

FCC TEST REPORT

FCC ID : A7ASMT888-3G
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

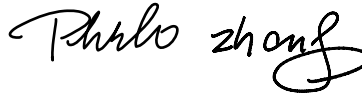
Date of Test : February 14 ~ February 17, 2012

Date of Issue : February 20, 2012

Test Engineer : Hunk yan / Engineer



Reviewed By : Philo zhong / Manager



Test Result	: PASS
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Prepared By:

Waltek Services (Shenzhen) Co., Ltd.

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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.

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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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
Operation Frequency :
Others Module :The EUT has the following module,and the modules have passed the FCC ID,for more details of the modules,refer to the following FCC ID corresponding report.
Bluetooth Module :FCC ID:POOWML-C40.
Standard :FCC Rule Part:Subpart C Part 15.247
Quad-Band GPRS Module :FCCID:PY7BC051021.
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 customer requested FCC tests for a GNSS. The standards used were FCC Part 15B 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	MY45114943	W2008001	9k-26.5GHz	Aug.2, 2011	Aug.1, 2012	±1dB
Trilog Broadband Antenne 30-3000 MHz	SCHWARZBECK MESS-ELEKTROM/ VULB9163	336	W2008002	30-3000 MHz	Aug.2, 2011	Aug.1, 2012	±1dB
Broad-band Horn Antenna 1-18 GHz	SCHWARZBECK MESS-ELEKTROM/ BBHA9120D	667	W2008003	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	W2008004	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	SUNSP0/ SP-14C	-	-	-	N/A	N/A	-
Test Receiver	ROHDE&SCHWARZ/ ESPI	101155	W2005001	9k-3GHz	Aug.2, 2011	Aug.1, 2012	±1dB
Two-Line V-Network	ROHDE&SCHWARZ/ ENV216	100115	W2005002	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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Reference No.: WT12020924-S-S-F

6 Conducted Emission Data

Test Requirement:	FCC Part 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:

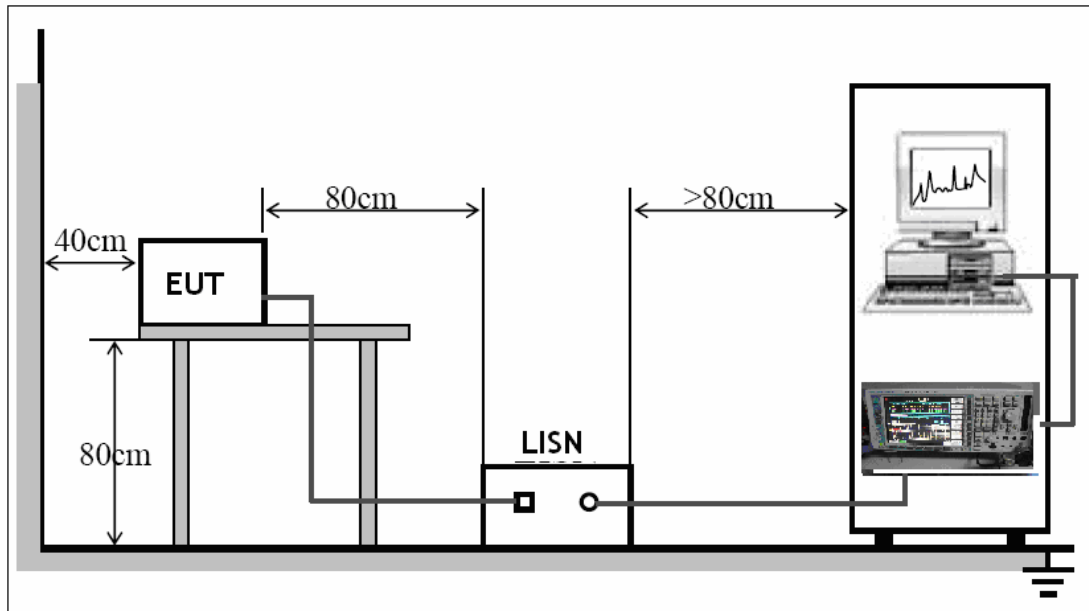
This test is not applicable for GNSS, and the compliance test for charger was performed in charging mode.

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 B 15.107 limits.

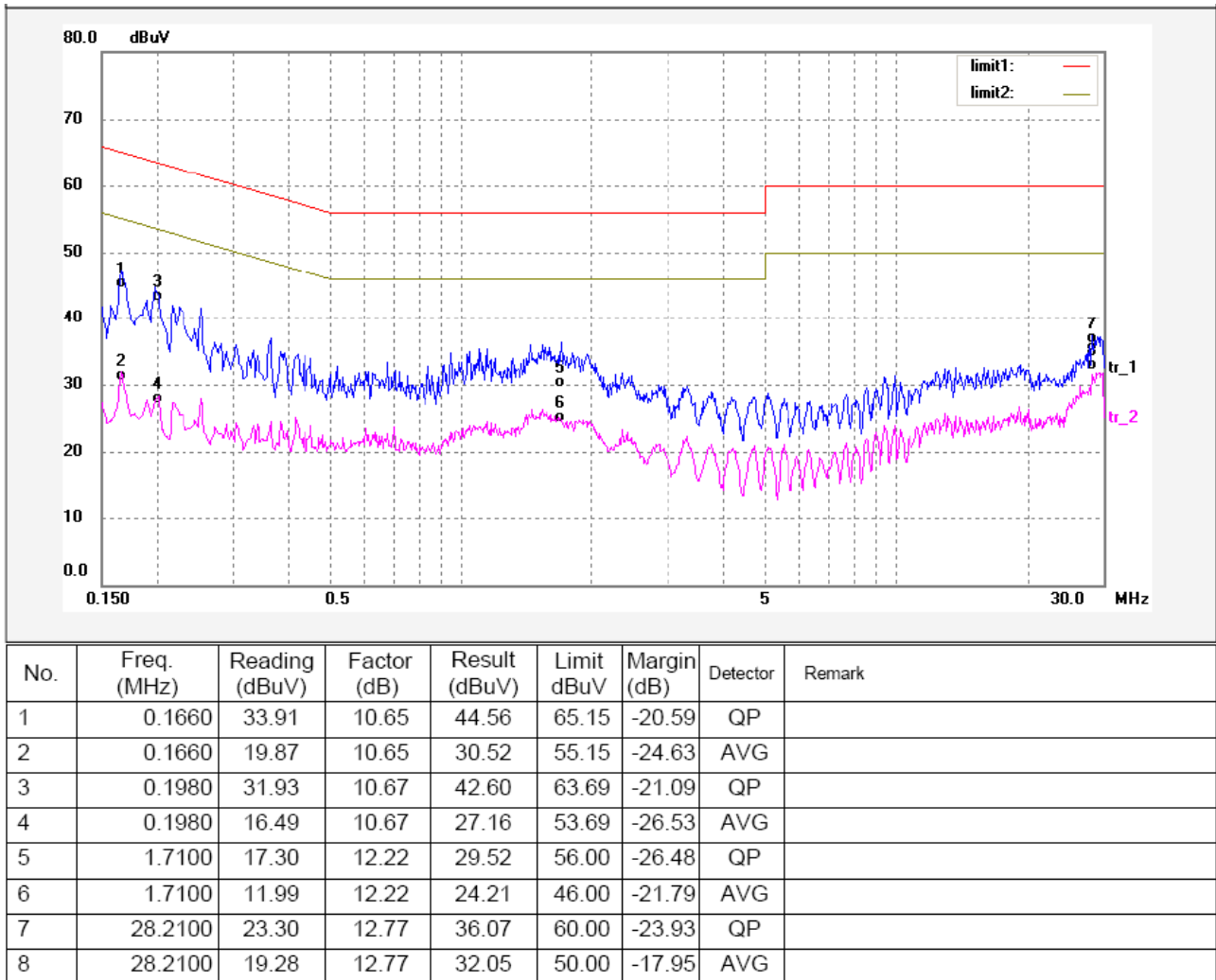


The EUT was placed on the test table in shielding room

6.3 Conducted Emission Test Result

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

Live line:

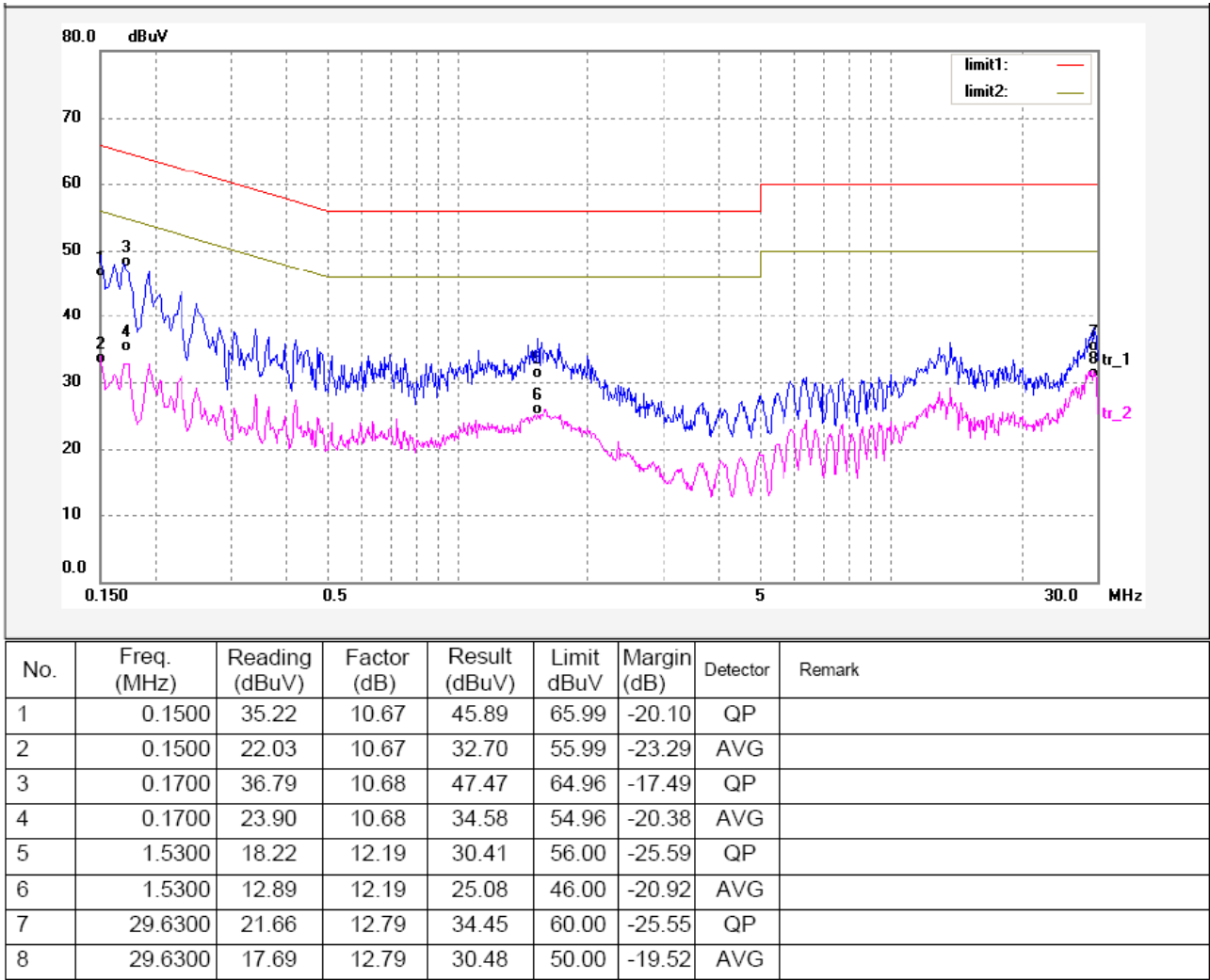


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Neutral line:



