

FCC TEST REPORT

FCC ID : WDAEASY-100W

Applicant : **Spal Automotive s.r.l.**
Via per Carpi 26/B Correggio (RE) Italy

Equipment Under Test (EUT) :

Product description : Parking sensor wireless

Model No. : EASY-100 WIRELESS PS4

Standards : FCC 15 Subpart C Paragraph 15.231

Date of Test : July16,2008

Test Engineer : **Nunu.Deng**

Reviewed By : 

PERPARED 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

2 Contents

	Page
1 COVER PAGE.....	1
2 CONTENTS	2
3 TEST SUMMARY.....	4
4 GENERAL INFORMATION.....	5
4.1 CLIENT INFORMATION	5
4.2 GENERAL DESCRIPTION OF E.U.T.....	5
4.3 DETAILS OF E.U.T.....	5
4.4 DESCRIPTION OF SUPPORT UNITS	5
4.5 STANDARDS APPLICABLE FOR TESTING.....	5
4.6 TEST FACILITY.....	6
4.7 TEST LOCATION.....	6
5 EQUIPMENT USED DURING TEST	7
6 CONDUCTED EMISSION TEST	9
6.1 TEST EQUIPMENT.....	9
6.2 TEST PROCEDURE.....	9
6.3 CONDUCTED TEST SETUP	10
6.4 EUT OPERATING CONDITION	10
6.5 CONDUCTED EMISSION LIMITS	11
6.6 CONDUCTED EMISSION TEST DATA.....	11
7 RADIATION EMISSION TEST.....	12
7.1 TEST EQUIPMENT.....	12
7.2 MEASUREMENT UNCERTAINTY.....	12
7.3 TEST PROCEDURE	12
7.4 RADIATED TEST SETUP	12
7.5 SPECTRUM ANALYZER SETUP.....	13
7.6 CORRECTED AMPLITUDE & MARGIN CALCULATION	14
7.7 SUMMARY OF TEST RESULTS	14
7.8 EUT OPERATING CONDITION	15
7.9 RADIATED EMISSIONS LIMIT.....	15
7.10 RADIATED EMISSIONS TEST RESULT.....	16
7.10.1 <i>Radiated Emission Test Data</i>	16
8 PERIODIC OPERATION.....	18
9 BAND EDGE	19
9.1 TEST PROCEDURE	19
9.2 BAND EDGE	19
9.3 BAND EDGE TEST RESULT	20
10 PHOTOGRAPHS OF TESTING.....	21
10.1 RADIATION EMISSION TEST VIEW FOR 30MHz-1000MHz.....	21
10.2 RADIATION EMISSION TEST VIEW FOR 1GHz-5GHz.....	21

11	PHOTOGRAPHS - CONSTRUCTIONAL DETAILS	22
11.1	EUT - FRONT VIEW	22
11.2	EUT - BACK VIEW	22
11.3	PCB-FRONT VIEW	23
11.4	PCB-BACK VIEW.....	23
12	FCC ID LABEL.....	24

3 Test Summary

Test	Test Requirement	Test Method	Class / Severity	Result
Radiated Emission (30MHz to 5GHz)	FCC PART 15: 2003	ANSI C63.4: 2003	N/A	PASS
Conducted Emission (150KHz to 30MHz)	FCC PART 15: 2003	ANSI C63.4: 2003	N/A	N/A

4 General Information

4.1 Client Information

Applicant:	SPAL Automotive S.r.l.
Address:	Via per Carpi 26/B Correggio (RE) Italy
Manufacturer:	Shenzhen longhorn technology CO. LTD
Address:	Longhorn HI-Tech Estate,TongFuyu Industrial Avenue,Longhua,Shenzhen G.D. China.

4.2 General Description of E.U.T.

Product description:	Parking sensor wireless
Model No.:	EASY-100 WIRELESS PS4

4.3 Details of E.U.T.

Power Supply: DC 12V -24V

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 Parking sensor wireless. The standards used were FCC 15 Paragraph 15.231, Paragraph 15.205, Paragraph 15.31,Paragraph 15.33, Paragraph 15.35.

4.6 Test Facility

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

- **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.June 24, 2008.

