.73	42.09	74.00	-31.91	peak	
2	1295.591	46.72	-5.14	41.58	74.00	-32.42	peak	
3	1490.982	48.53	-5.12	43.41	74.00	-30.59	peak	
4	1727.455	46.76	-5.28	41.48	74.00	-32.52	peak	

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Antenna polarization: Horizontal

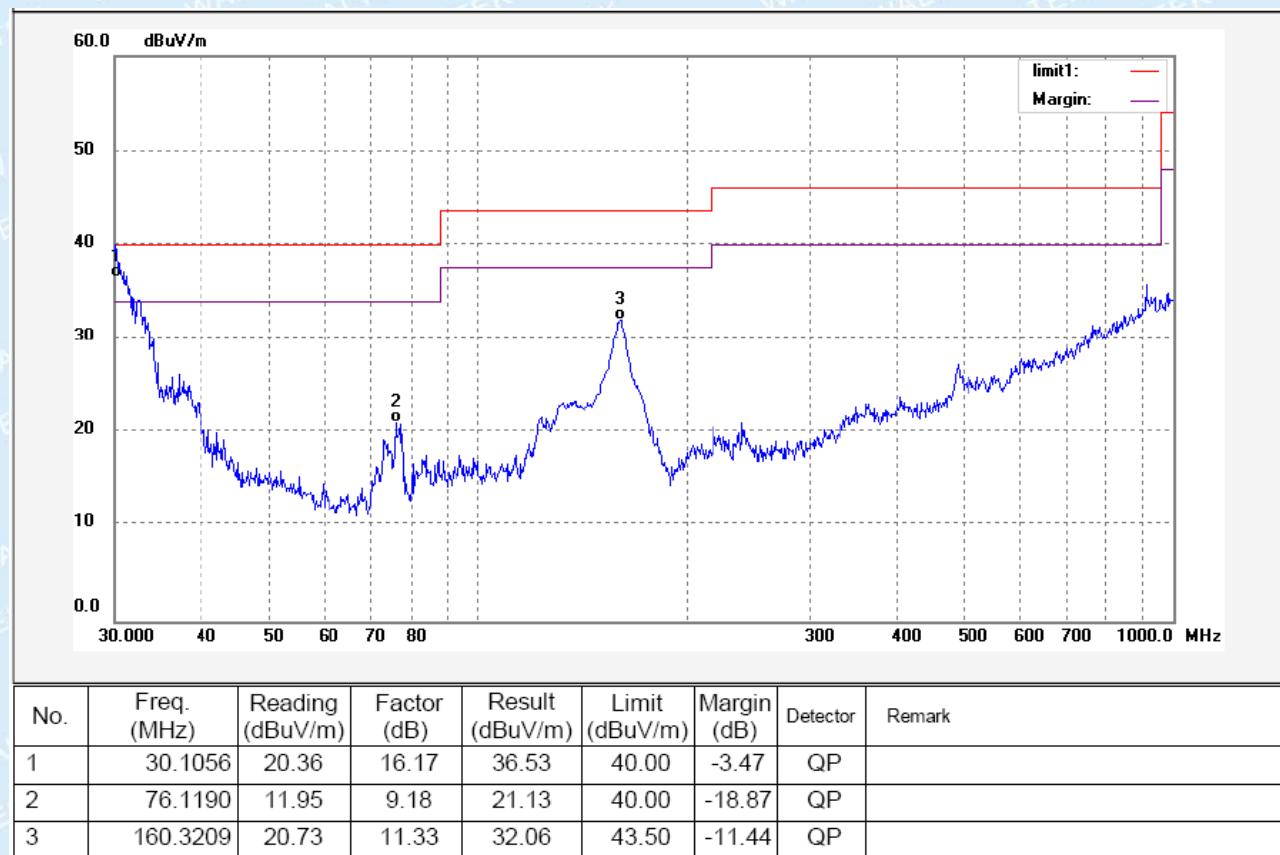


Remark: the frequency above 2GHz to 26.5GHz, the signal is lower than the nosie level of the spectrum, so the data won't showing in the test report.

