

FCC TEST REPORT

FCC ID : KE3-3001163
Applicant : Radio Systems Corporation
Address : 10427 Electric Ave.Knoxville, TN 37932 USA


Equipment Under Test (EUT) :

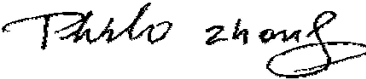
Product Name : Boundary Plus® V5
Model No. : RIG00-13329

Standards : FCC CFR47 Part 15 Section 15.209:2009

Date of Test : August 22 ~ August 26, 2011

Date of Issue : September 5, 2011

Test Engineer : Hunk yan 

Reviewed By : Philo zhong 

Test Result	: PASS
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Prepared By:
Waltek Services (Shenzhen) Co., Ltd.
1/F, Fukangtai Building, West Baima Rd., Songgang Street, Baoan District,
Shenzhen 518105, China

Tel :+86-755-27553488

Fax:+86-755-27553868

☆ 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

FCC Part 15 Subpart C Requirements			
Test Items	Test Requirement	Test Method	Result
Spurious Radiated Emissions (9kHz to 5GHz)	15.209	ANSI C63.4: 2003	PASS
Conducted Emissions (150kHz ~ 30MHz)	15.207	ANSI C63.4:2003	N/A

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4 General Information

4.1 Client Information

Applicant : Radio Systems Corporation
Address of Applicant : 10427 Electric Ave.Knoxville, TN 37932 USA

Manufacturer : Radio Systems Corporation
Address of Manufacturer : 10427 Electric Ave.Knoxville, TN 37932 USA

4.2 General Description of E.U.T.

Product Name : Boundary Plus® V5
Model No. : RIG00-13329
Operation Frequency : 433.92MHz

4.3 Details of E.U.T.

Technical Data: : 3.0V Battery

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 Boundary Plus® V5. The standards used were FCC CFR47 Part 15 Section 15.209:2009.

4.6 Test Facility

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

- **IC – Registration No.: IC7760A**

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	Cert. No	Uncertainty
EMC Analyzer	Agilent/ E7405A	MY451149 43	W2008001	9k-26.5GHz	Aug. 2, 2011	Aug. 1, 2012	Wws20 081596	±1dB
Trilog Broadband Antenne	SCHWARZB ECK MESS- ELEKTROM / VULB9163	336	W2008002	30-3000 MHz	Aug. 2, 2011	Aug. 1, 2012	-	±1dB
Broad-band Horn Antenna	SCHWARZB ECK MESS- ELEKTROM / BBHA 9120D(1201)	667	W2008003	1-18GHz	Aug. 2, 2011	Aug. 1, 2012	-	f<10 GHz: ±1dB 10GHz<f< 18 GHz: ±1.5dB
Broadband Preamplifier	SCHWARZB ECK 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	SCHWARZB ECK MESS- ELEKTROM / AK 9515 H	-	-	-	Aug. 2, 2011	Aug. 1, 2012	-	-
10m 50 Ohm Coaxial Cable	SCHWARZB ECK MESS- ELEKTROM / AK 9513	-	-	-	Aug. 2, 2011	Aug. 1, 2012	-	-
Positioning Controller	C&C LAB/ CC-C-IF	-	-	-	Aug. 2, 2011	Aug. 1, 2012	-	-
Color Monitor	SUNSP0/ SP-14C	-	-	-	Aug. 2, 2011	Aug. 1, 2012	-	-
Test Receiver	ROHDE&SC HWARZ/ ESPI	101155	W2005001	9k-3GHz	Aug. 2, 2011	Aug. 1, 2012	Wws20 080942	±1dB
Two-Line V-Network	ROHDE&SC HWARZ/ ENV216	100115	W2005002	50Ω/50μH	Aug. 2, 2011	Aug. 1, 2012	Wws20 080941	±10%
RF Generator	TESEQ GmbH/ NSG4070	25781	W2008008	Fraq-range: 9K-1GHz RF voltage: -60 dBm- +10dBm	Aug. 2, 2011	Aug. 1, 2012	Wws20 081890	Power_freq distinguish0. 1Hz RFelectricity distinguish 0.1 B
Active Loop Antenna 9kHz-30MHz	Beijing Dazhi / ZN30900A	-	-	9kHz- 30MHz	Aug. 2, 2011	Aug. 1, 2012	-	±1dB

6 Conducted Emissions

Test Requirement: FCC CFR47 Part 15 Section 15.107

Test Method: ANSI C63.4:2003

Test Result: N/A

Remark: The EUT is powered by 3.0V Battery, so this test is not applicable.