4.7 Test Location

All Emissions tests were performed at:-

1/F, Fukangtai Building, West Baima Rd., Songgang Street,
Baoan District, Shenzhen 518105, China

5 Equipment Used during Test

Equipment	Brand Name	Model	Related standards	Cal.Intal Months	Last Cal. Date	Serial No
3m Anechoic chamber						
EMC Analyzer	Agilent	E7405A	ISO9001:2000	12	Jan-08	MY4511494 3
Trilog Broadband Antenne 30-3000 MHz	SCHWARZB ECK MESS-ELEKTROM	VULB9163	EN/ISO/IEC 17025 DIN EN ISO9001	12	Jan-08	336
Broad-band Horn Antenna	SCHWARZB ECK MESS-ELEKTROM	BBHA 9120 D	EN/ISO/IEC 17025 DIN EN ISO9001	12	Jan-08	667
Broadband Preamplifier	SCHWARZB ECK MESS-ELEKTROM	BBV 9718	EN/ISO/IEC 17025 DIN EN ISO9001	12	Jan-08	9718-148
10m Coaxial Cable with N-male Connectors	SCHWARZB ECK MESS-ELEKTROM	AK 9515 H	EN/ISO/IEC 17025 DIN EN ISO9001	12	Jan-08	-
10m 50 Ohm Coaxial Cable with N-plug,individual length,usable up to 3(5)GHz, Connectors	SCHWARZB ECK MESS-ELEKTROM	AK 9513	EN/ISO/IEC 17025 DIN EN ISO9001	12	Jan-08	-
Positioning Controller	C&C LAB	CC-C-IF	ISO9001	12	Jan-08	MF7802108
Color Monitor	SUNSPO	SP-14C	ISO9001	12	Jan-08	-
EMI Shielded Room						
Test Receiver	ROHDE&SC HWARZ	ESPI	ISO9001	12	Jan-08	101155
Two-Line V-Network	ROHDE&SC HWARZ	ENV216	ISO9001 EN/ISO/IEC 17025	12	Jan-08	100115
Absorbing Clamp	ROHDE&SC HWARZ	MDS-21	ISO9001 EN/ISO/IEC 17025	12	Jan-08	100205

10m 50 Ohm Coaxial Cable with N- plug,individual length,usable up to 3(5)GHz, Connectors	SCHWARZB ECK MESS- ELEKTROM	AK 9514	EN/ISO/IEC 17025 DIN EN ISO9001	12	Jan-08	-
--	-----------------------------------	---------	---------------------------------------	----	--------	---

6 Conducted Emission Test

Product Name:	Parking sensor wireless
Test Requirement:	FCC Part15 Paragraph 15.207
Test Method:	Based on FCC Part15 Paragraph 15.207
Test Date:
Frequency Range:	150kHz to 30MHz
Class:	Class B
Detector:	Peak for pre-scan (9kHz Resolution Bandwidth) Quasi-Peak & Average if maximised peak within 6dB of Average Limit

6.1 Test Equipment

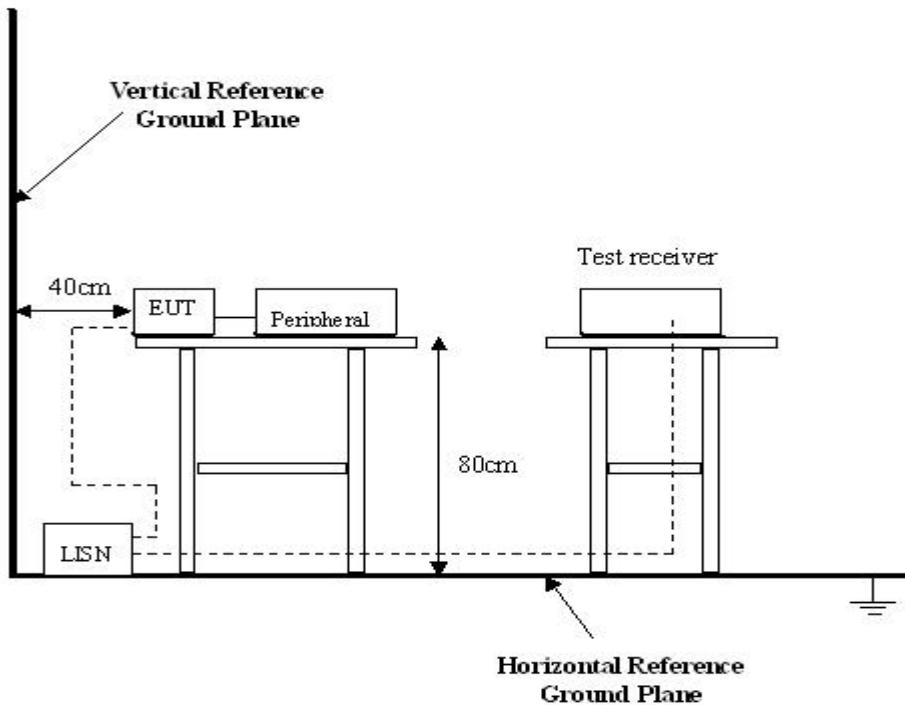
Please refer to Section 5 this report.