Measurement Data of Charger

Test Mode: Charging mode

Antenna polarization: Vertical

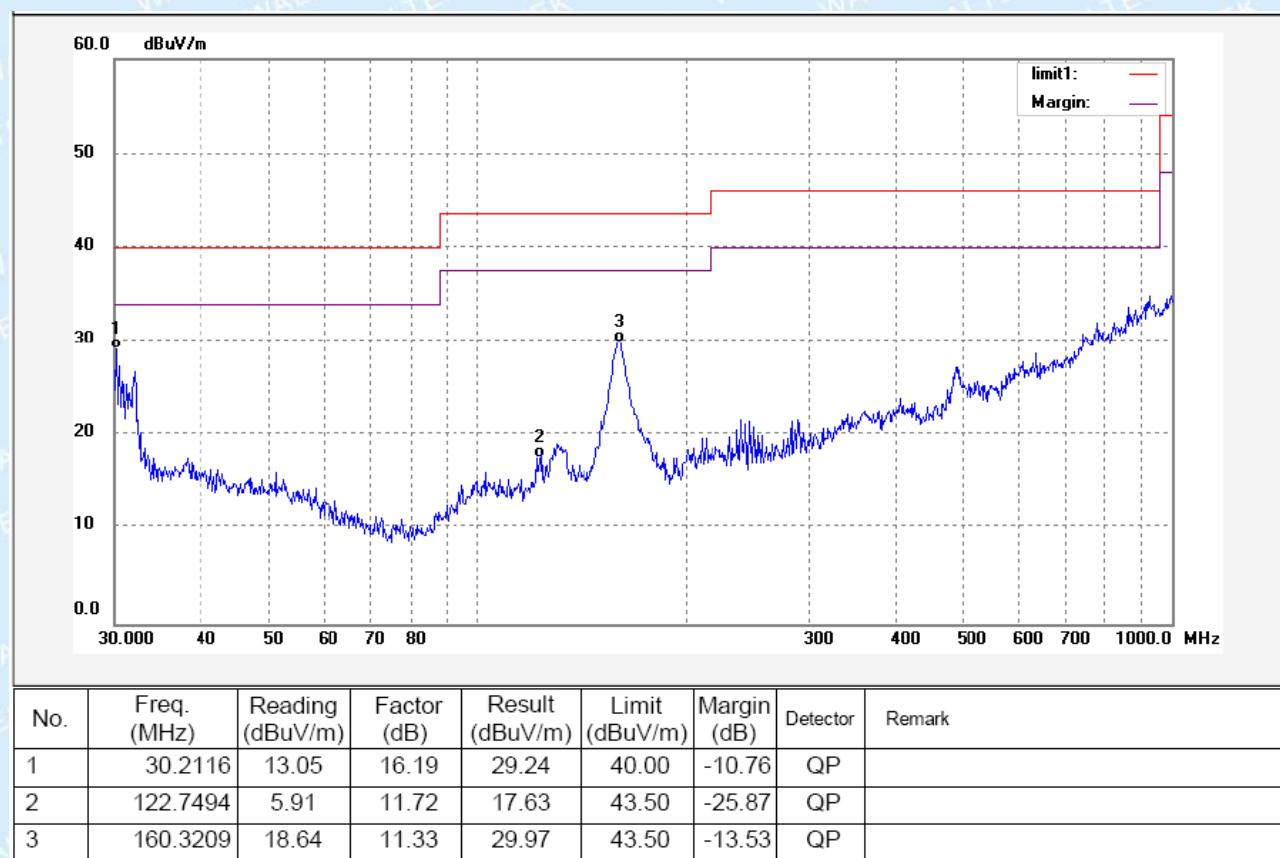


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Antenna polarization: Horizontal



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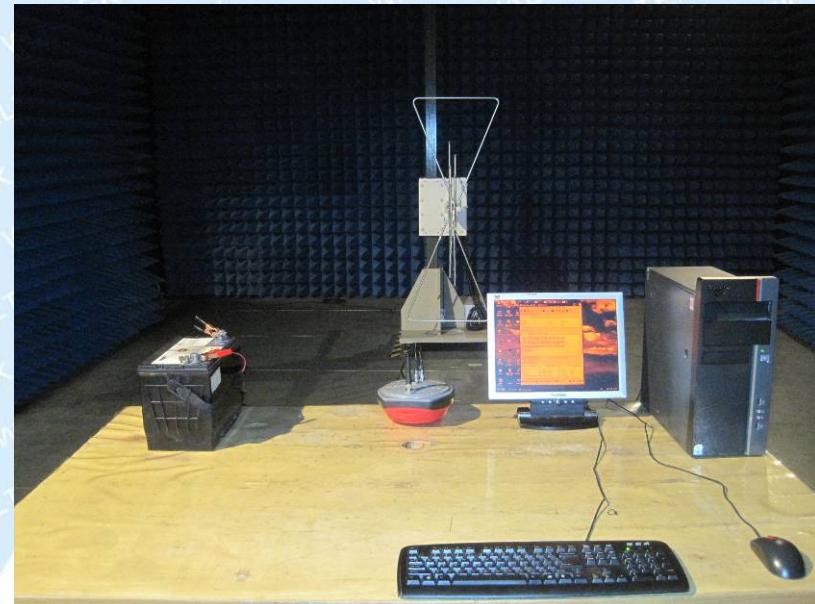
Reference No.: WT12064021-S-S-F

