

# FCC PART 15 SUBPART C EMI MEASUREMENT AND TEST REPORT

FOR

Beijing Lantian Haodi Science & Technology Co., Ltd.  
Room 2708, Baolong No. 2 BuildiScieng, Sience Town, Fengtai District  
Beijing, CHINA

**FCC ID: ULG001**

**Model: PAS/WL**

August 8, 2006

<b>This Report Concerns:</b> <input checked="" type="checkbox"/> Original Report	<b>Equipment Type:</b> Parking Assistance System
<b>Test Engineer:</b> Xiting Shi/ <i>Xiting Shi</i>	
<b>Test Firm :</b> Jiangsu Electronic Products Supervision & Inspection Institute , FCC Registered Test Site Number:399439	
<b>Test Date:</b> August 3, 2006	
<b>Test report:</b> RECWG20060801	
<b>Reviewed By:</b> <i>Wei Chen</i> Chen Wei- Director, EMC Lab	
<b>Prepared By:</b> Easy Compliance Work Group Co., Ltd. Room A1206, Building 5, No.3 Gate, Yan Jing Li Zhong Jie, Chaoyang District, Beijing,China Tel86 -10-65918849 Fax: 86-10-65918039	

**Note:** This test report is specially limited to the above client company and product model only. It may not be duplicated without prior written consent of Easy Compliance Work Group Co., Ltd. This report **must not** be used by the client to claim product endorsement by any agency of the U.S. government

**TABLE OF CONTENTS**

<b>1 - GENERAL INFORMATION.....</b>	<b>3</b>
1.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT).....	3
1.2 OBJECTIVE .....	3
1.3 RELATED SUBMITTAL(S)/GRANT(S) .....	3
1.4 TEST METHODOLOGY.....	3
1.5 TEST FACILITY .....	3
1.6 TEST EQUIPMENT LIST AND DETAILS .....	4
<b>2 - SYSTEM TEST CONFIGURATION.....</b>	<b>5</b>
2.1 JUSTIFICATION .....	5
2.2 BLOCK DIAGRAM& SCHEMATICS.....	5
2.3 EUT EXERCISE SOFTWARE .....	5
2.4 SPECIAL ACCESSORIES .....	5
2.5 EQUIPMENT MODIFICATIONS .....	5
2.6 CONFIGURATION OF TEST SYSTEM.....	5
<b>3 - SUMMARY OF TEST RESULTS.....</b>	<b>6</b>
<b>§15.203 - ANTENNA REQUIREMENT.....</b>	<b>7</b>
<b>§15.205, §15.209, §15.231 (E)- RADIATED EMISSION.....</b>	<b>8</b>
<b>§15.231(C) 20DB BANDWIDTH TESTING .....</b>	<b>14</b>
<b>§15.231(E)1-DEACTIVATION TESTING.....</b>	<b>16</b>
<b>APPENDIX A – EUT BLOCK DIAGRAM .....</b>	<b>21</b>
<b>APPENDIX B –EUT SCHEMATICS .....</b>	<b>22</b>
<b>APPENDIX C – FCC ID LABEL.....</b>	<b>23</b>
<b>APPENDIX D – EUT EXTERNAL PHOTOS.....</b>	<b>24</b>
<b>APPENDIX E – EUT INTERNAL PHOTOS .....</b>	<b>25</b>
<b>APPENDIX F – EUT TEST PHOTOS .....</b>	<b>26</b>
<b>APPENDIX G – EUT OPERATING DESCRIPTON .....</b>	<b>27</b>
<b>APPENDIX H – EUT USERS MANUAL.....</b>	<b>28</b>

## 1 - GENERAL INFORMATION

---

### 1.1 Product Description for Equipment Under Test (EUT)

The *Beijing Lantian Haodi Science & Technology Co., Ltd.*, model *PAS/WL* or the "EUT" as referred to in this report is 433.92 MHz periodic transmitter of a Parking Assistance System which is measured approximately 104mm L x 73mm W x 23mm H. Input rated voltage: 12V  $\pm$  1.5V DC,

*\*\* The test data gathered are from an engineering sample, serial number: 065WLA0152, provided by the manufacturer, we receive the EUT on 2006-8-1.*

### 1.2 Objective

This document is a test report based on the Electromagnetic Interference (EMI) tests performed on the EUT. The EMI measurements were performed according to the measurement procedure described in ANSI C63.4 - 2003.