6.4 Photograph – Conducted Emission Test Setup



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Reference No.: WT12020924-S-S-F

7 Radiation Emission Data

Test Requirement:	FCC Part15.109
Test Method:	ANSI C63.4:2003
Test Result:	PASS
Frequency Range:	30MHz to 2GHz
Measurement Distance:	3m
Class:	Class B
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
Detector:	Peak for pre-scan (120kHz resolution bandwidth)

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.

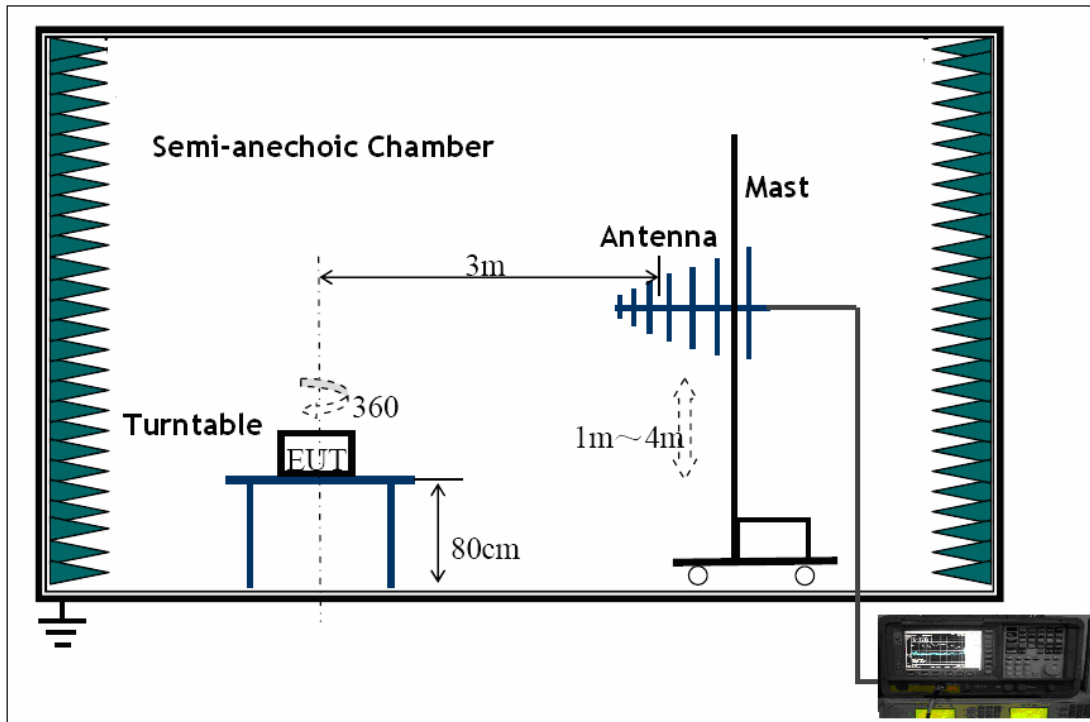
7.2 Measurement Uncertainty

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, using the setup accordance with the ANSI C63.4:2003, The specification used in this report was the FCC Part15.109limits.



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

7.4 Spectrum Analyzer Setup

According to FCC Part15 B Rules, the GNSS was tested from 30MHz to 2000MHz 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

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Above 1GHz

Start Frequency 1000 MHz
 Stop Frequency 2000MHz
 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 B standards.

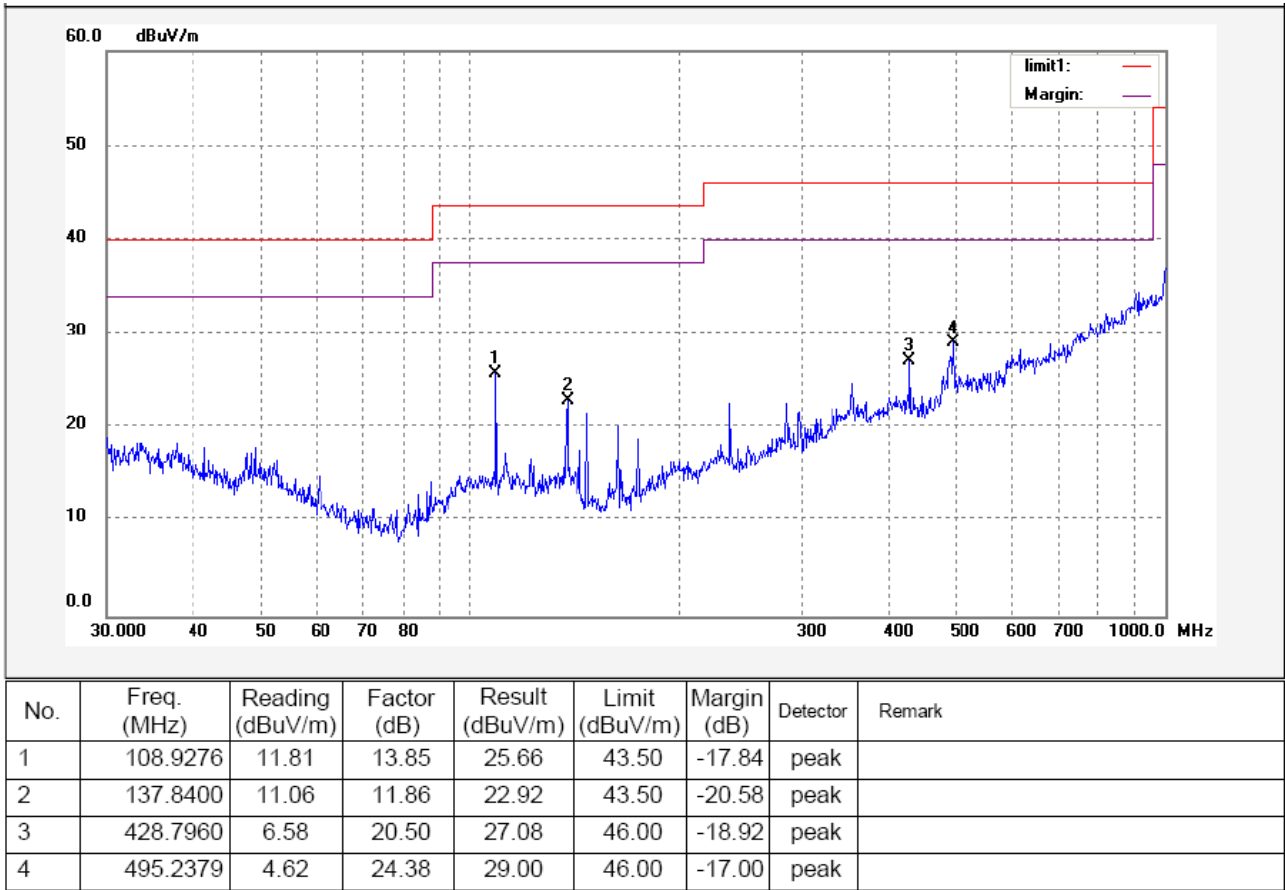
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Measurement Data of GNSS