6.2 Test Procedure

1. The EUT was tested according to ANSI C63.4: 2003. The frequency spectrum from 150kHz to 30MHz was investigated.
2. 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.

6.3 Conducted Test Setup

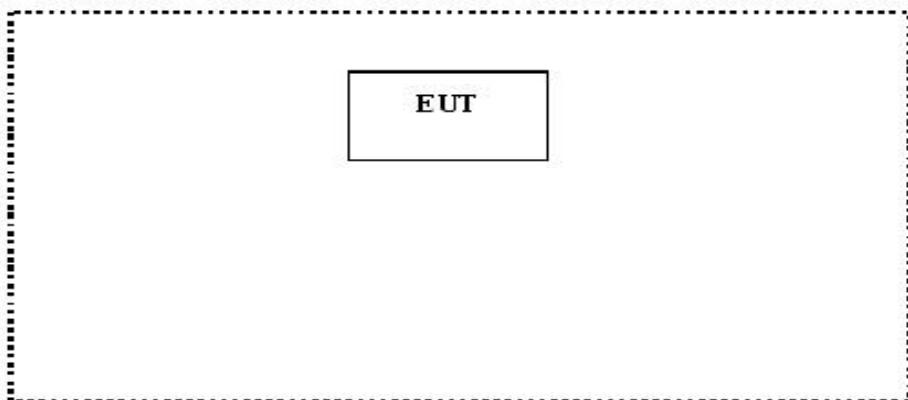
The conducted emission tests were performed using the setup accordance with the ANSI C63.4: 2003, The specification used in this report was the FCC Part15 Paragraph 15.207 limits.



6.4 EUT Operating Condition

Operating condition is according to ANSI C63.4: 2003.

- A. Setup the EUT and simulators as shown on follow.
- B. Enable RF signal and confirm EUT active.
- C. Modulate output capacity of EUT up to specification.



6.5 Conducted Emission Limits

66-56 dB μ V/m between 0.15MHz & 0.5MHz

56 dB μ V/m between 0.5MHz & 5MHz

60 dB μ V/m between 5MHz & 30MHz

Note: In the above limits, the tighter limit applies at the band edges.

6.6 Conducted Emission Test Data

Owing to the DC operation of EUT, this test is not performed.

7 Radiation Emission Test

Product Name:	Parking sensor wireless
Test Requirement:	FCC Part15 Paragraph 15.231
Test Method:	Based on FCC Part15 Paragraph 15.33
Test Date:	July 16,2008
Frequency Range:	30MHz to 5GHz
Measurement Distance:	3m
Detector:	Peak for pre-scan (120kHz resolution bandwidth) Quasi-Peak if maximised peak within 6dB of limit

7.1 Test Equipment

Please refer to Section 5 this report.

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 ANSI C63.4: 2003, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at Waltek EMC Lab is +4.0 dB.