7.8 Photograph – Radiation Emission Test Setup

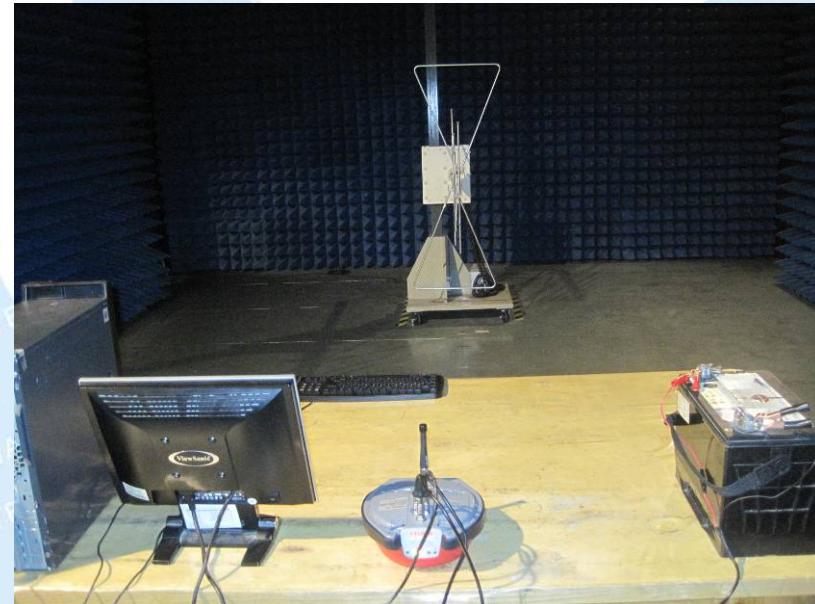
Test Setup for GNSS

Below 1GHz

Front View



Back View

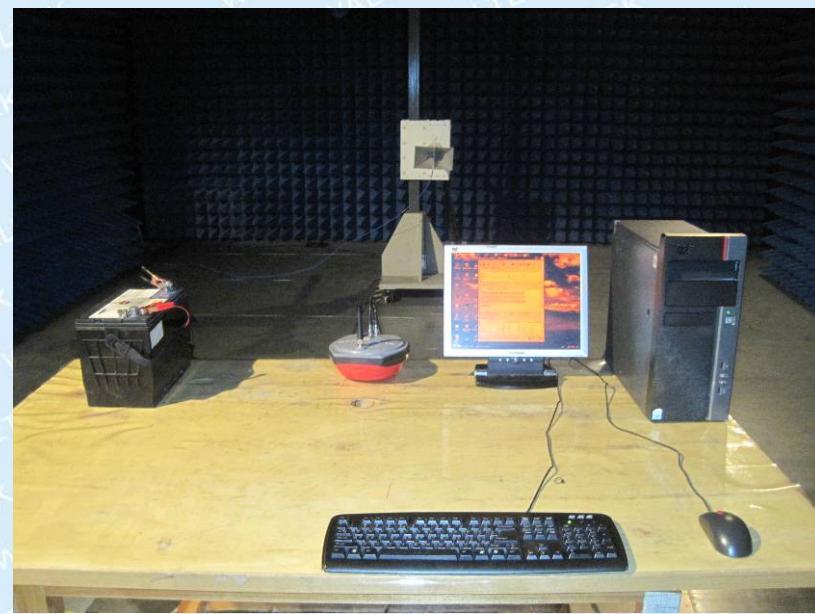


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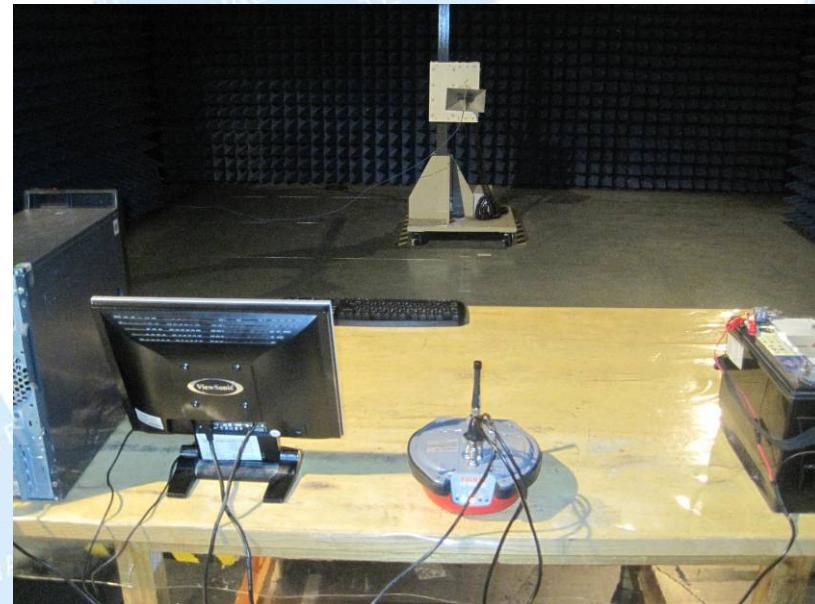
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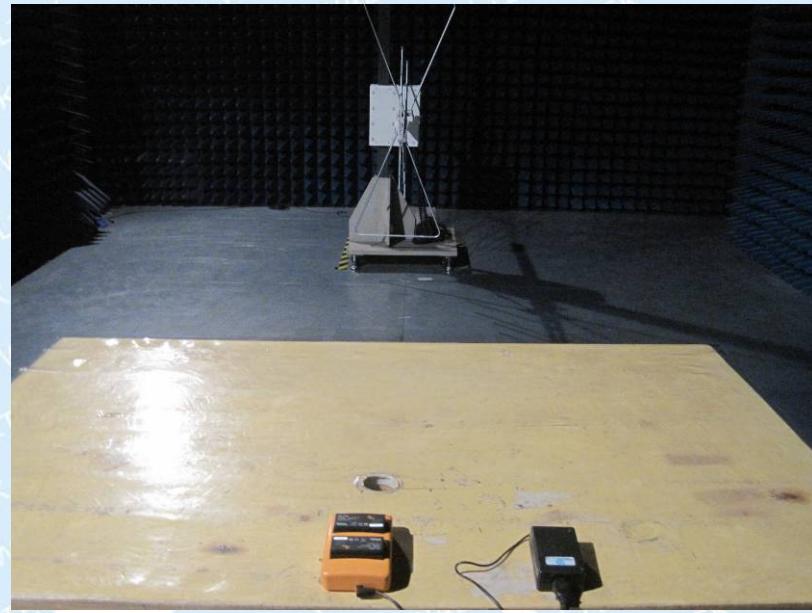
Reference No.: WT12064021-S-S-F

Above 1GHz
Front View



Back View



Test Setup for Charger

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8 Photographs - Constructional Details