7 Spurious Radiated Emissions

Test Requirement:	FCC CFR47 Part 15 Section 15.209
Test Method:	ANSI C63.4:2003
Test Result:	PASS
Frequency Range:	9kHz to 5GHz
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 Above limits are for Quasi-Peak if maximised peak within 6dB of limit 74.0 dBuV/m for peak above 1GHz 54.0 dBuV/m for AVG above 1GHz The tighter limit applies at the band edges.
Detector:	Peak for pre-scan (120kHz resolution bandwidth)

EUT Operation :

Operating Environment:

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

EUT Operation:

The EUT was tested in continuously transmit mode.

7.1 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.

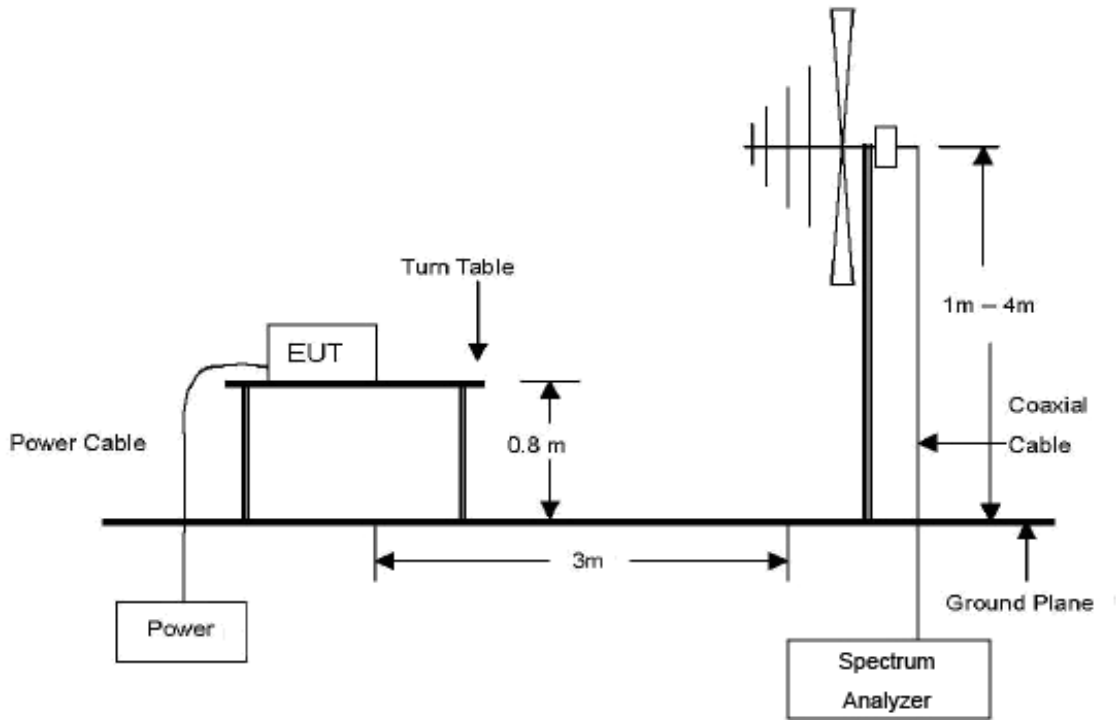
WALTEK SERVICES

Reference No.: WT11084244-D-E-F

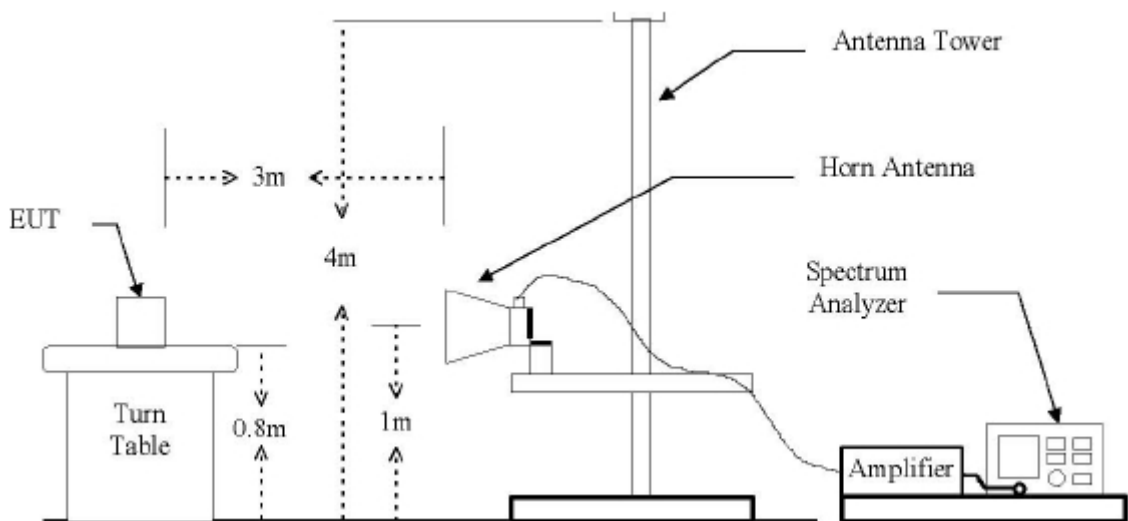
7.2 EUT Setup

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 diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz Emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 1 GHz to 5 GHz Emissions.



7.2.2 Spectrum Analyzer Setup

According to FCC Part15 Rules, the system was tested 9kHz to 5000MHz.

Below 30MHz

Start Frequency	9 kHz
Stop Frequency	30MHz
Sweep Speed	Auto
IF Bandwidth.....	10 KHz
Video Bandwidth.....	10KHz
Resolution Bandwidth	10KHz

30MHz ~ 1000MHz

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	1000MHz
Stop Frequency	5000MHz
Sweep Speed	Auto
IF Bandwidth.....	120 KHz
Video Bandwidth.....	100KHz
Quasi-Peak Adapter Bandwidth	120 KHz
Quasi-Peak Adapter Mode	Normal
Resolution Bandwidth	1MHz

7.3 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(normal uses) axis positioning. And all the modes was tested in the report. Only the worst case is shown in the report.