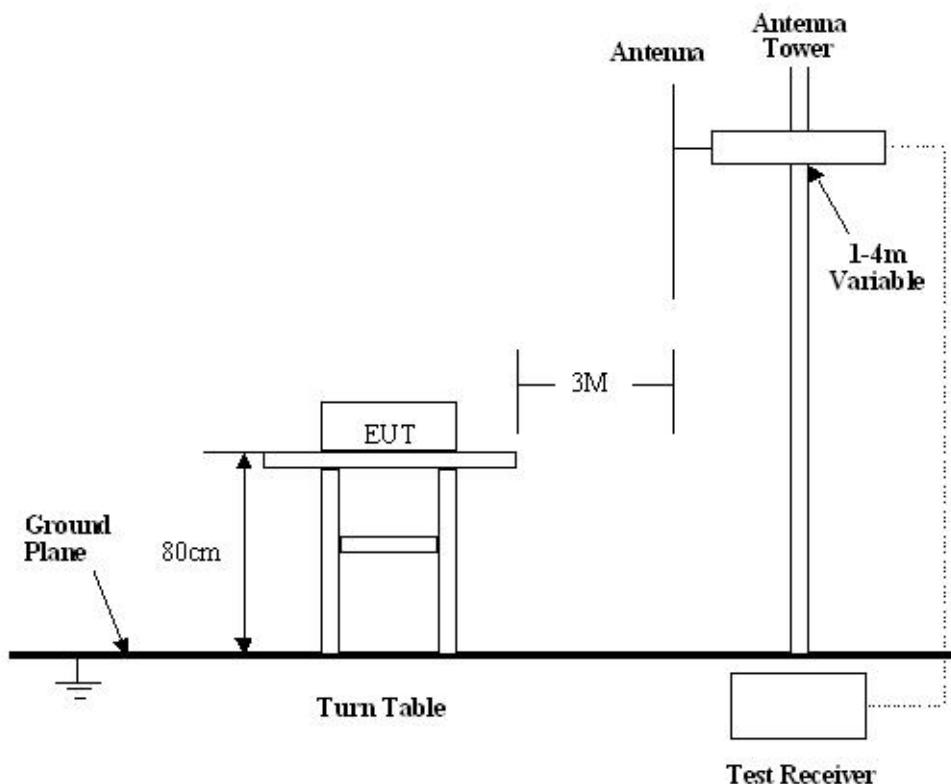
7.3 Test Procedure

1. For the radiated emissions test, since the EUT does not have a power source, there was not connection to AC outlets.
2. Maximizing procedure was performed on the six (6) highest emissions to ensure EUT is compliant with all installation combinations.
3. All data was recorded in the peak and average detection mode.
4. The EUT was under working mode during the final qualification test and the configuration was used to represent the worst case results.

7.4 Radiated Test 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 Paragraph 15.231, Paragraph 15.209 limits.



7.5 Spectrum Analyzer Setup

According to FCC Part15 Paragraph 15.231 Rules, the system was tested to 5000 MHz.

Start Frequency	30 MHz
Stop Frequency	5000 MHz
Sweep Speed Auto	
IF Bandwidth	100 kHz
Video Bandwidth	1 MHz
Quasi-Peak Adapter Bandwidth	120 kHz
Quasi-Peak Adapter Mode	Normal
Resolution Bandwidth	1MHz

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 $-7\text{dB}\mu\text{V}$ means the emission is $7\text{dB}\mu\text{V}$ 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 section 7.10, the EUT complied with the FCC Part15 Paragraph 15.231 standards.

7.8 EUT Operating Condition

Same as section 6.4 of this report.

7.9 Radiated Emissions Limit

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40.66-40.70.....	1,000.....	100
70-130.....	1,250.....	125
130-174.....	\1\ 1,250 to 3,750	\1\ 125 to 375
174-260.....	3,750.....	375
260-470.....	\1\ 3,750 to 12,500.	\1\ 375 to 1,250
Above 470.....	12,500.....	1,250

7.10 Radiated Emissions Test Result

Formula of conversion factors: the field strength at 3m was established by adding The meter reading of the spectrum analyser (which is set to read in units of dBuV) To the antenna correction factor supplied by the antenna manufacturer. The antenna Correction factors are stated in terms of dB. The gain of the pressleter was accounted For in the spectrum analyser meter reading.