**The EUT is 433.92 MHz periodic transmitter of a Parking Assistance System, so the applicable sections of FCC Rules are: 15.203, 15.205, 15.209 and 15.231 (e)**

**The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.209 and 15.231 (e) rules.**

### 1.3 Related Submittal(s)/Grant(s)

No Related Submittals

### 1.4 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4 –2001, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz. All radiated and conducted emissions measurement was performed at JIANGSU ELECTRONIC PRODUCTS SUPERVISION & INSPECTION INSTITUTE. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

### 1.5 Test Facility

The 3 meter anechoic chamber test site used by JIANGSU ELECTRONIC PRODUCTS SUPERVISION & INSPECTION INSTITUTE to collect radiated and conducted emission measurement data is located in the No.107 Ge lane, Zhongqiao, Wuxi, Jiangsu Province, China.

Test site at JIANGSU ELECTRONIC PRODUCTS SUPERVISION & INSPECTION INSTITUTE has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports has been found to be in compliance with the requirements of 2.948 of the FCC Rules on November 04, 2004. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 399439. The test site has been approved by the FCC and is listed in the FCC Public Access Link (PAL) database.

**16 Test Equipment List and Details**

Test Equipment	Model	Serial No.	Manufacturer	Last Cal.	Cal. Due Date
EMI TEST RECEIVER	ESCI	1166.595003 100065	ROHDE&SCWARZ	05.11.23	06.11.22
BILOG ANTENNA	CBL6112	117.0800.20	CHASE	06.2.17	07.2.16
Spectrum Analyzer	E4440A	US45303119	Agilent	06.03.9	2007.03.9
Broad-Band Horn Antenna	BBHA9120D	513	Schwarzbeck	06.1.10	07.1.9
Preamplifier	8449B	3008A02200	Agilent	06.1.28	07.1.27
Anechoic Chamber	FACT-3	601	LINDGREN	06.1.10	07.1.9

Note: All testing were performed using internationally recognized standards. All test instruments were calibrated and traceable to the National Institute of Standards and Technology (NIST).

## 2 - SYSTEM TEST CONFIGURATION

---

### 2.1 Justification

The EUT was configured for testing in a typical fashion (as normally used in a typical application).

The final qualification test was performed with the EUT operating at normal mode, refer to

Appendix G: Operating Description

### 2.2 Block Diagram& Schematics

Appendix A contains a copy of the EUT's block diagram as reference.

Appendix B contains a copy of the EUT's Schematics as reference.

### 2.3 EUT Exercise Software

N/A.

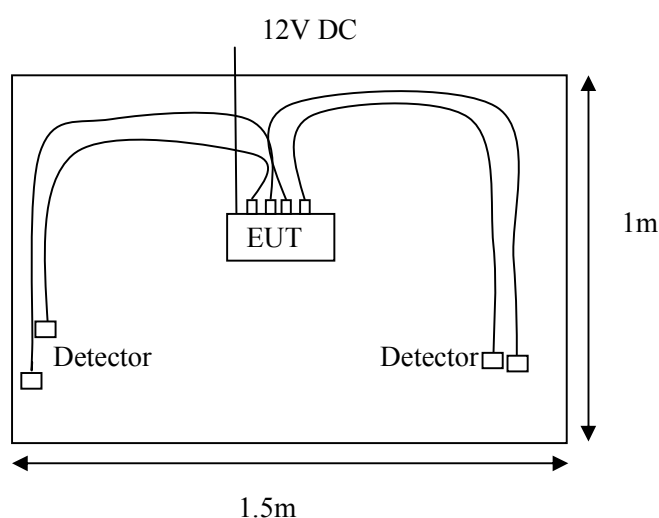
### 2.4 Special Accessories

The EUT is a transmitter of a Parking Assistance System, and it communicates with the receiver of Parking Assistance System when it normally operating. Appendix D contains external photos of EUT and the receiver with relevant display devices.

### 25Equipment Modifications

No modifications were made by JIANGSU ELECTRONIC PRODUCTS SUPERVISION & INSPECTION INSTITUTE to ensure the EUT to comply with the applicable limits and requirements.

### 26Configuration of Test System



### 3 - SUMMARY OF TEST RESULTS

FCC Rules	REQUIREMENTS	SUMMARY	RESULT
FCC 15.203	Antenna Requirement	<i>§ 15.203</i>	Compliant
FCC 15.205	Restricted Band	<i>§ 15.205</i>	Compliant
FCC 15.209	General Requirement	<i>§ 15.209</i>	Compliant
FCC 15.231(e)	Field Strength	<i>§ 15.231(e)</i>	Compliant
FCC 15.231(c)	20dB Bandwidth	<i>§ 15.231(c)</i>	Compliant
FCC 15.231 (e)1	Deactivation Testing	<i>§ 15.231(e)1</i>	Compliant

## **§15.203 - ANTENNA REQUIREMENT**

---

### **Standard Applicable**

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.