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

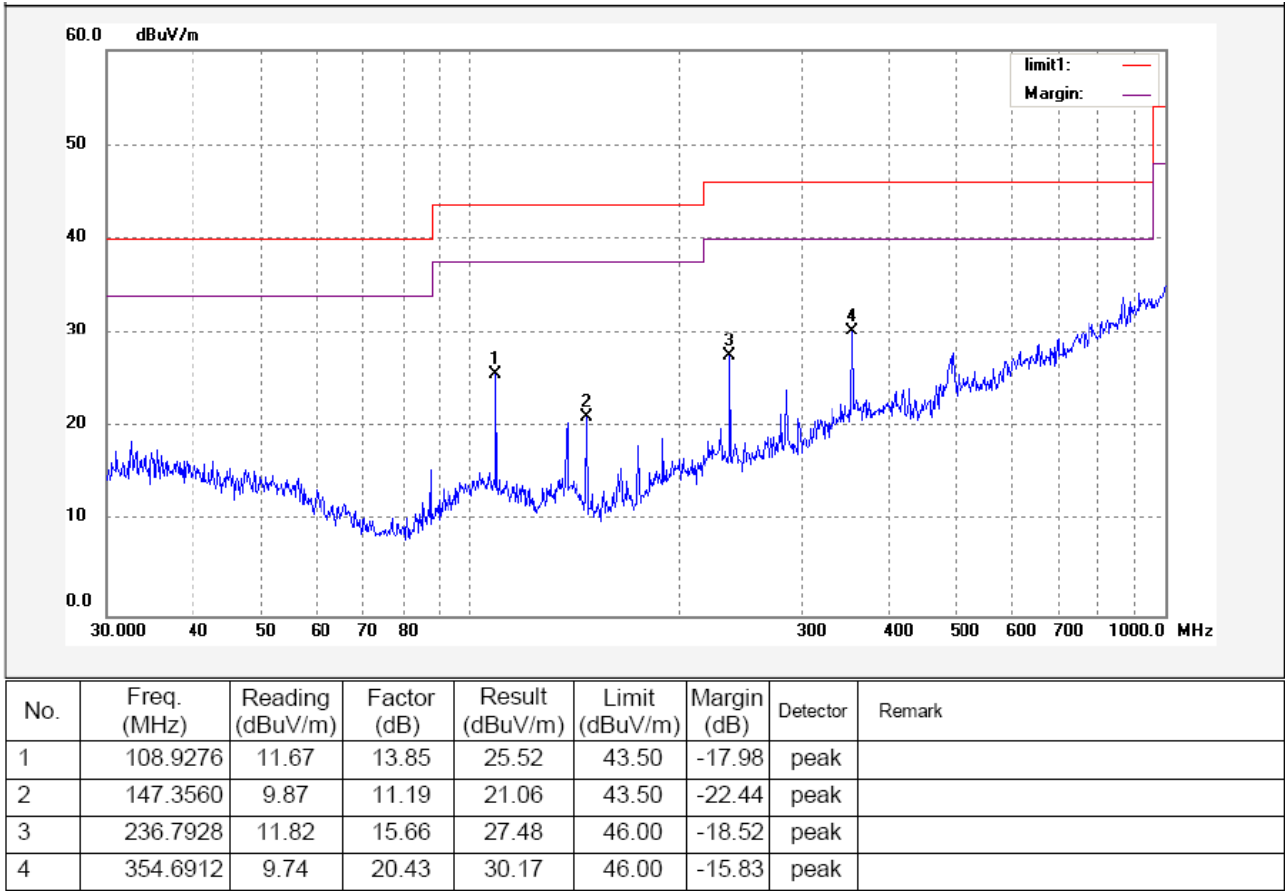
Frequency Range: 30MHz ~ 1GHz

Antenna polarization: Vertical



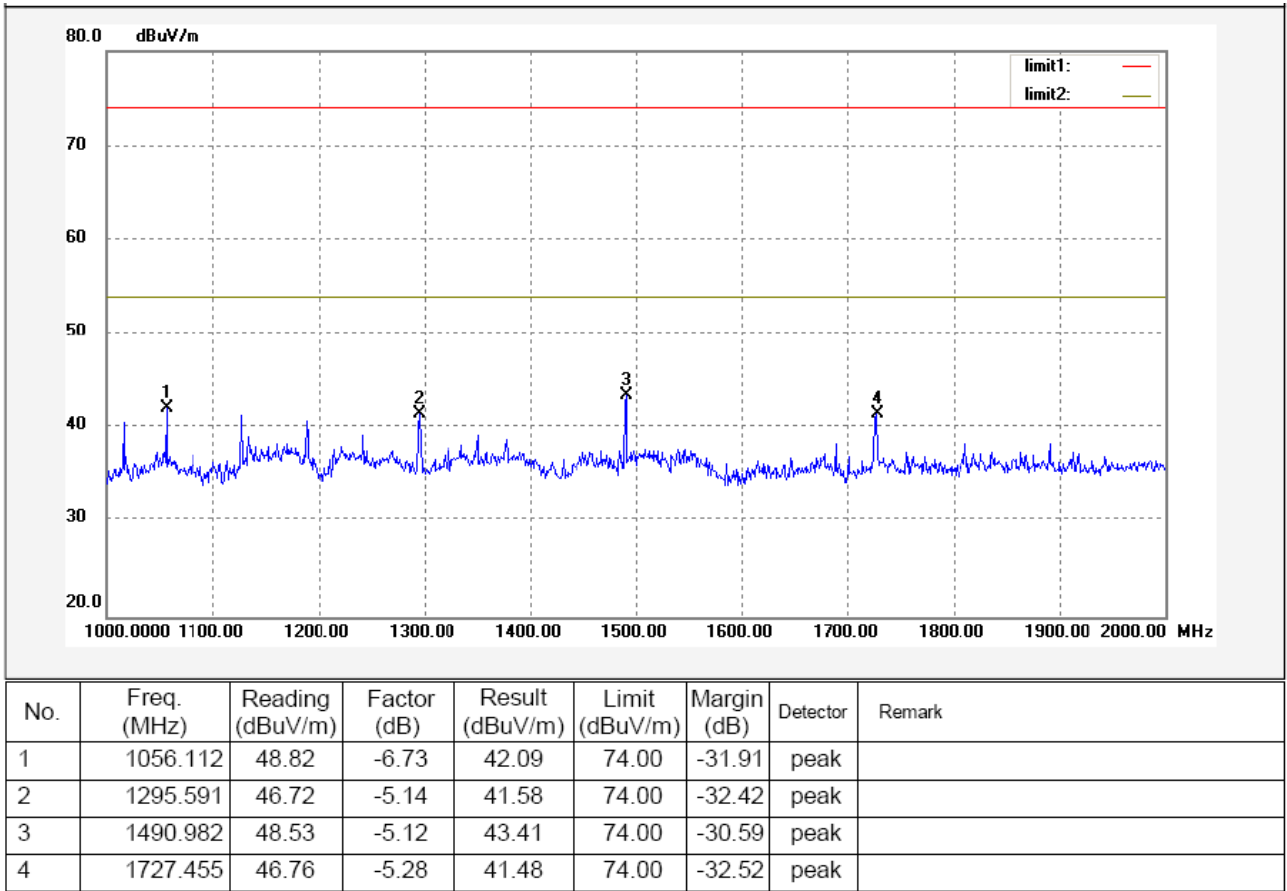
The results shown in this test report refer only to the sample(s) tested , This Test report cannot be reproduced, except in full, without prior written permission of the Company.