Example:

Freq(MHz) Meter Reading +ACF=FS
33 20dBuV+10.36dB=30.36dBuV/m @3m

7.10.1 Radiated Emission Test Data

Test Item:	Radiated Emission Test Data
Test Voltage:	DC 12V
Test Mode:	TX On
Temperature:	24 °C
Humidity:	52%RH
Test Result:	PASS

Frequency (MHz)	Antenna Polarization	Emission Level (dBuV/m)	FCC 15 Subpart C Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Turntable Angle (°)
433.92	Vertical	57.08	72.87	15.79	2.0	60
433.92	Horizontal	67.89	72.87	4.98	1.5	45
867.831	Vertical	43.84	52.87	9.03	2.0	60
1301.76	Vertical	41.35	54.00	12.65	1.0	100
1735.58	Vertical	33.89	54.00	20.11	1.5	100
2169.60	Vertical	33.63	54.00	20.37	1.5	120
2603.52	Vertical	34.52	54.00	19.48	1.0	180
3037.44	Vertical	26.05	54.00	27.95	2.0	90
3471.36	Vertical	21.28	54.00	32.72	2.0	90
3905.28	Vertical	20.89	54.00	33.11	1.5	60
4339.20	Vertical	20.17	54.00	33.83	1.0	60
867.831	Horizontal	43.19	52.87	9.68	1.5	90
1301.76	Horizontal	35.82	54.00	18.18	1.0	60
1735.58	Horizontal	28.19	54.00	25.81	1.5	45
2169.60	Horizontal	34.02	54.00	19.98	2.0	100
2603.52	Horizontal	28.22	54.00	25.78	2.0	180
3037.44	Horizontal	25.65	54.00	28.35	1.5	120
3471.36	Horizontal	25.47	54.00	28.53	1.5	120
3905.28	Horizontal	24.25	54.00	29.75	1.5	100
4339.20	Horizontal	20.19	54.00	33.81	1.0	60

Where F is the frequency in MHz, The formulas for calculating the maximum permitted fundamental field strengths are as follows:

- (1). For the band 130-174MHz,uV/m at 3 meters=22.72727(F)-2454.545;
- (2). For the band 260-470MHz,uV/m at 3 meters=16.6667(F)-2833.3333.