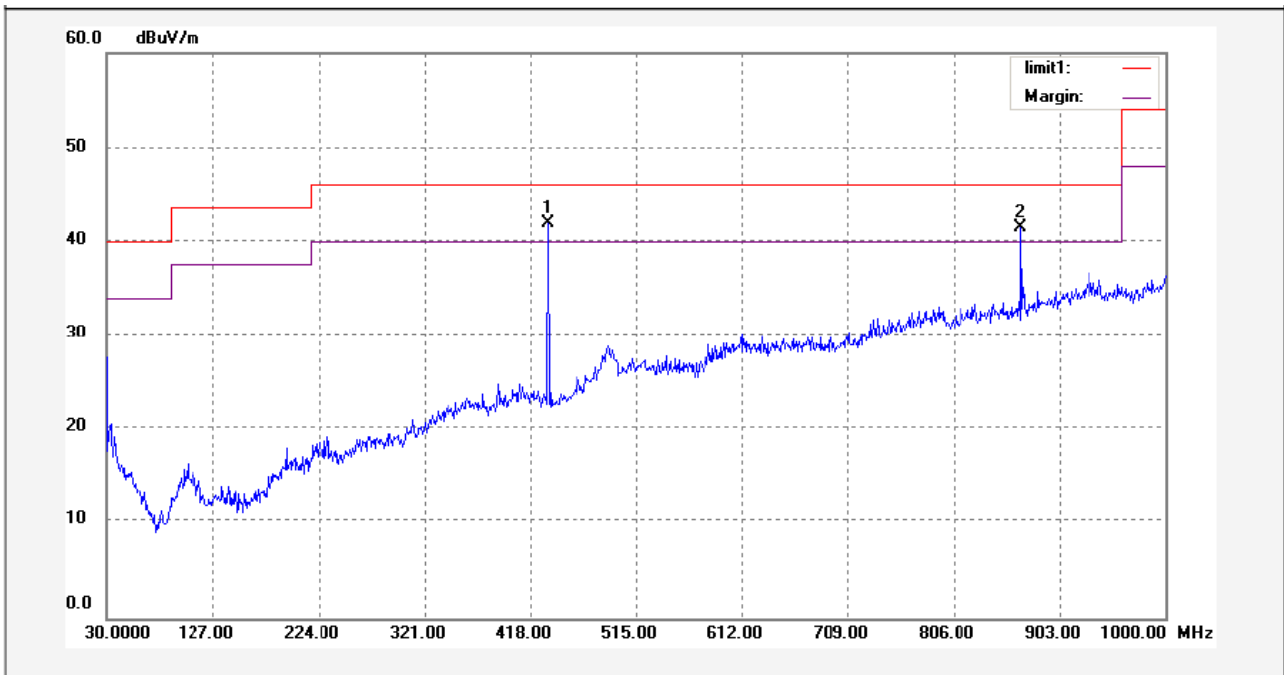
7.4 Summary of Test Results

According to the data in this section, the EUT complied with the FCC Part15 C standards. The emissions below 30MHz are more than 20dB below the limit, so the data is not show in the report.

Test Data:

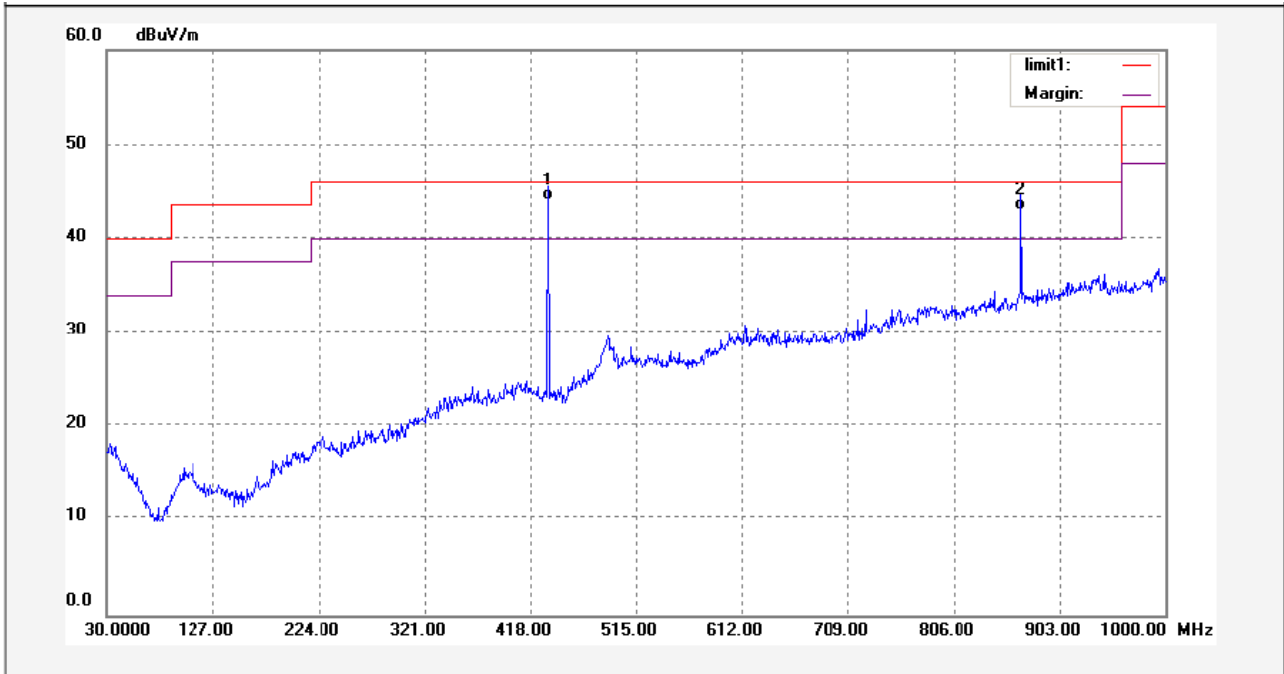
Test Frequency: 30MHz ~ 1000MHz

Antenna Polarization: Vertical



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	433.8761	21.72	20.27	41.99	46.00	-4.01	peak	
2	867.8156	11.29	30.25	41.54	46.00	-4.46	peak	