Antenna polarization: Horizontal

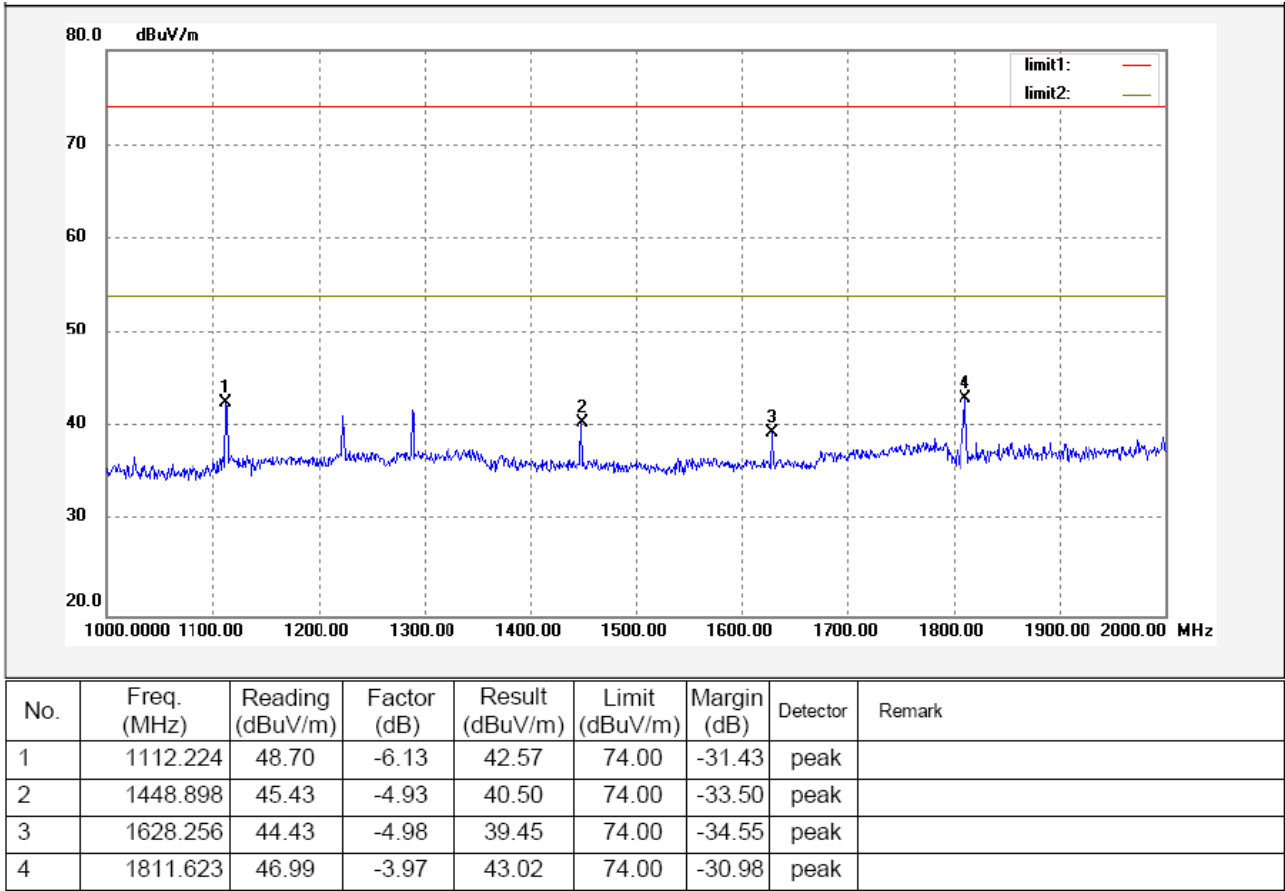


Frequency Range: 1GHz ~ 2GHz

Antenna polarization: Vertical



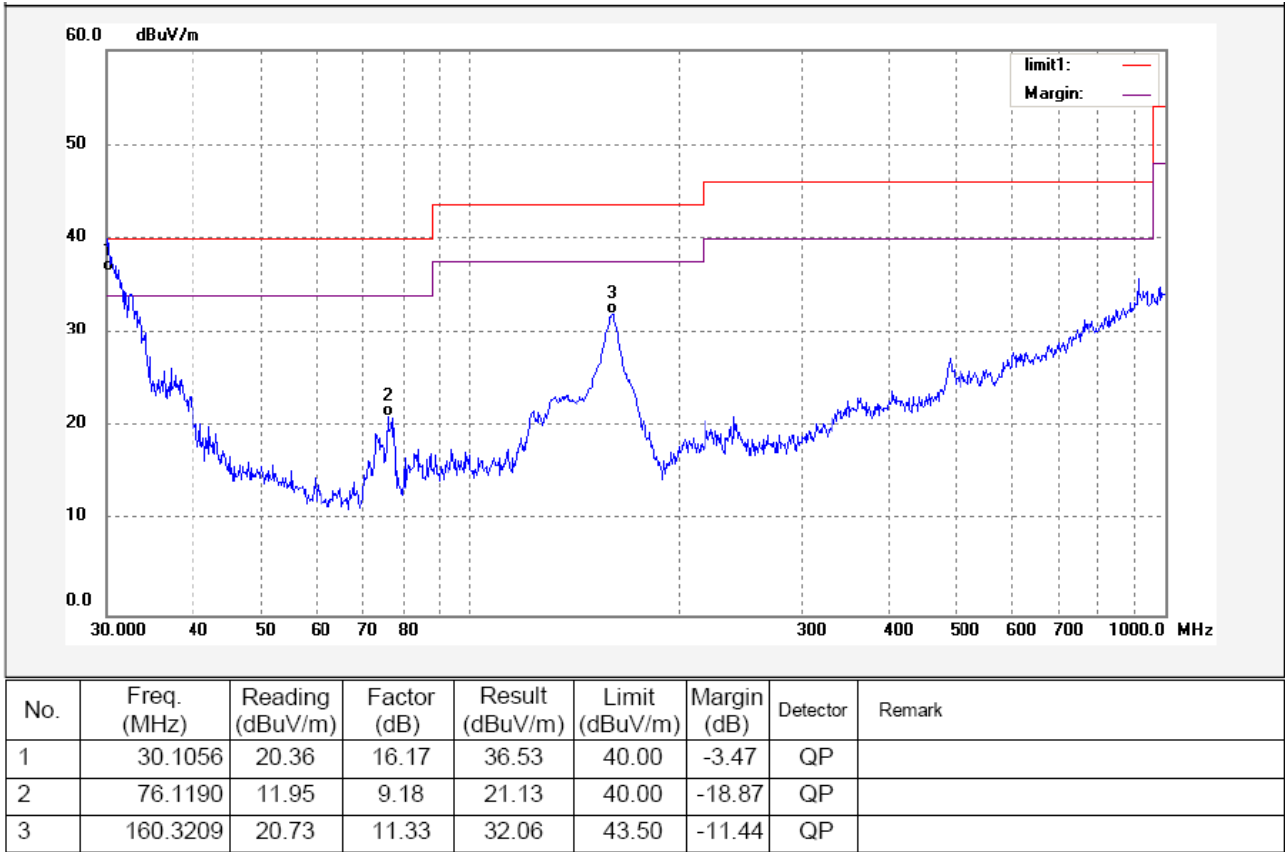
Antenna polarization: Horizontal



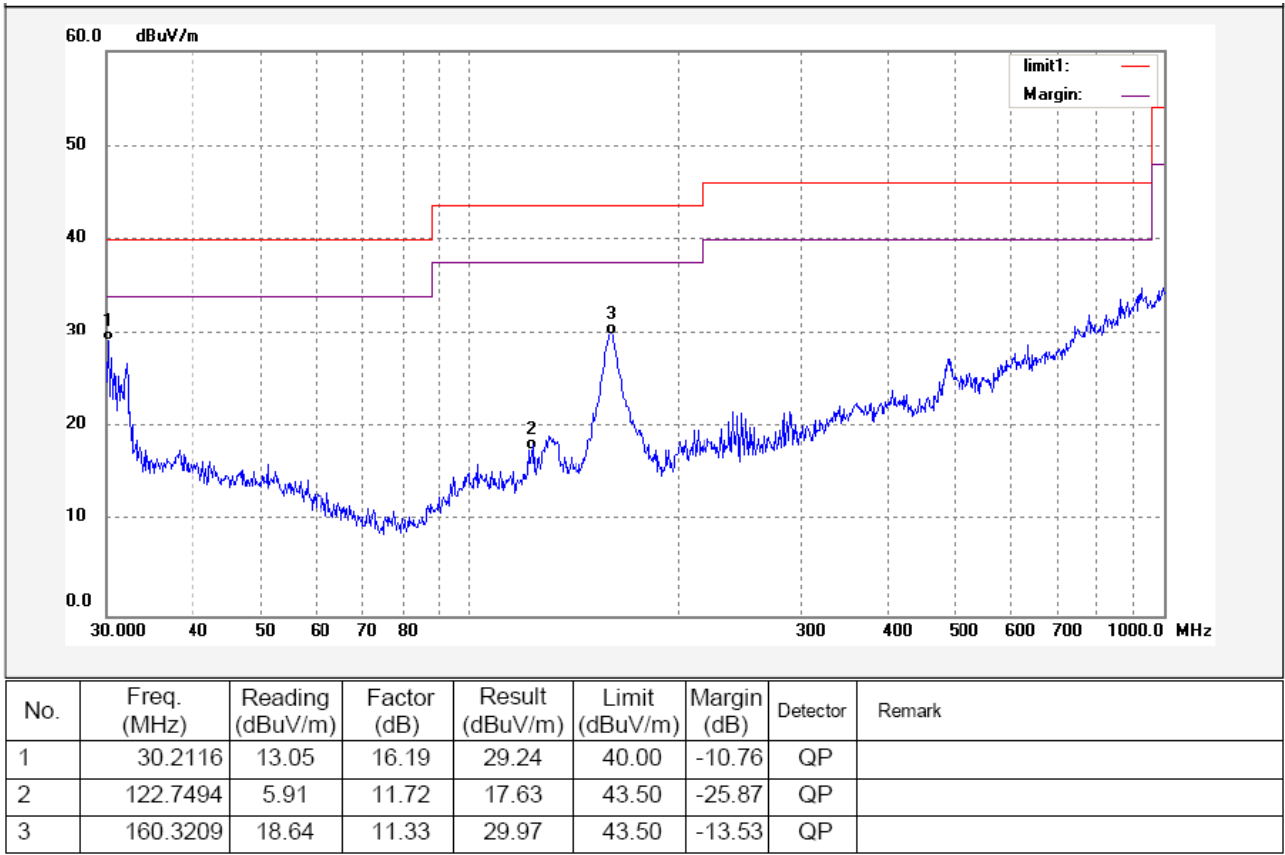
Measurement Data of Charger

Test Mode: Charging mode

Antenna polarization: Vertical



Antenna polarization: Horizontal

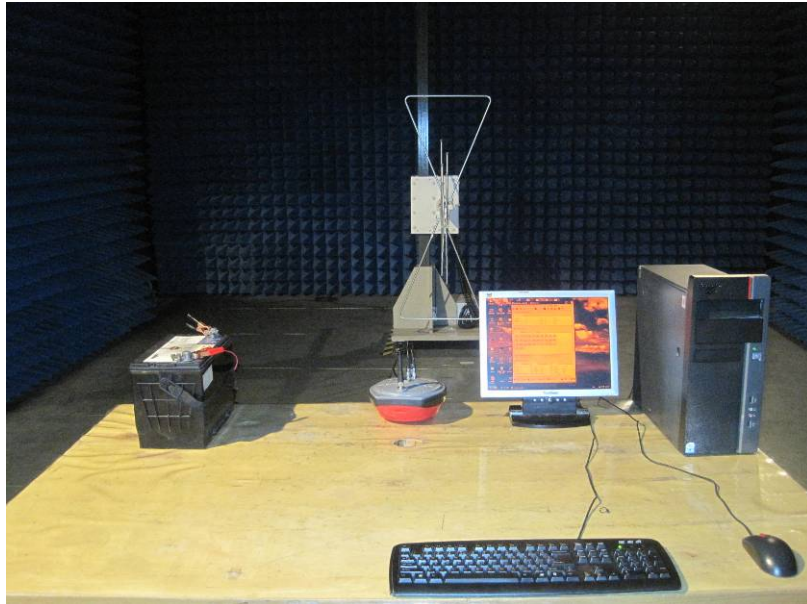


7.8 Photograph – Radiation Emission Test Setup

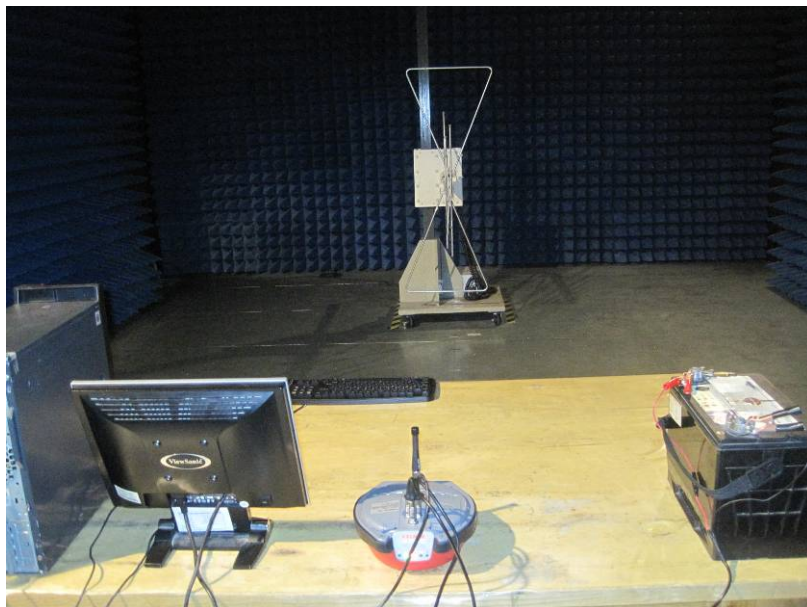
Test Setup for GNSS

Below 1GHz

Front View



Back View

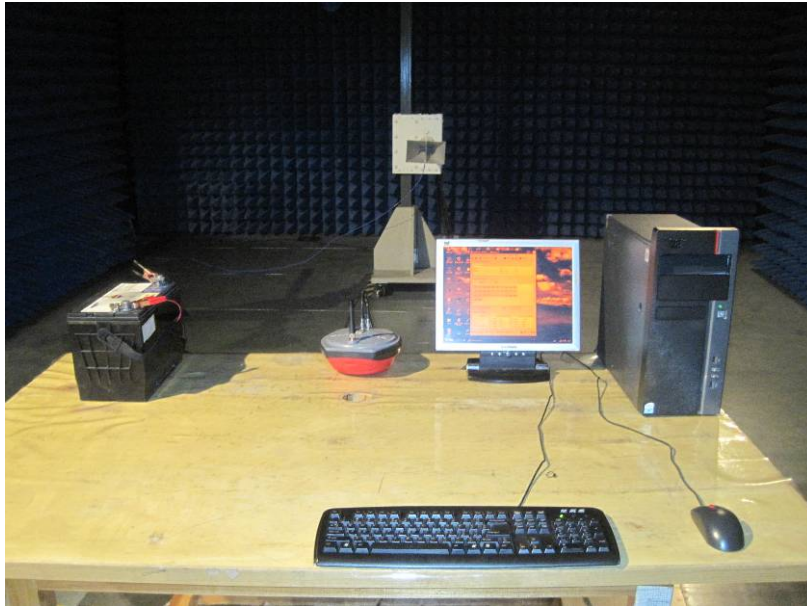


The results shown in this test report refer only to the sample(s) tested , This Test report cannot be reproduced, except in full, without prior written permission of the Company.