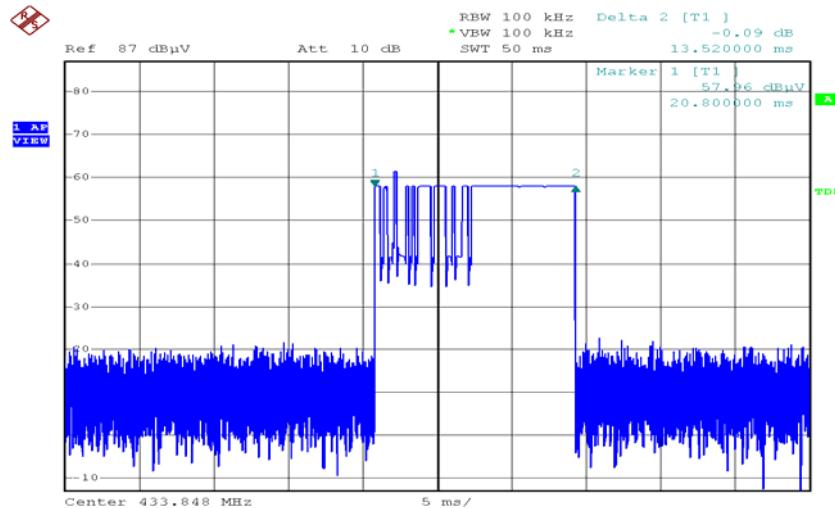
Sample calculation of limit @ 433.92MHz

$$16.6667 (433.92) - 2833.333 = 4893.68 \text{ V/m}$$

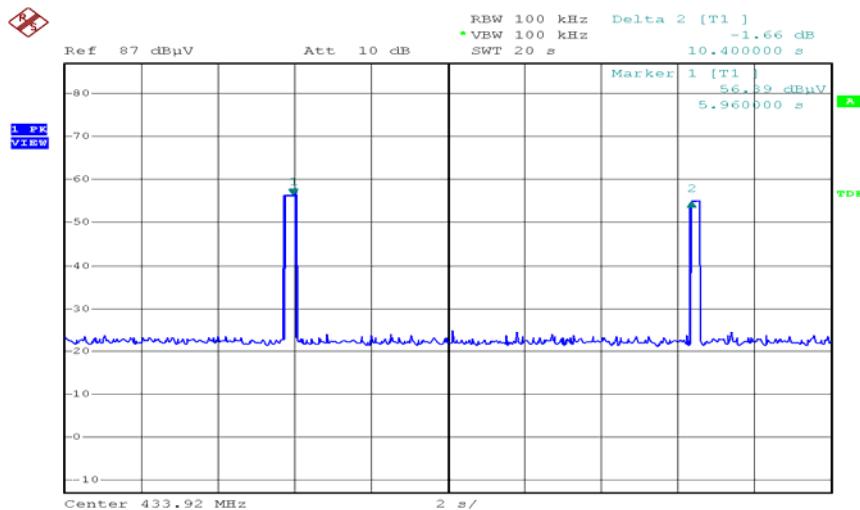
$$20\log(4893.68) = 72.8664 \text{ dBuV/m limit @ 433.92MHz}$$

8 Periodic Operation

Refer to the plot (as below), We find each the duration transmission for the device is about 13.5 ms and silent period between transmissions is about 10.4 seconds, This device does meet the FCC requirement.



1
Date: 24.JUN.2008 09:43:45



1
Date: 9.APR.2008 13:52:42

9 Band Edge

Test Requirement:	FCC Part15 C
Test Method:	Based on FCC Part15 Paragraph 15.231
Test Date:	June 18, 2008
Test mode:	TX On
Temperature:	24 °C
Humidity:	52% RH

9.1 Test Procedure

1. The transmitter output (antenna port) was connected to the spectrum analyzer. EUT and its simulators are placed on a table, let EUT working in test mode, then test it.
2. The bandwidth of the fundamental frequency was measured by spectrum analyser with 100KHz RBW and 100KHz VBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power 20dB.

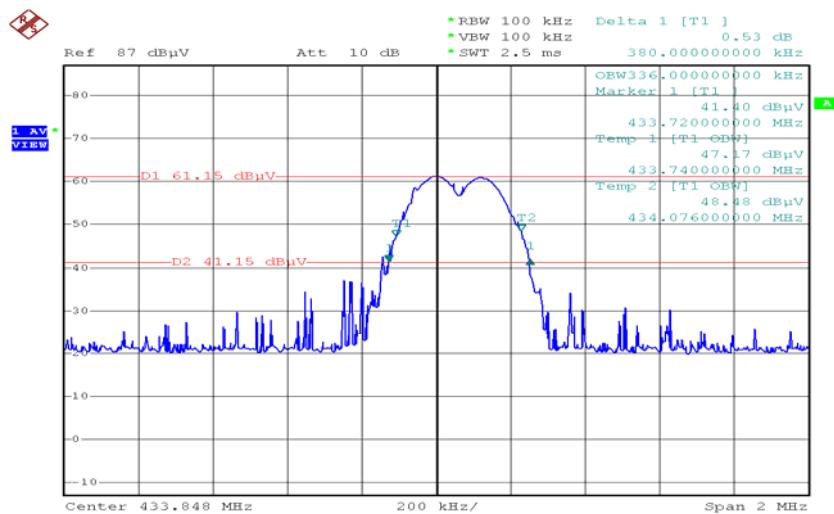
9.2 Band Edge

Requirements: The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

Frequency (MHz)	Bandwidth Emission (KHz)	Limit (KHz)	Result
433.92	380	1084.8	Pass