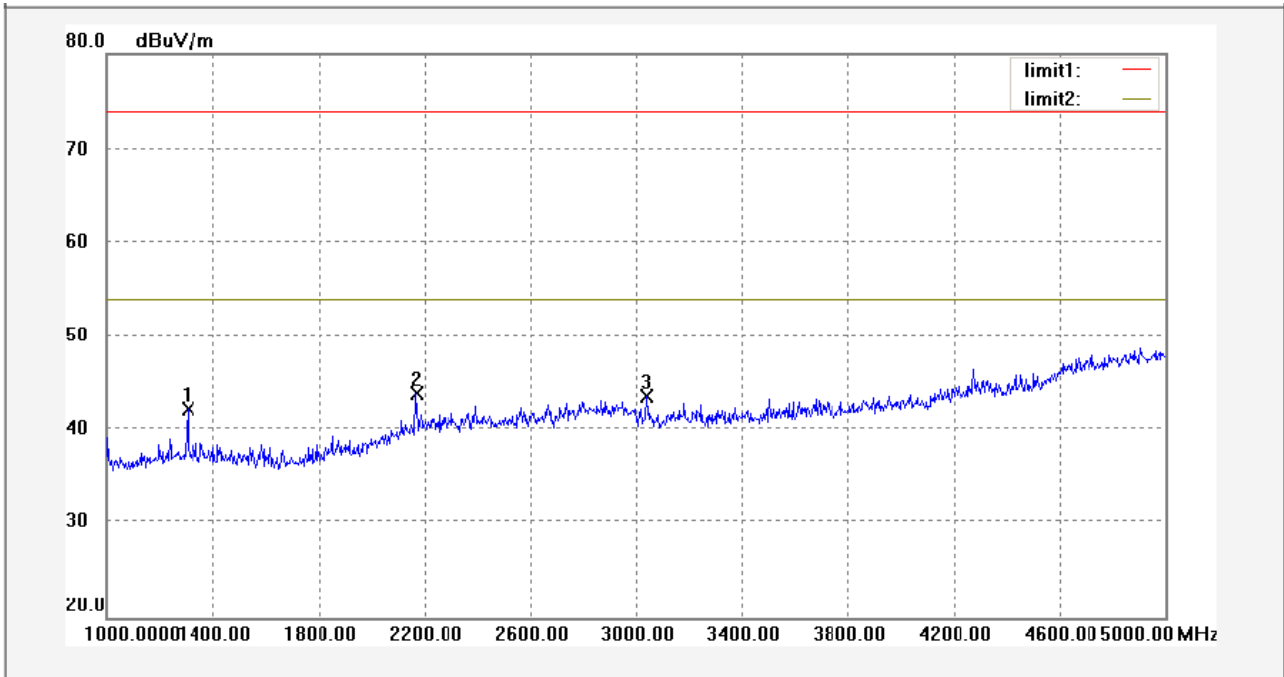
Antenna Polarization: Horizontal



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	433.8761	23.81	20.27	44.08	46.00	-1.92	QP	
2	867.8156	12.69	30.25	42.94	46.00	-3.06	QP	