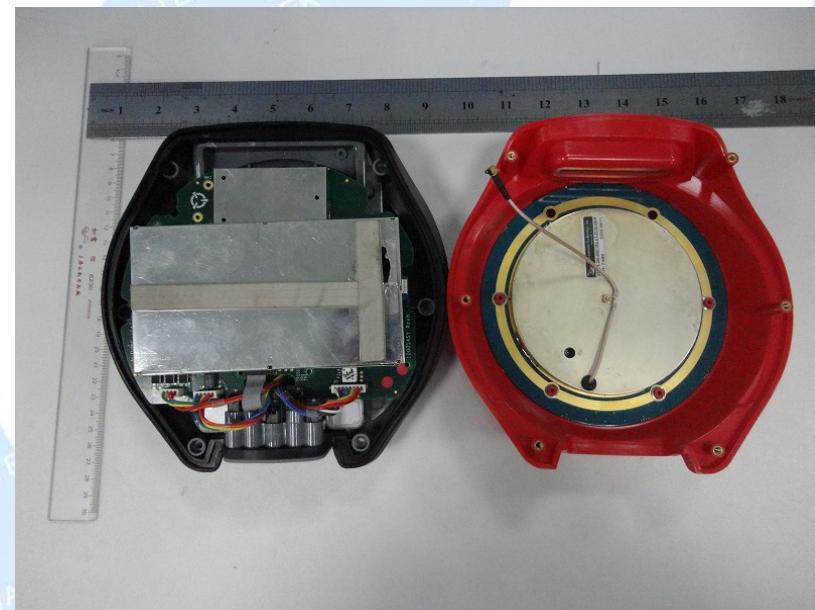
8.1 Product View

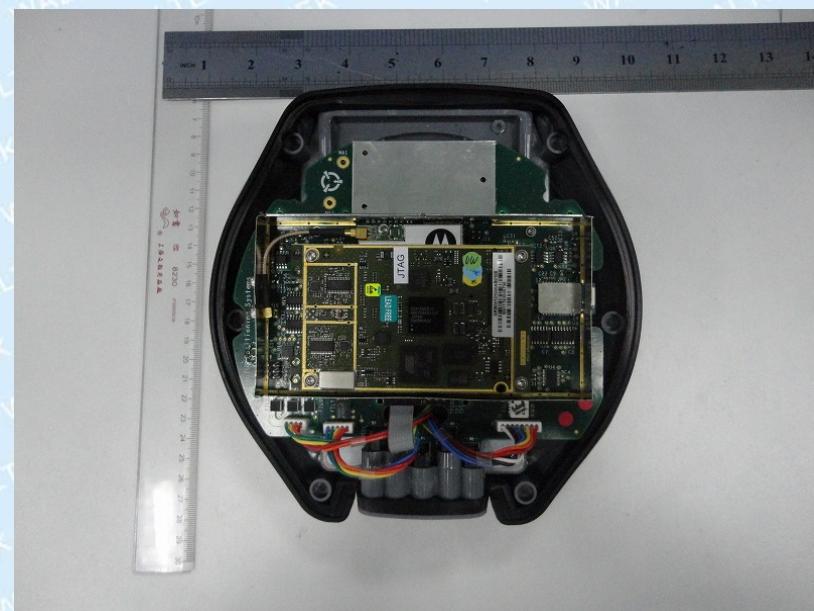


8.2 G3100-R1 - Appearance View

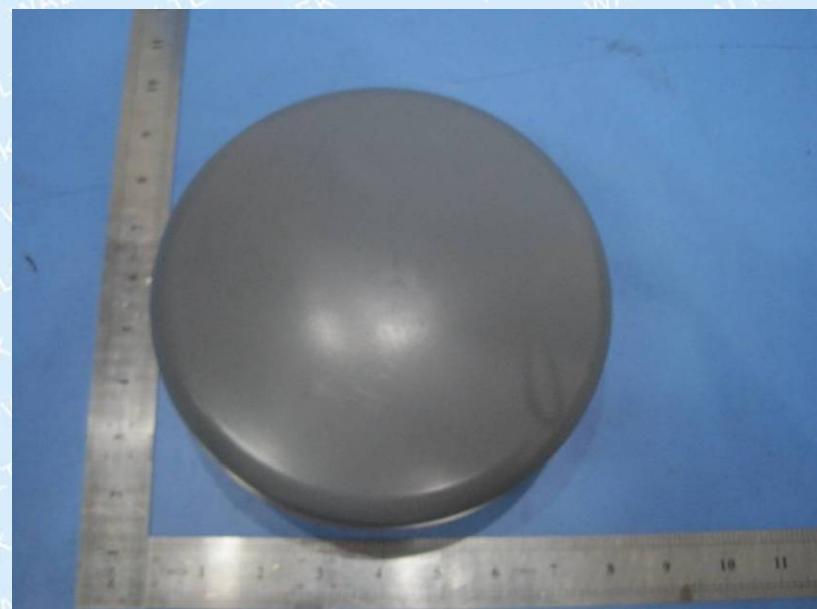


8.3 G3100-R1 – Open View(1)



8.4 G3100-R1 – Open View(2)**8.5 G3100-R1 – Open View(3)**

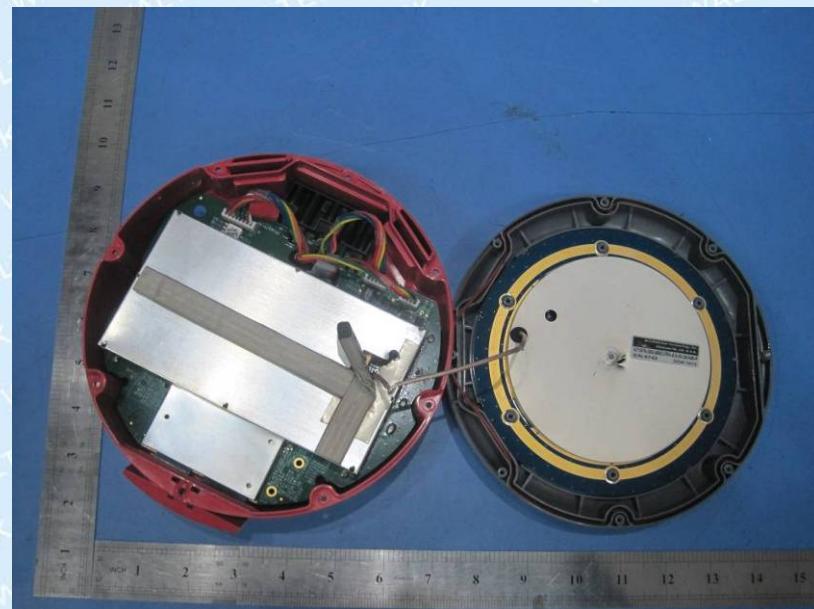
8.6 SMT888-3G - Appearance Front View



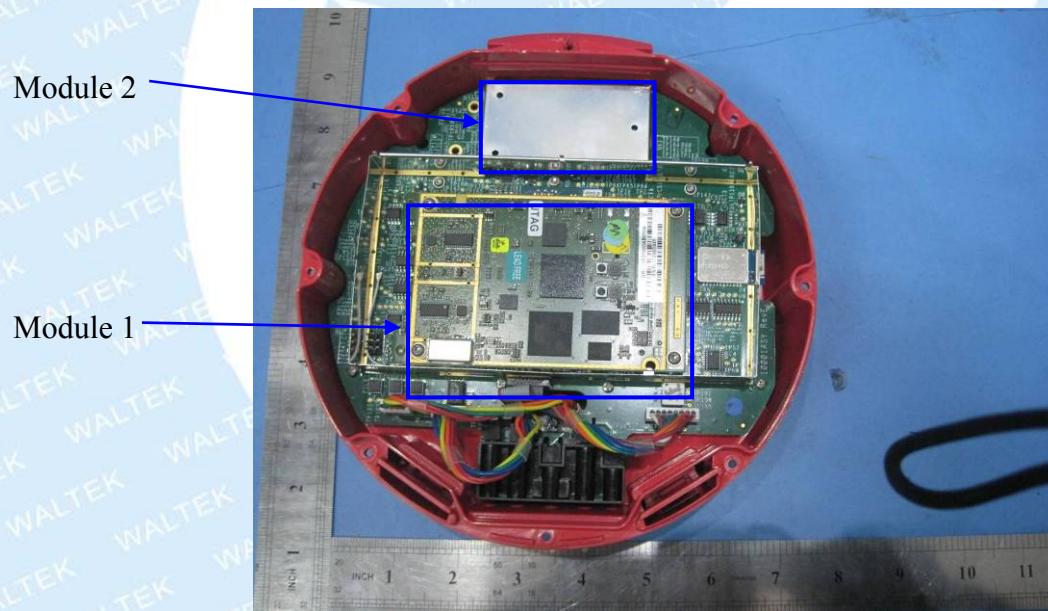
8.7 SMT888-3G - Appearance Back View



8.8 SMT888-3G – Open View(1)



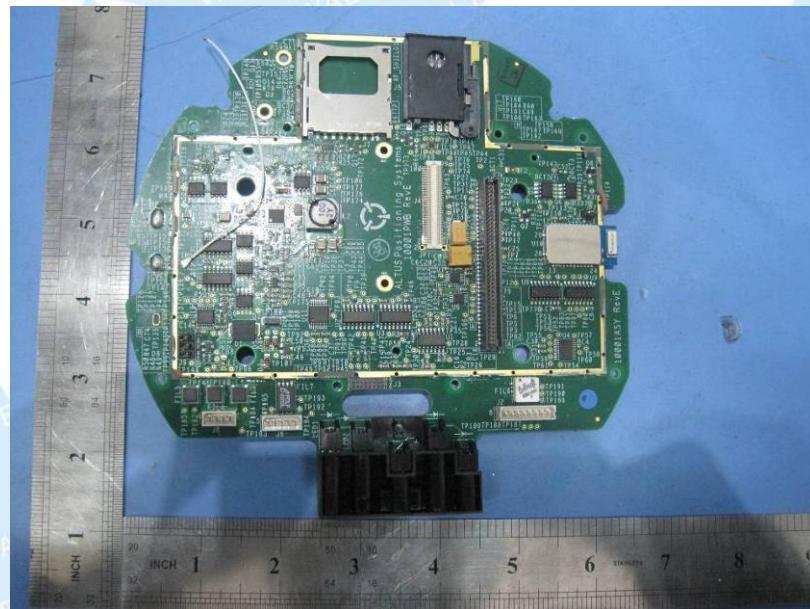
8.9 SMT888-3G – Open View(2)