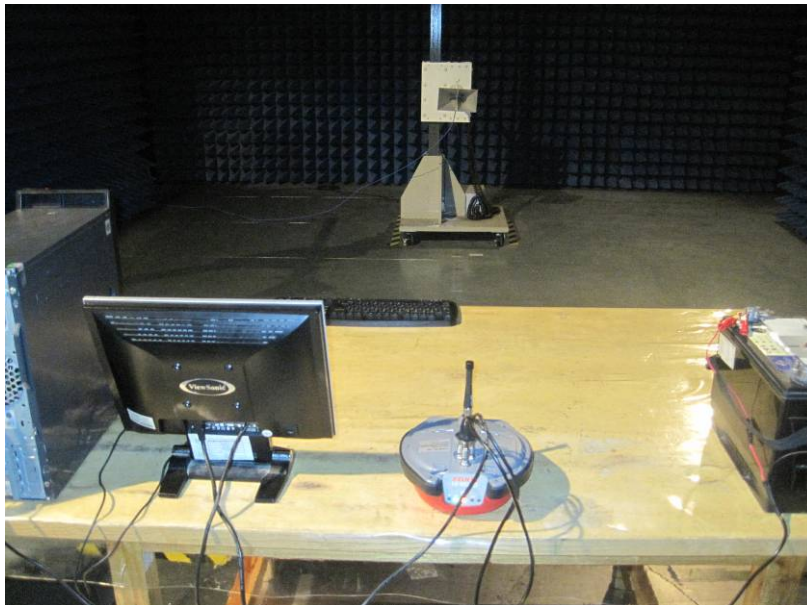
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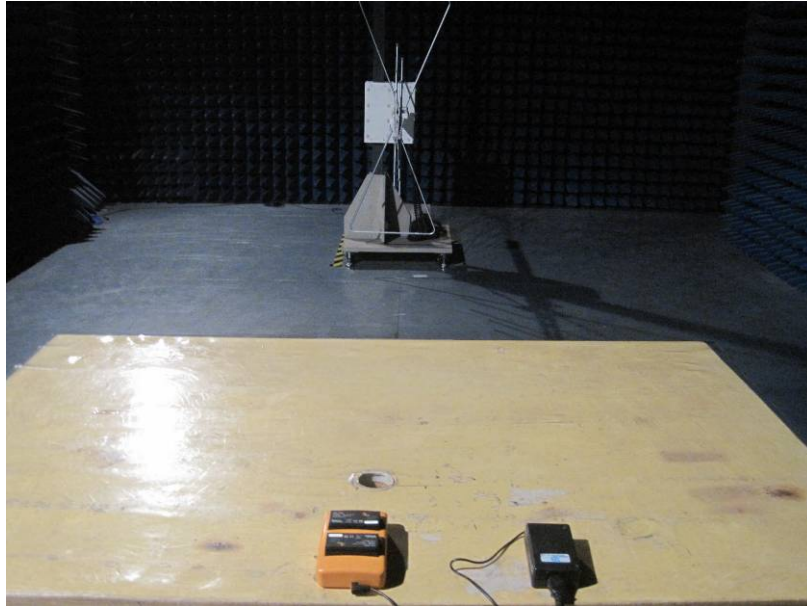
**Above 1GHz
Front View**



Back View



Test Setup for Charger



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8 Photographs - Constructional Details

8.1 Product View

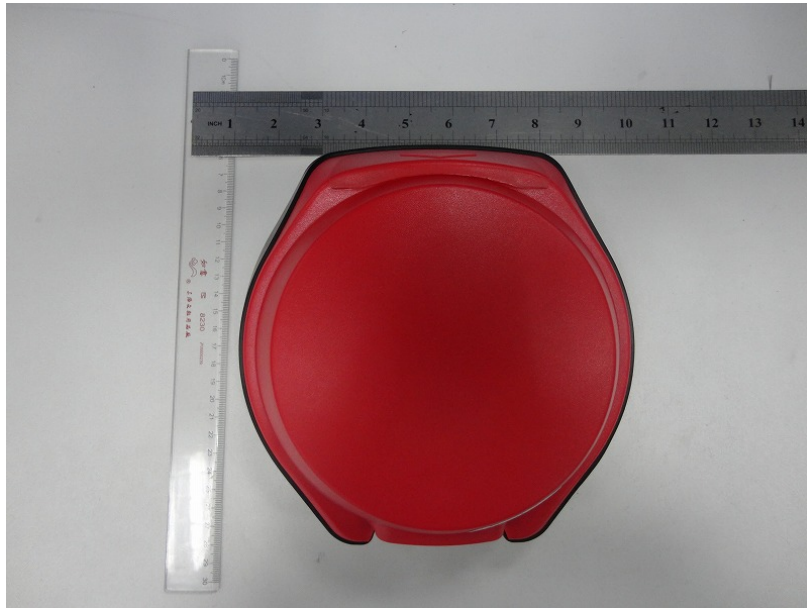


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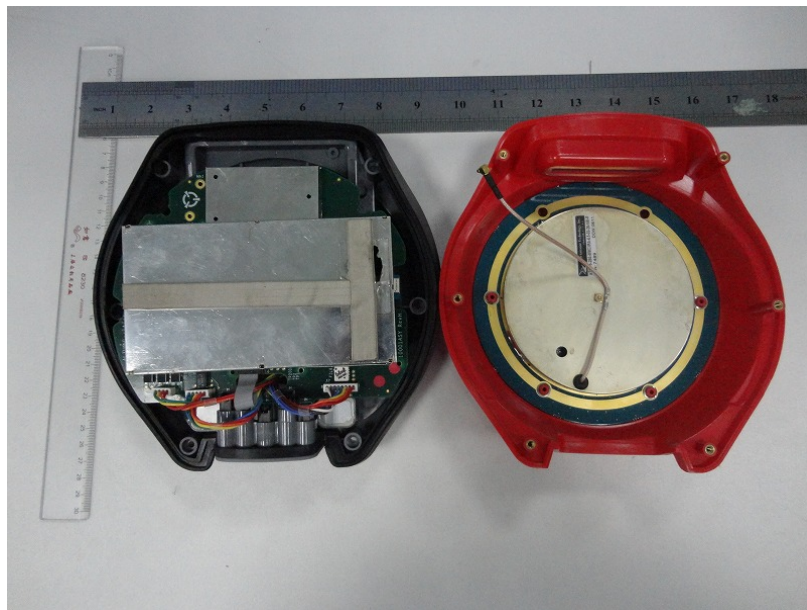
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8.2 G3100-R1 - Appearance View



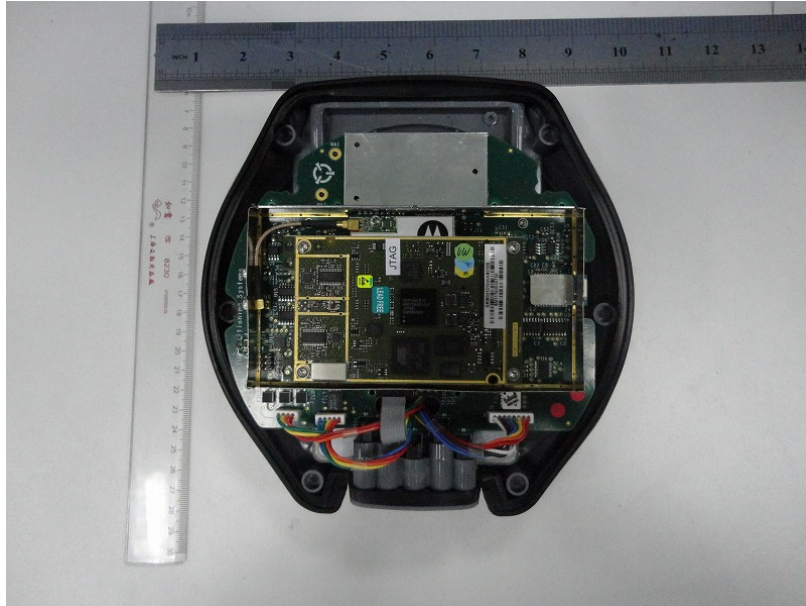
8.3 G3100-R1 – Open View



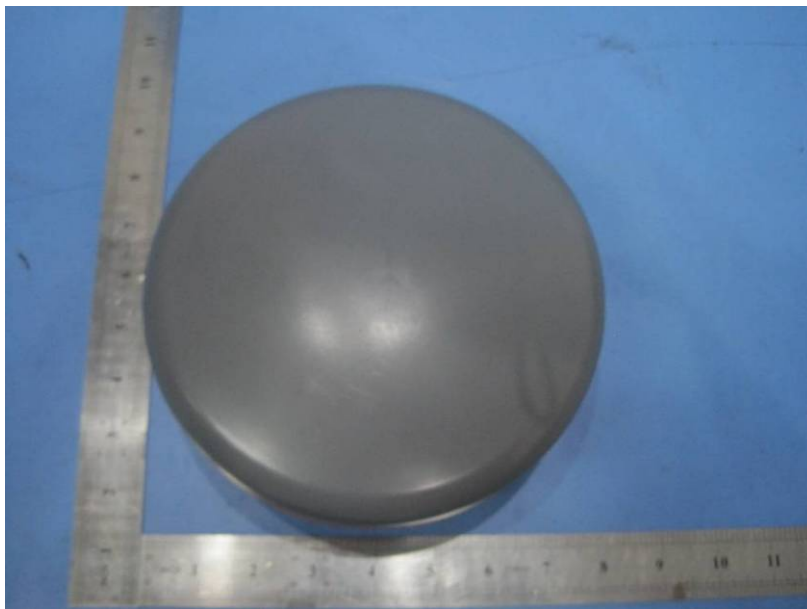
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8.4 SMT888-3G - Appearance View