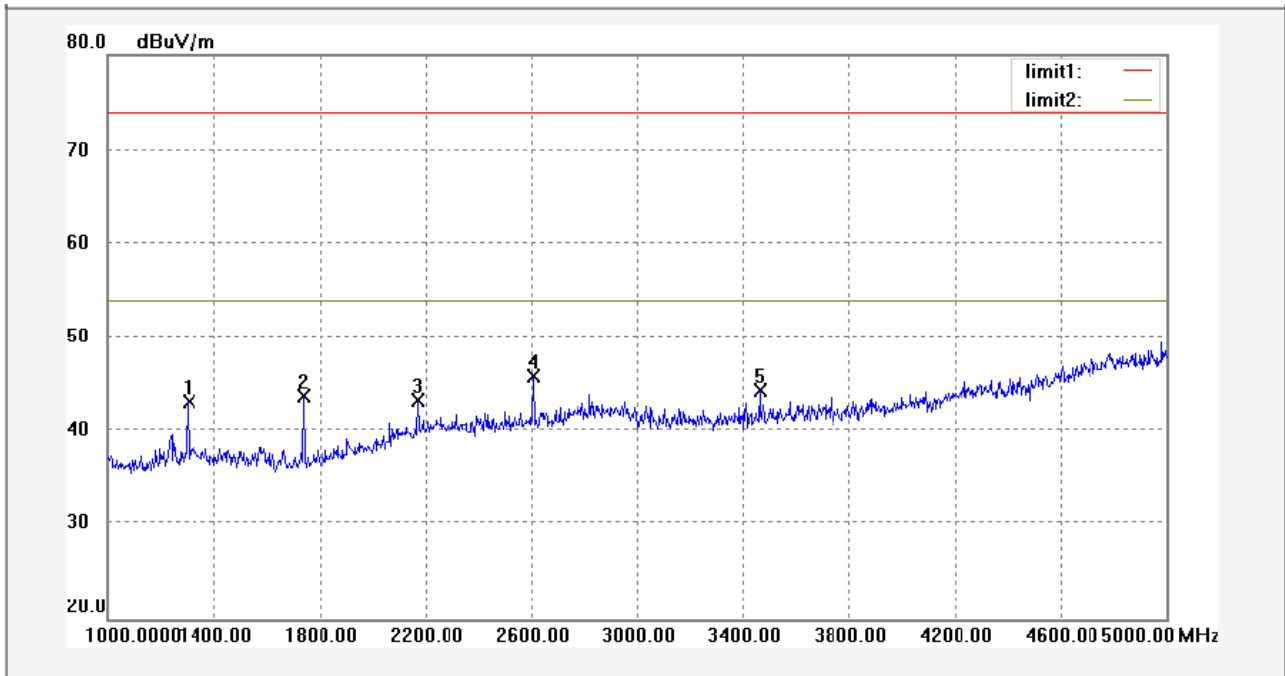
Test Frequency: 1GHz ~ 5GHz

Antenna Polarization: Vertical



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	1301.644	44.22	-1.90	42.32	74.00	-31.68	peak	
2	2169.407	42.01	1.87	43.88	74.00	-30.12	peak	
3	3037.169	39.62	4.07	43.69	74.00	-30.31	peak	

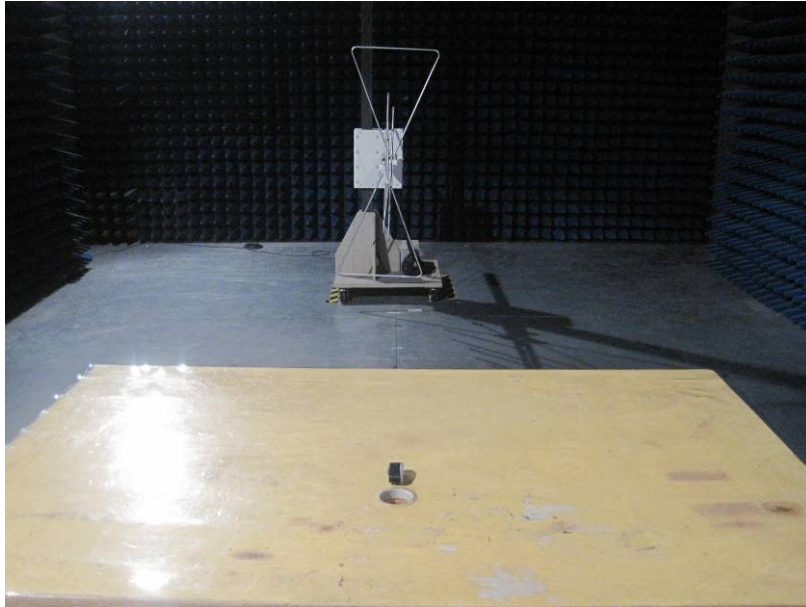