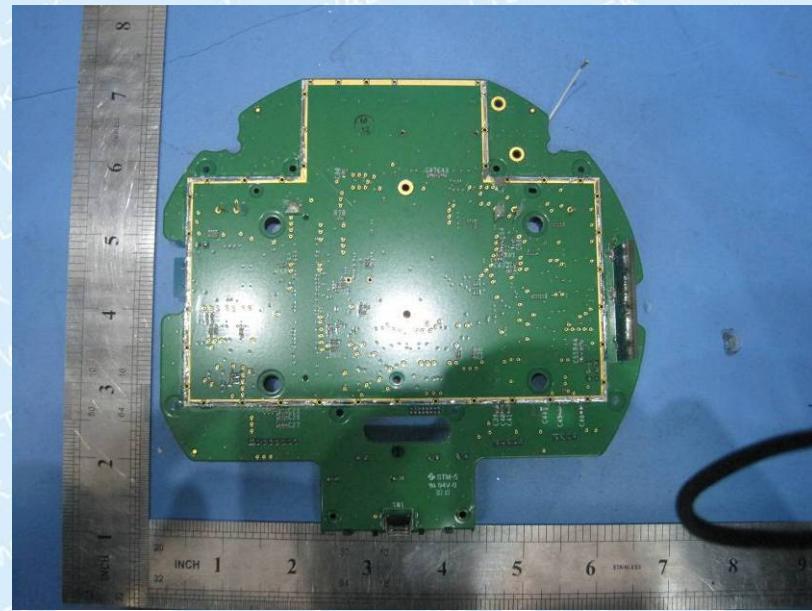
8.10 SMT888-3G – Open View(3)