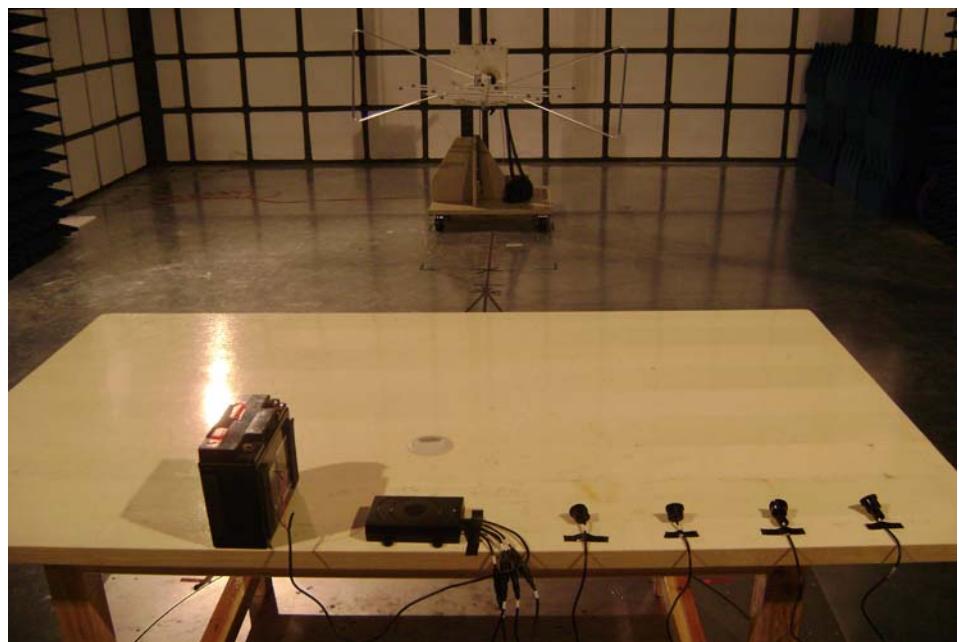
9.3 Band Edge Test Result

433.92MHz TX

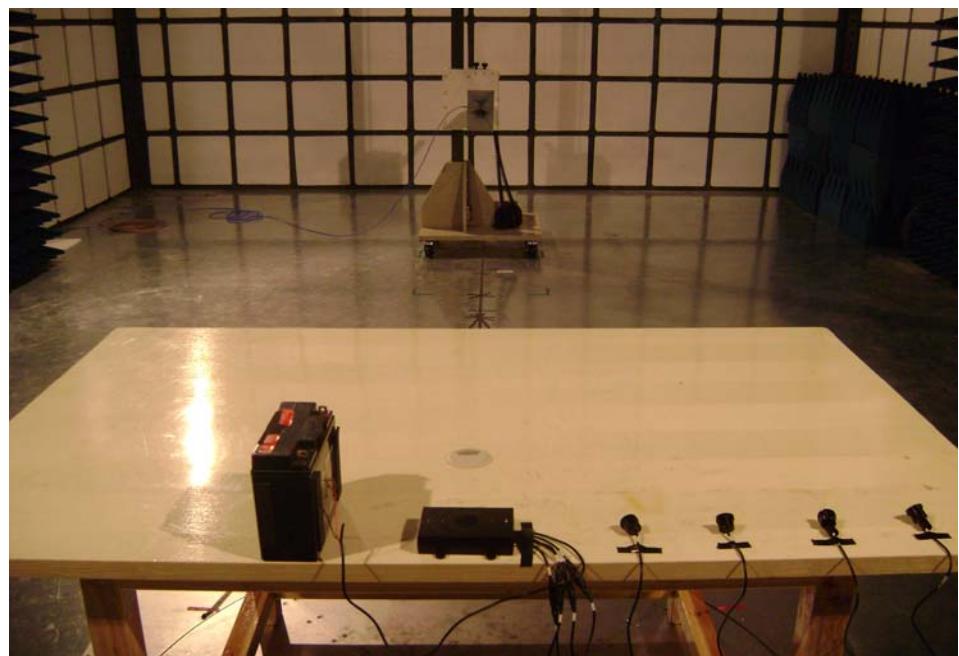


10 Photographs of Testing

10.1 Radiation Emission Test View For 30MHz-1000MHz



10.2 Radiation Emission Test View For 1GHz-5GHz



11 Photographs - Constructional Details