Antenna Polarization: Horizontal



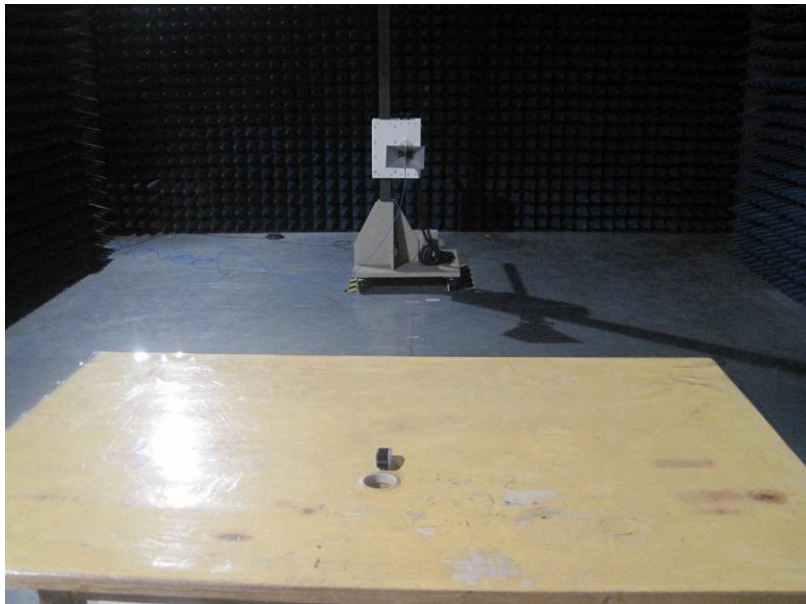
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	1301.644	45.07	-1.90	43.17	74.00	-30.83	peak	
2	1735.526	45.66	-1.82	43.84	74.00	-30.16	peak	
3	2169.407	41.50	1.87	43.37	74.00	-30.63	peak	
4	2607.214	42.94	2.89	45.83	74.00	-28.17	peak	
5	3464.930	39.84	4.50	44.34	74.00	-29.66	peak	