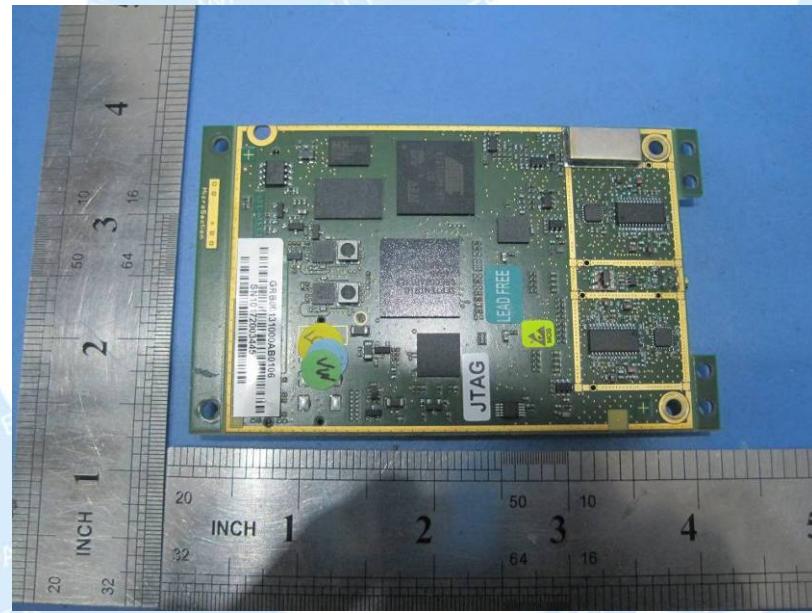
8.11 PCB 1 – Front View

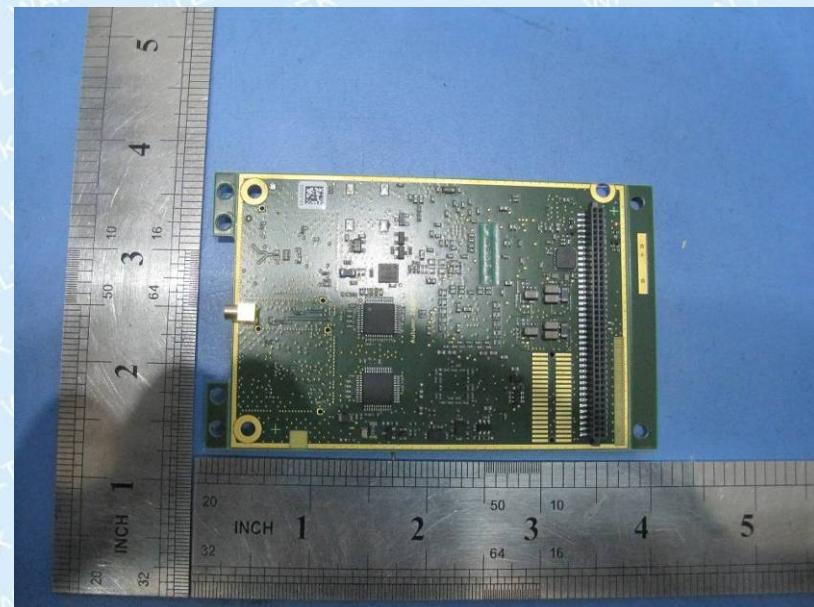


8.12 PCB 1 – Back View

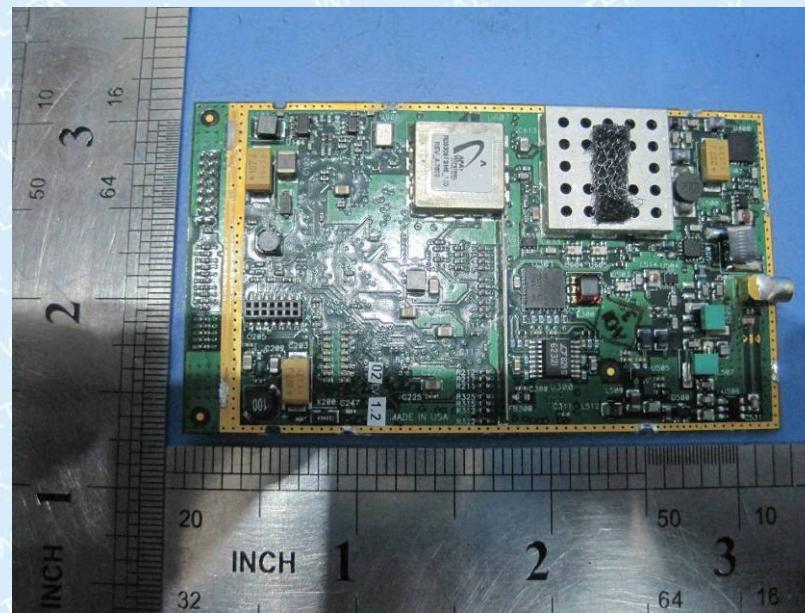


8.13 Module 1 – PCB Front View

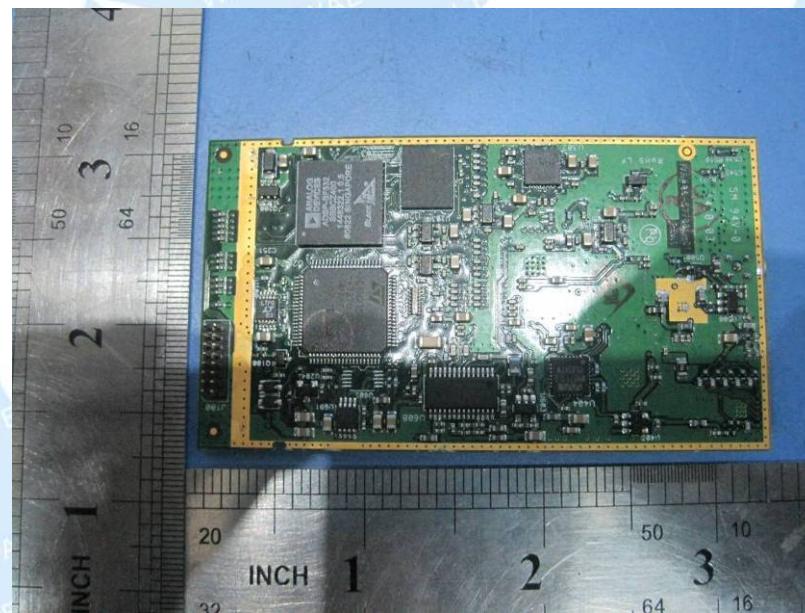


8.14 Module 1 – PCB Back View**8.15 Module 2 – Appearance View**

8.16 Module 2 – PCB Front View



8.17 Module 2 – PCB Back View



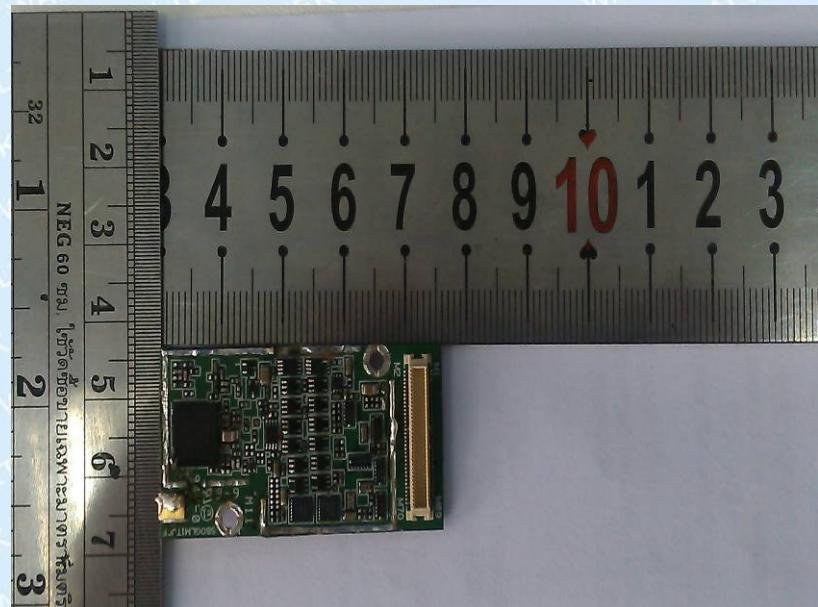
8.18 Module 3 – Appearance Front View