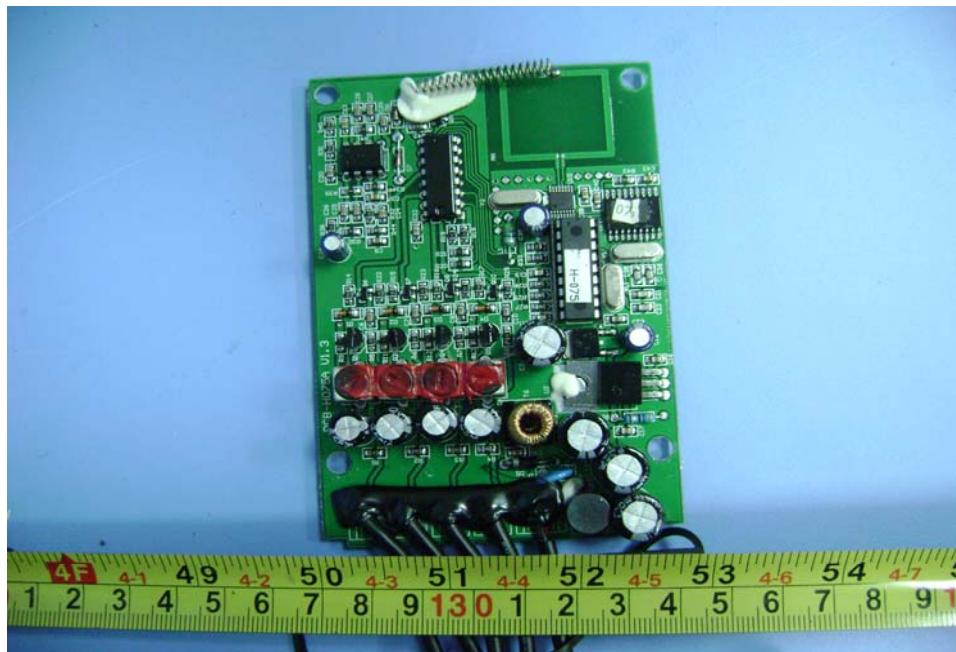
11.1 EUT - Front View



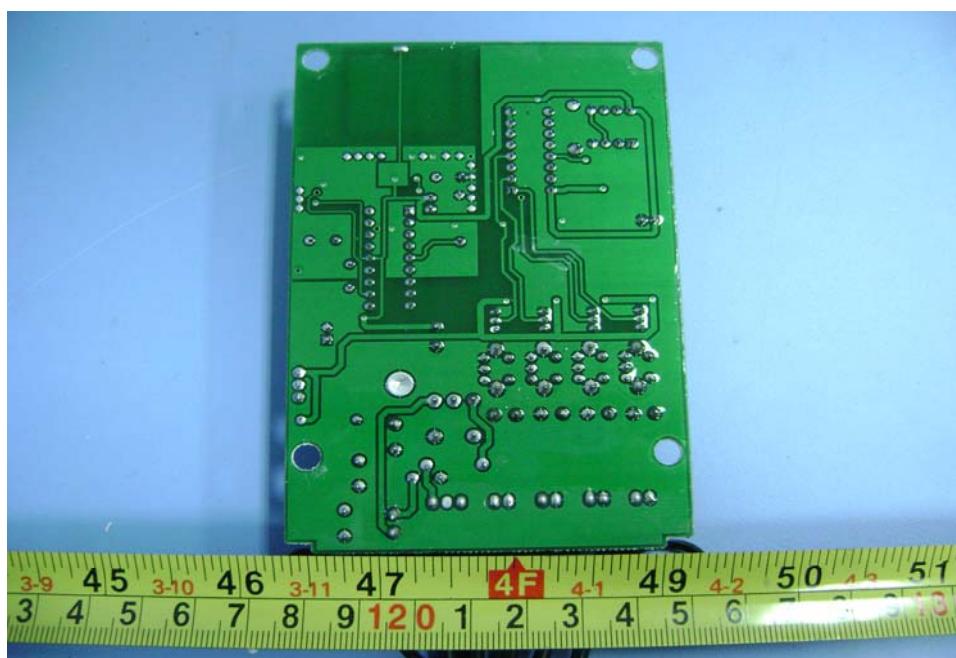
11.2 EUT - Back View



11.3 PCB-Front View



11.4 PCB-Back View



12 FCC ID 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 Bottom View/proposed FCC label Location