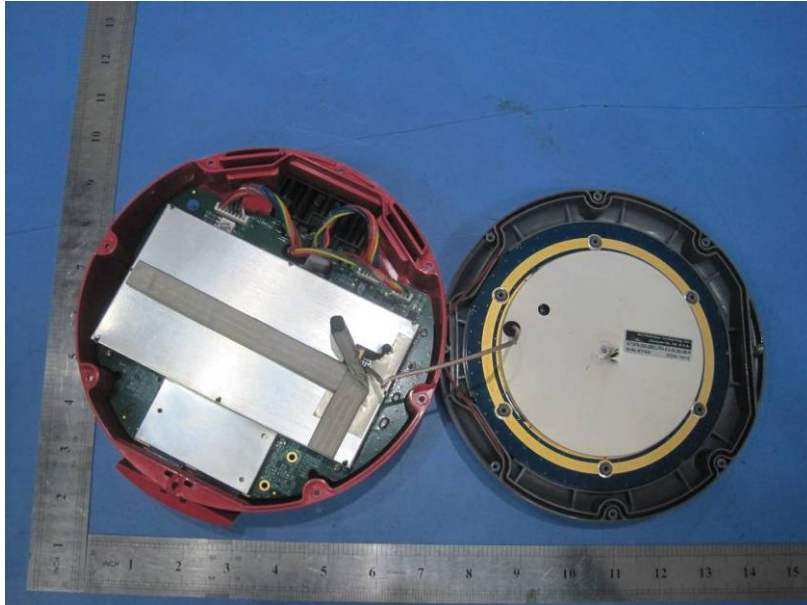


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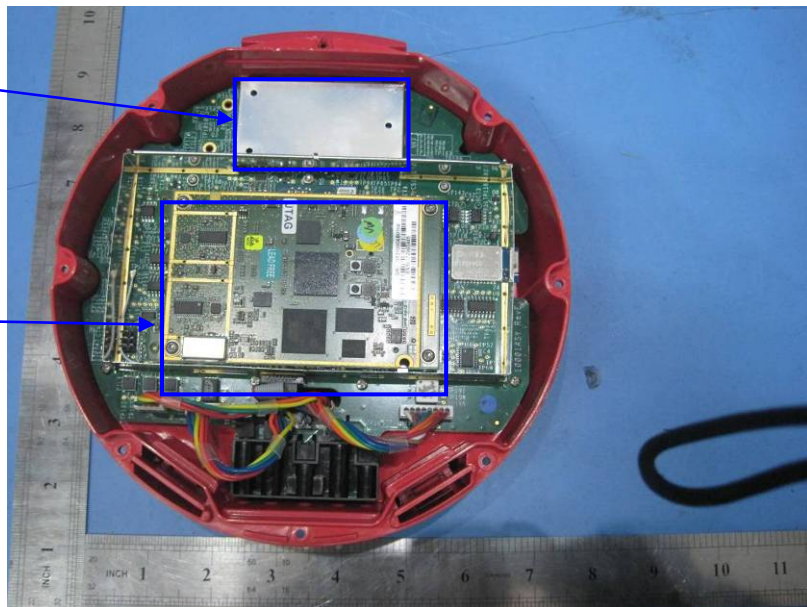
Reference No.: WT12020924-S-S-F

8.5 SMT888-3G – Open View



Module 2

Module 1



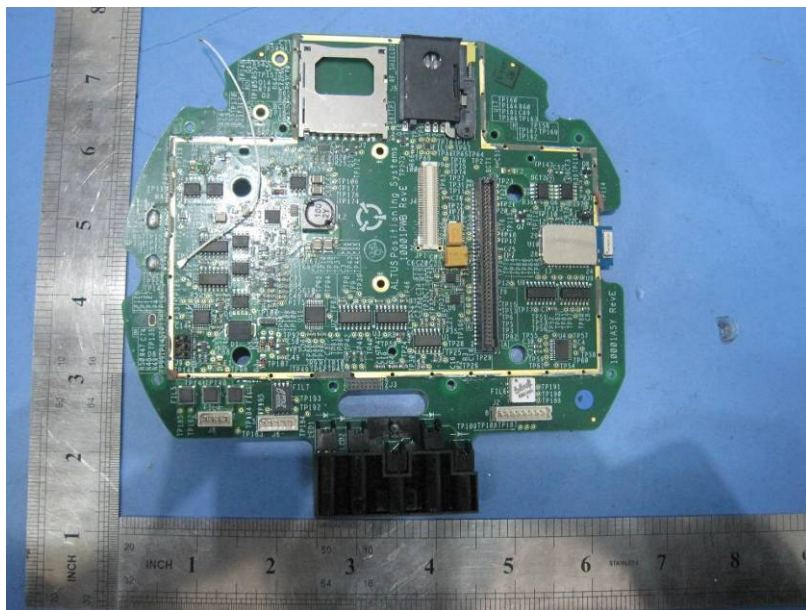
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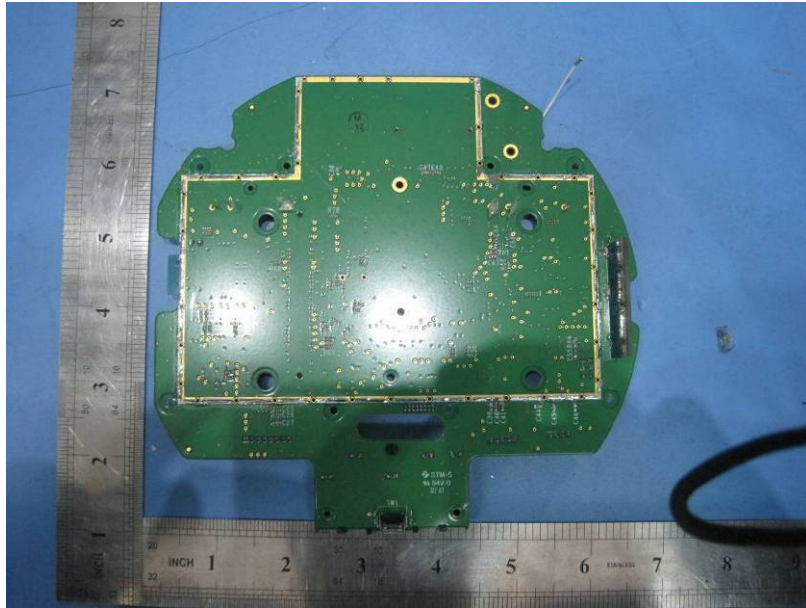
8.6 PCB 1 - View



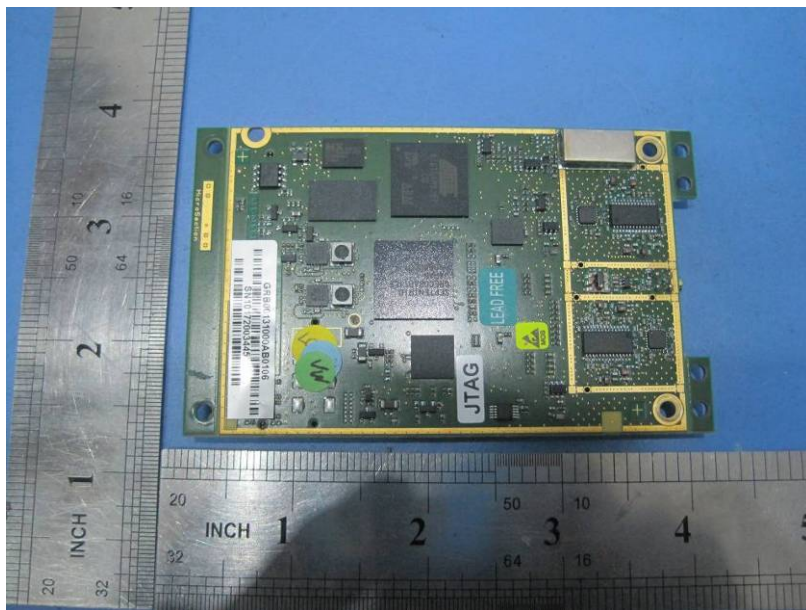
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Reference No.: WT12020924-S-S-F



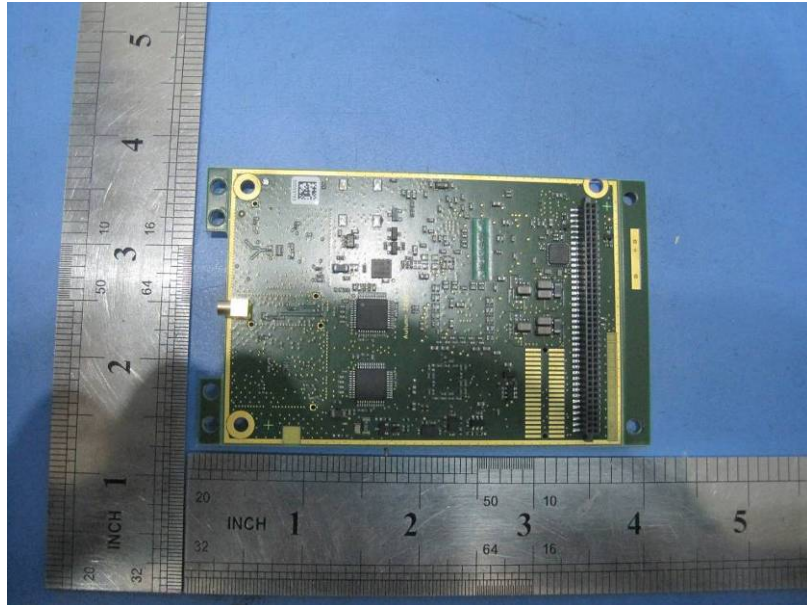
8.7 Module 1 – PCB View



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8.8 Module 2 – Appearance View