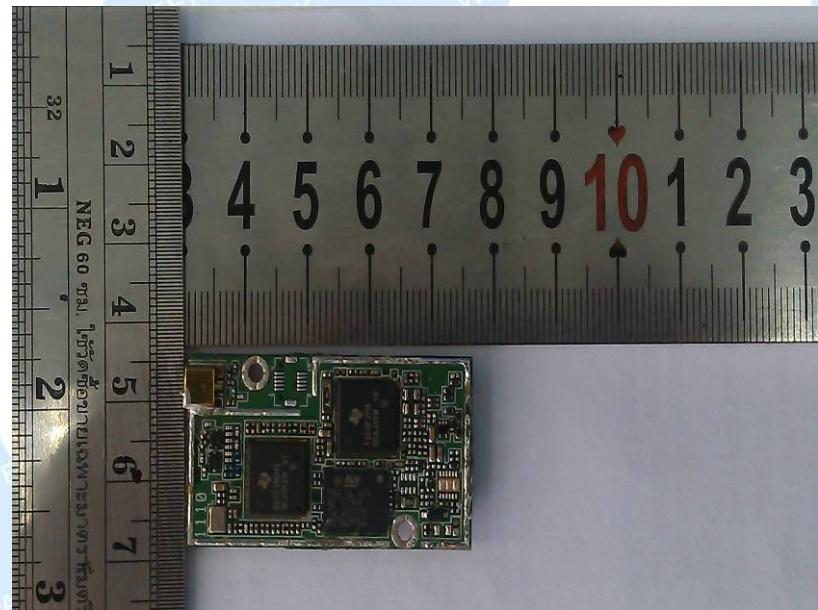
8.19 Module 3 – Appearance Back View

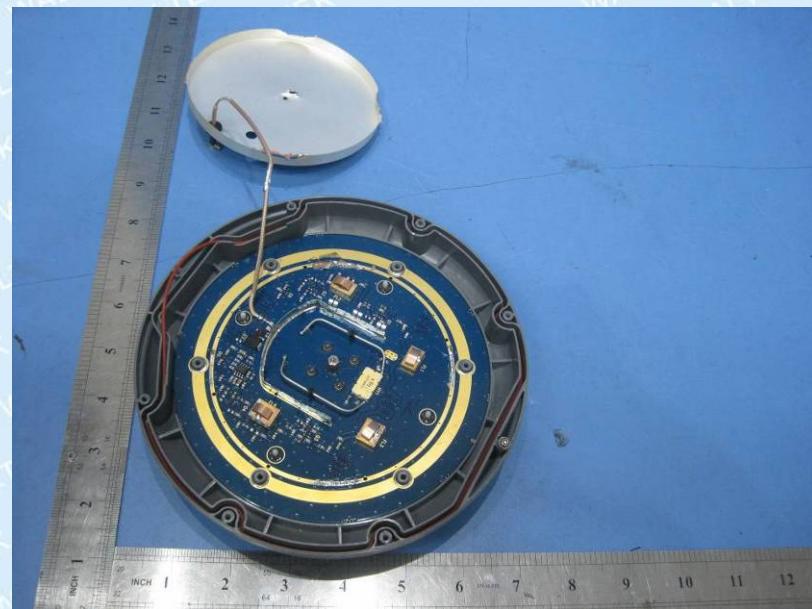


8.20 Module 3 – PCB Front View



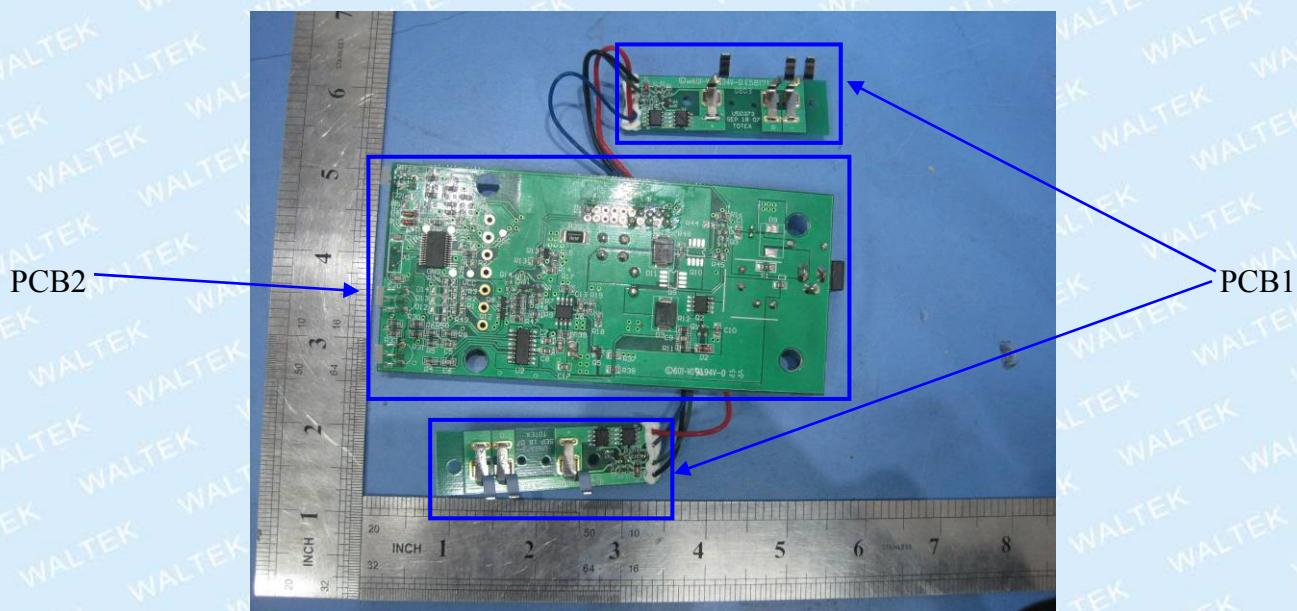
8.21 Module 3 – PCB Back View



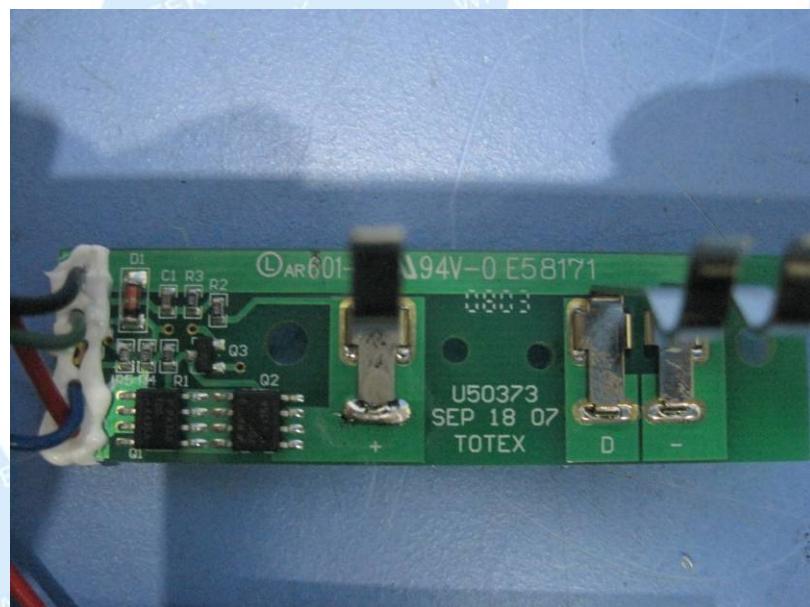
8.22 Bottom – PCB View**8.23 Charger – Appearance Front View**

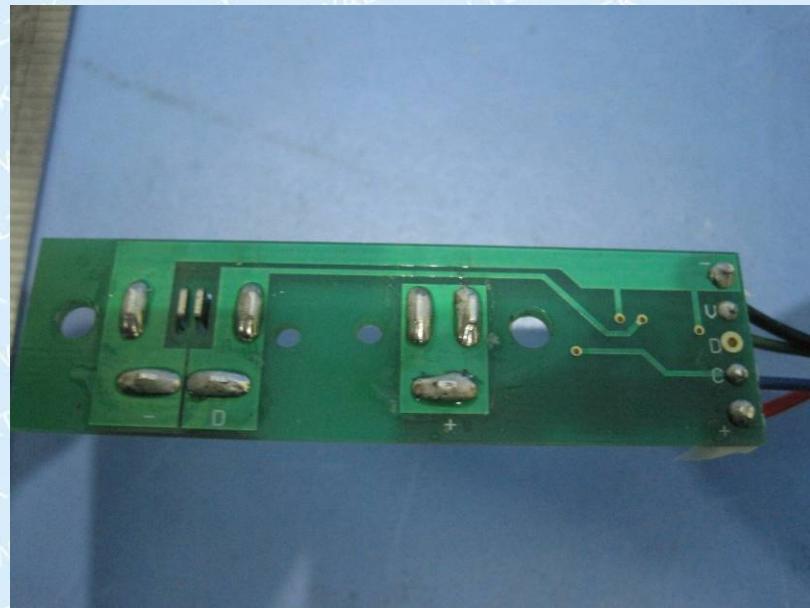
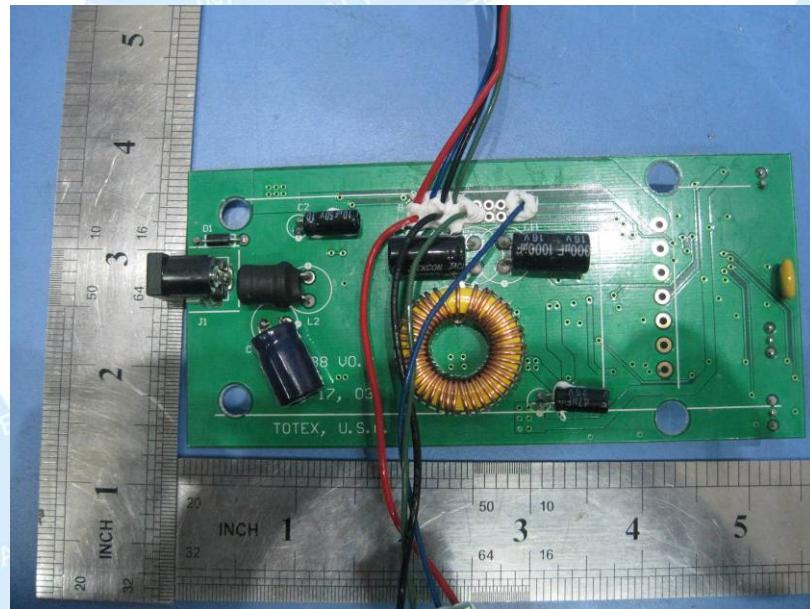
8.24 Charger – Appearance Back View**8.25 Charger – Open View**