7.5 Photograph – Radiation Emission Test Setup

Below 1GHz



Above 1GHz



8 Antenna Requirement

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The EUT has a integral PCB antenna, it is full fill with the requirement.

9 Photographs - Constructional Details

9.1 EUT – Appearance View1



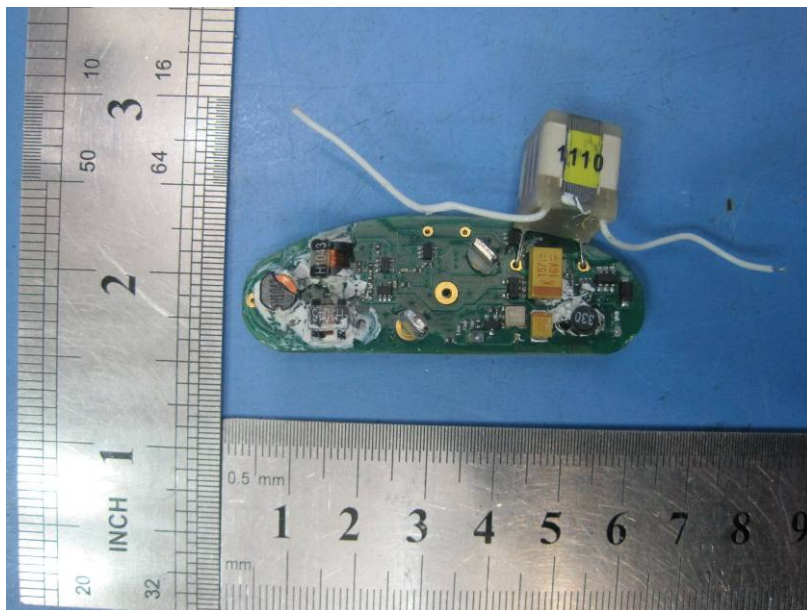
9.2 EUT – Appearance View2



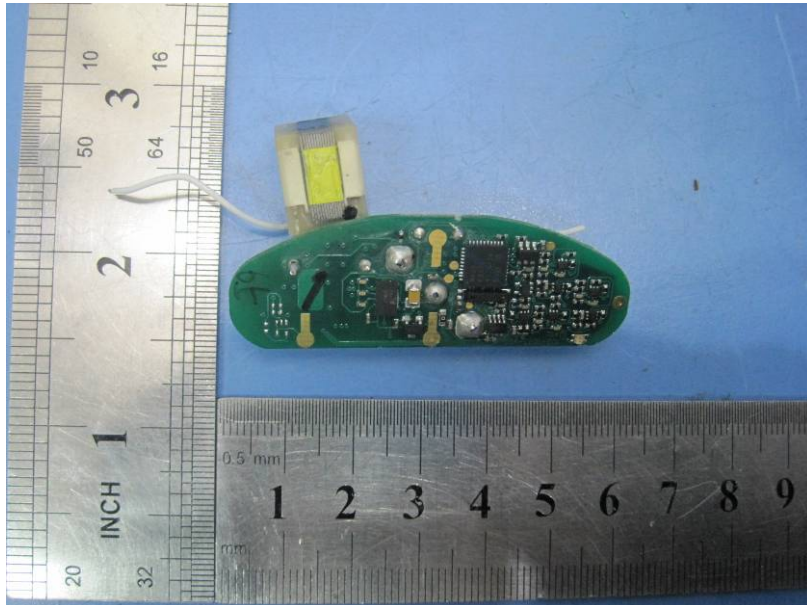
9.3 EUT – Open View



9.4 PCB – Front View



9.5 PCB – Back View



10 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.