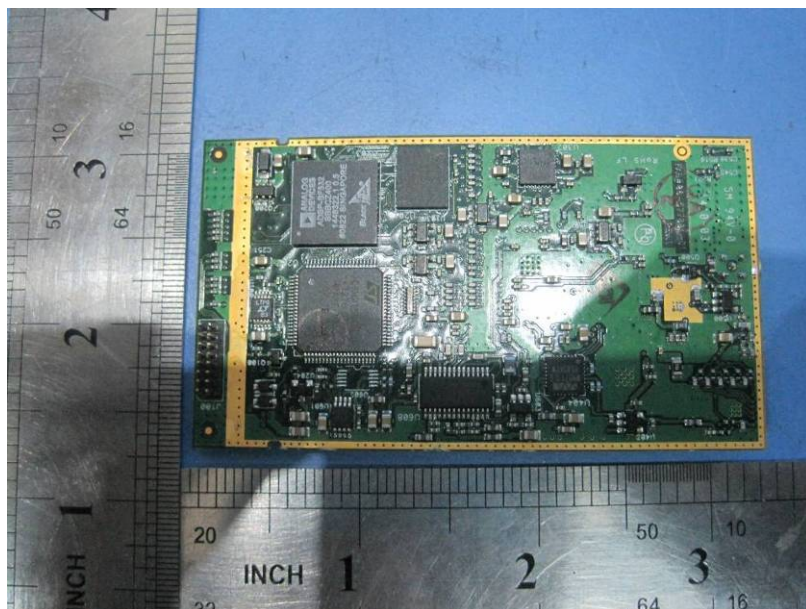
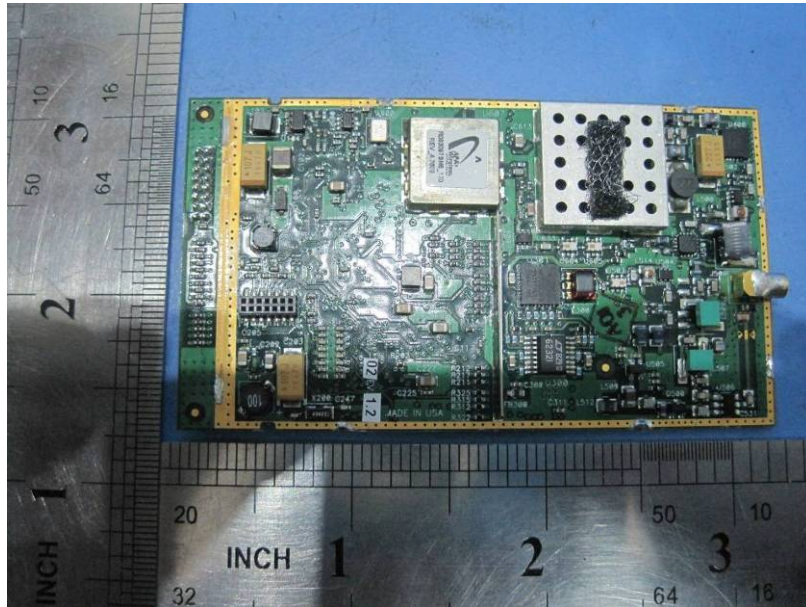


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Reference No.: WT12020924-S-S-F

8.9 Module 2 – PCB View

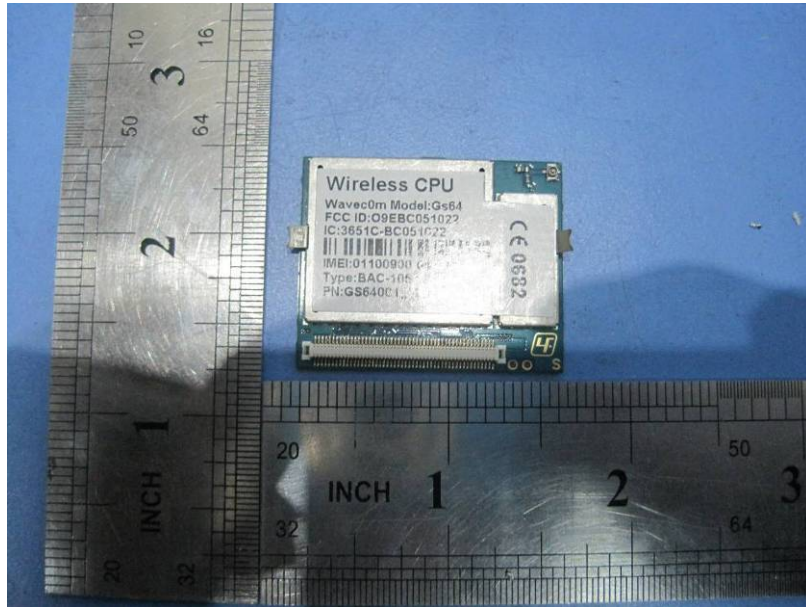


The results shown in this test report refer only to the sample(s) tested , This Test report cannot be reproduced, except in full, without prior written permission of the Company.

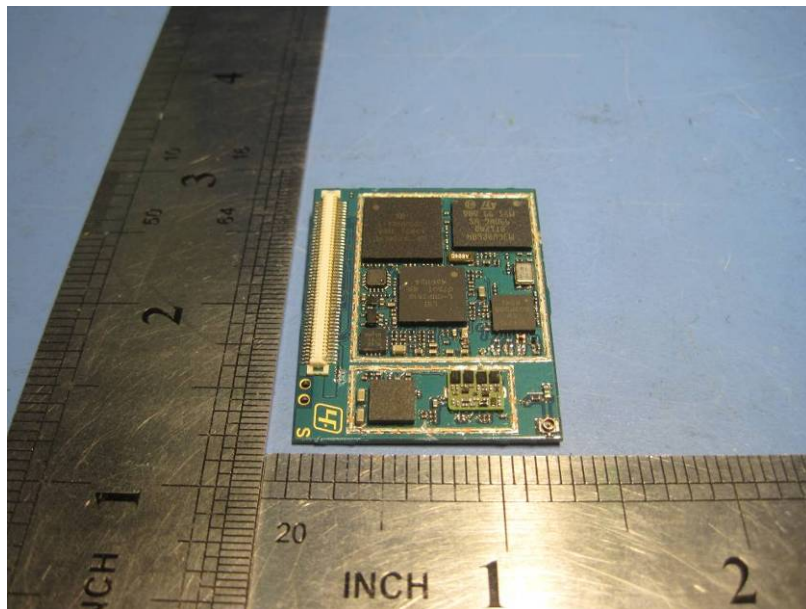
WALTEK SERVICES

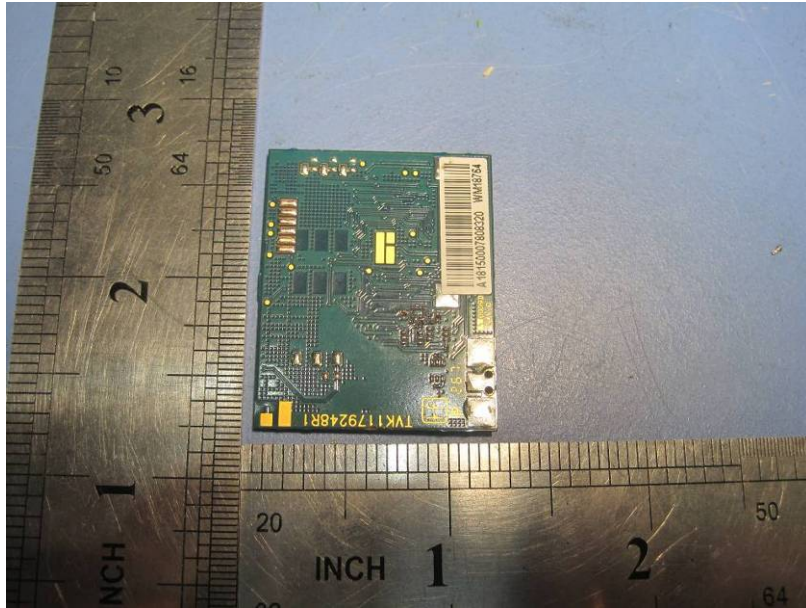
Reference No.: WT12020924-S-S-F

8.10 Module 3 – Appearance View

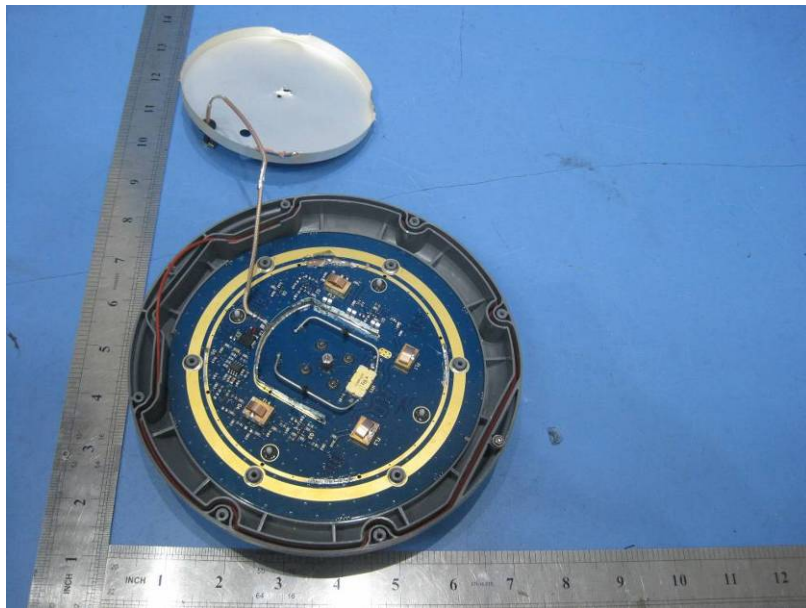


8.11 Module 3 – PCB View





8.12 Bottom – PCB View



8.13 Charger – Appearance View



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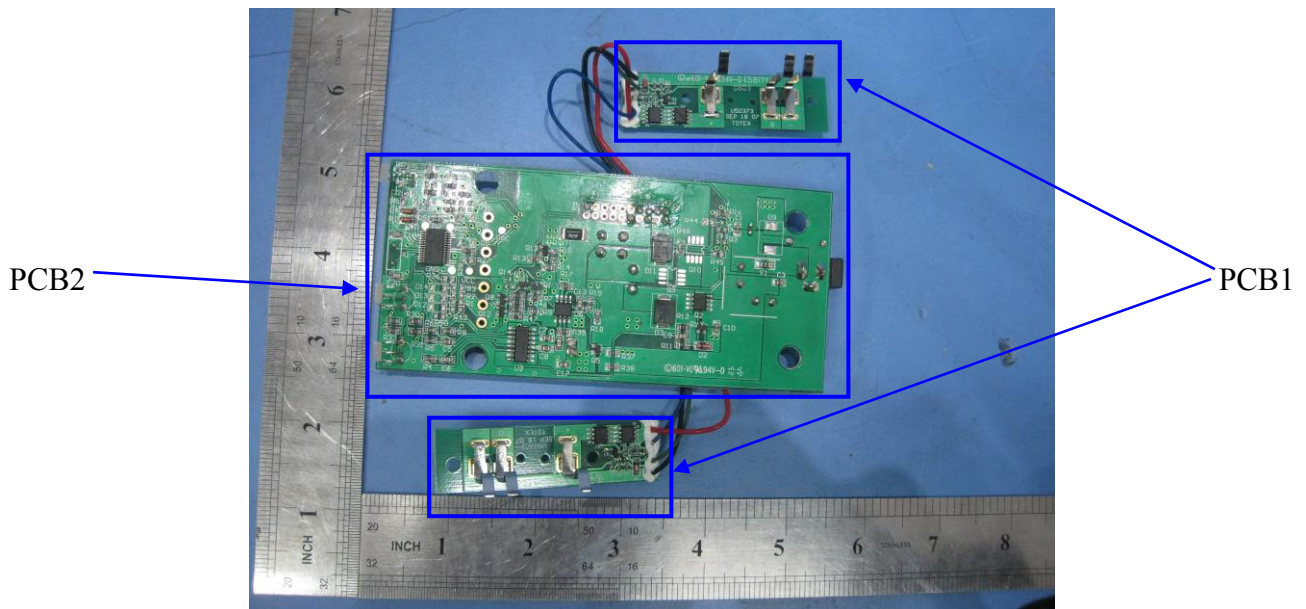
WALTEK SERVICES