8.26 Charger – PCB View

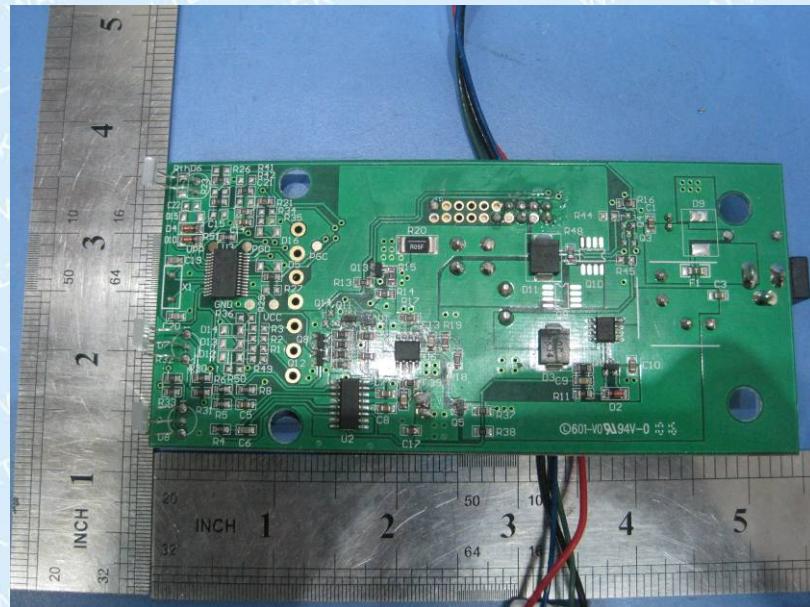


8.27 Charger – PCB1 Front View



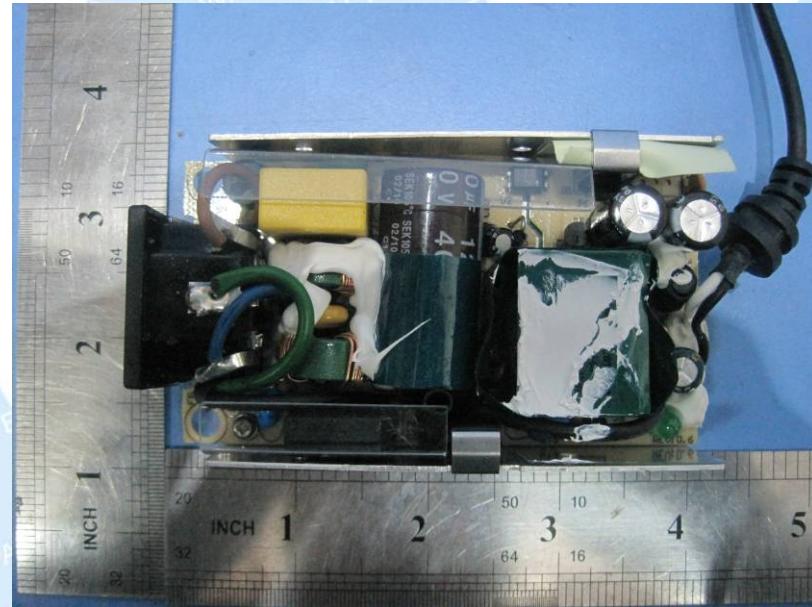
8.28 Charger – PCB1 Back View**8.29 Charger – PCB2 Front View**

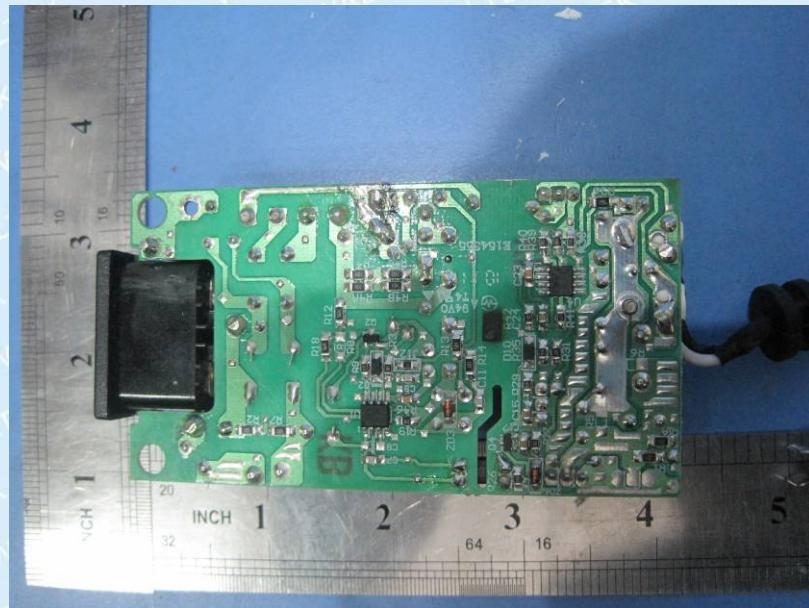
8.30 Charger – PCB2 Back View



8.31 Adapter – Appearance View



8.32 Adapter – Open View**8.33 Adapter – PCB Front View**

8.34 Adapter – PCB Back View

9 FCC Label

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:(1)this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation

The Label must not be a stick-on paper. The Label on these products must be permanently affixed to the product and readily visible at the time of purchase and must last the expected lifetime of the equipment not be readily detachable.

Proposed Label Location on EUT
EUT Top View/proposed FCC Label Location