Reference No.: WT12020924-S-S-F

8.14 Charger – Open View



8.15 Charger – PCB View

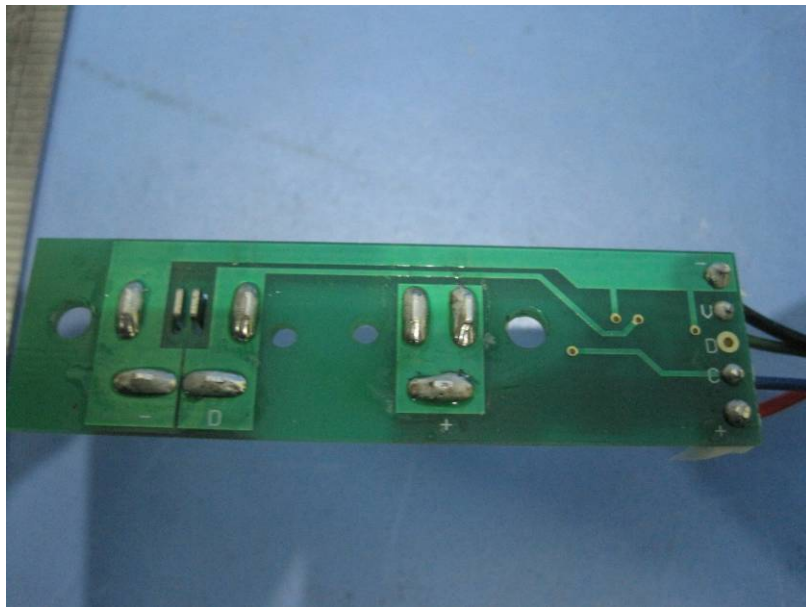
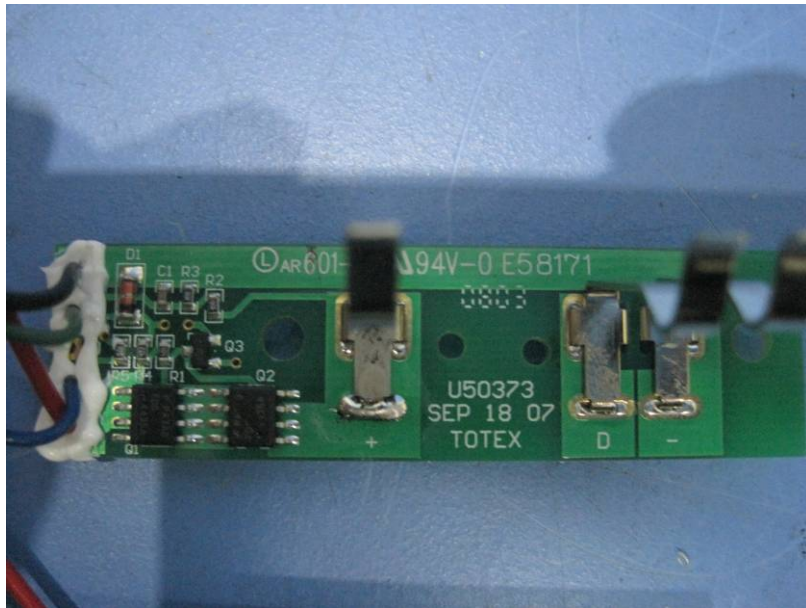


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Reference No.: WT12020924-S-S-F

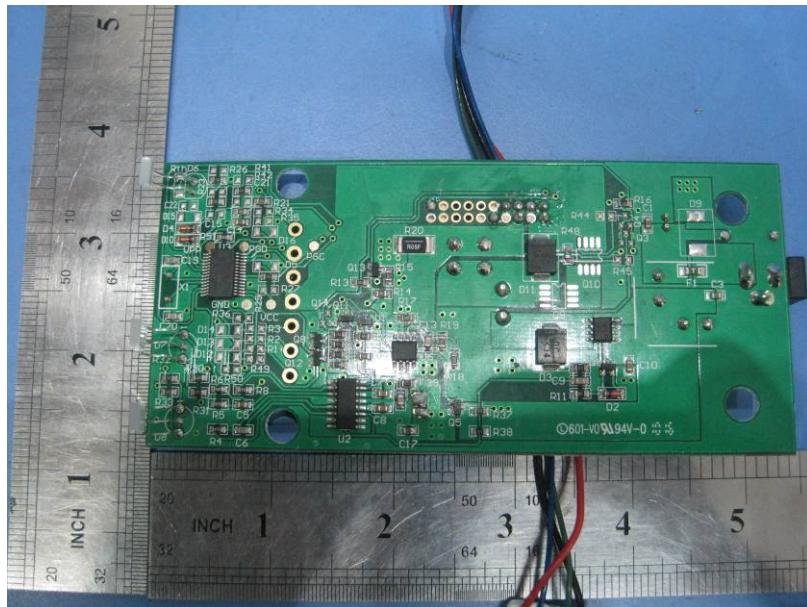
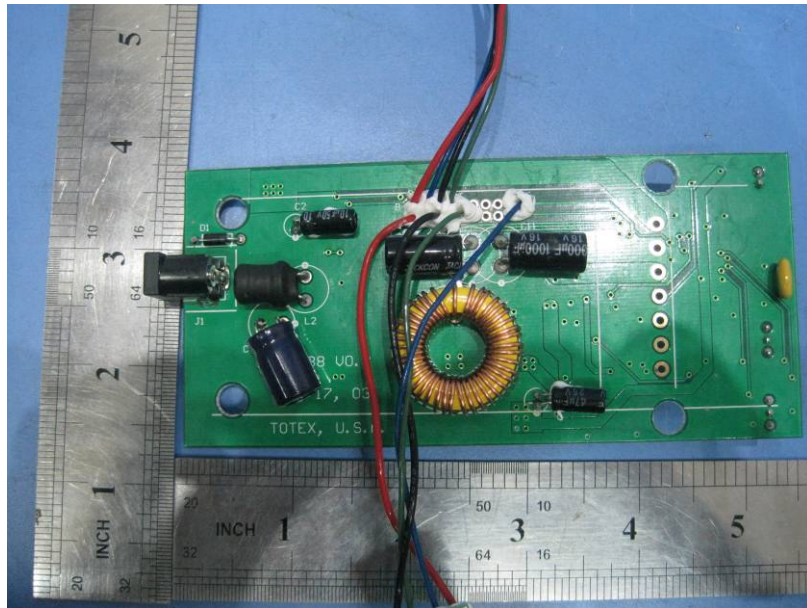
8.16 Charger – PCB1 View



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8.17 Charger – PCB2 View

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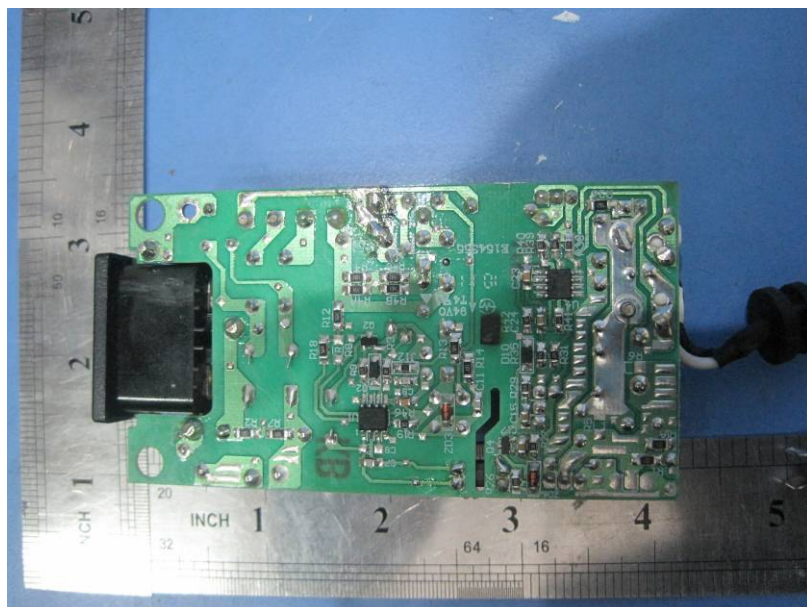
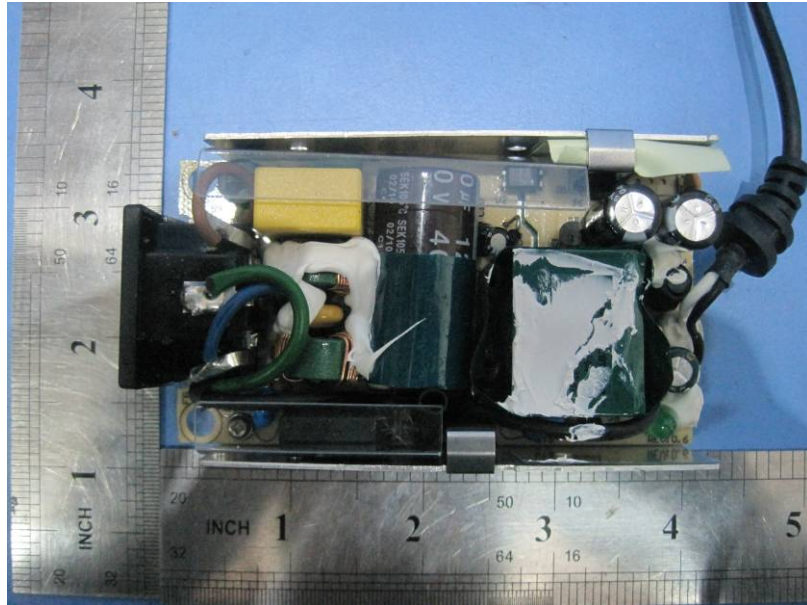
8.18 Adapter – Appearance View



8.19 Adapter – Open View



8.20 Adapter – PCB View



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