Refer to Appendix E: EUT Internal Photos

This product has a build on board antenna, fulfill the requirement of this section,

Test Result: Pass

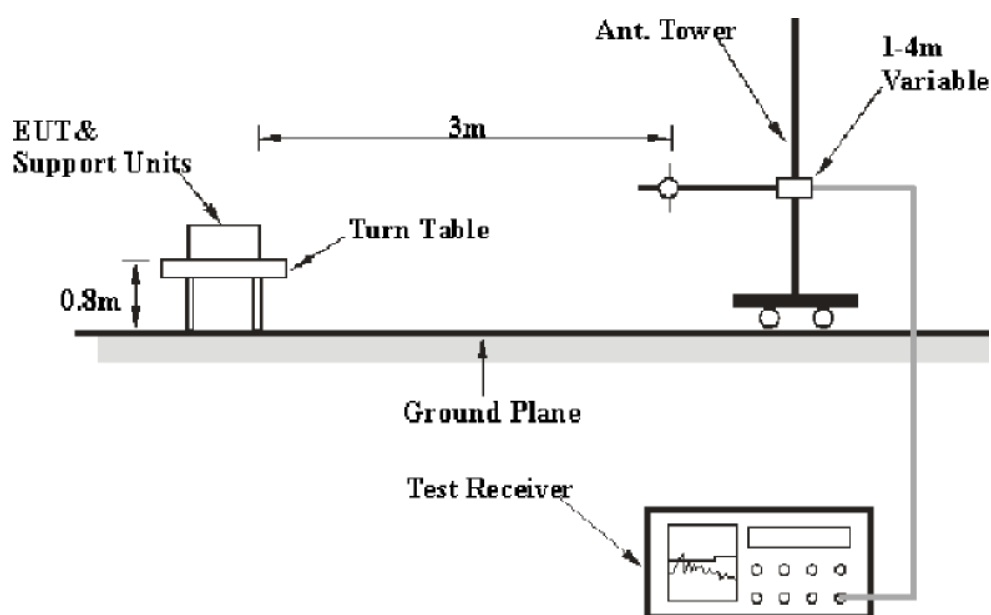
## §15.205, §15.209, §15.231 (E)- RADIATED EMISSION

### Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in 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 JIANGSU ELECTRONIC PRODUCTS SUPERVISION & INSPECTION INSTITUTE is  $\pm 4.0$  dB.

### EUT Setup



The radiated emission tests were performed in the 3 meters chamber B test site, using the setup accordance with the ANSI C63.4 - 2003. The specification used was the FCC 15 § 15.209 and 15.231.

### EMI Test Receiver Setup

The system was investigated from 30 MHz to 5 GHz. From 30MHz-2GHz use spectrum analyzer function of R/S test receiver, from 2GHz-5GHz, use Agilent spectrum analyzer.

During the radiated emission test, the test receiver and spectrum analyzer was set with the following configurations:

<i>Frequency Range</i>	<i>RBW</i>	<i>VBW</i>
30 – 1000 MHz	100 kHz	300 kHz
1000 MHz – 5 GHz	1 MHz	3 MHz
2GHz – 5GHz	1 MHz	3 MHz



**Test Procedure**

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All data was recorded in the Peak and Average detection mode.

**Standard Applicable**

According to 15.231(e), Intentional radiators may operate at a periodic rate exceeding that specified in paragraph (a) of this section and may be employed for any type of operation, including operation prohibited in paragraph (a) of this section, provided the intentional radiator complies with the provisions of paragraphs (b) through (d) of this section, except the field strength table in paragraph (b) of this section is replaced by the following:

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 .....	500.....	50
130-174 .....	500 to 1,500 \1\.....	50 to 150 \1\
174-260 .....	1,500 .....	150
260-	1,500 to 5,000 \1\.....	150 to 500 \1\
Above 470	5,000 .....	500

\1\Linear interpolations for frequency ranges 130 - 174 MHz and 260 - 470 MHz.

The above field strength limits are specified at a distance of 3-meters the tighter limits apply at the band edges.

**Corrected Amplitude & Margin Calculation**

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

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

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -5.8dB means the emission is 5.8dB below the limit for Class B. The equation for margin calculation is as follows:

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

**Test Results Summary**

According to the data in the following table, the EUT complied with the FCC Part 15.205,15.209 and 15.231, with the worst margin reading of:

**-0.83 dB at 1301.76 MHz in the Vertical polarization.**

**Test Data****Environmental Conditions**

Temperature: 25 °C  
Relative Humidity: 60%  
ATM Pressure: 1009mbar

The testing was performed by Xiting Shi on

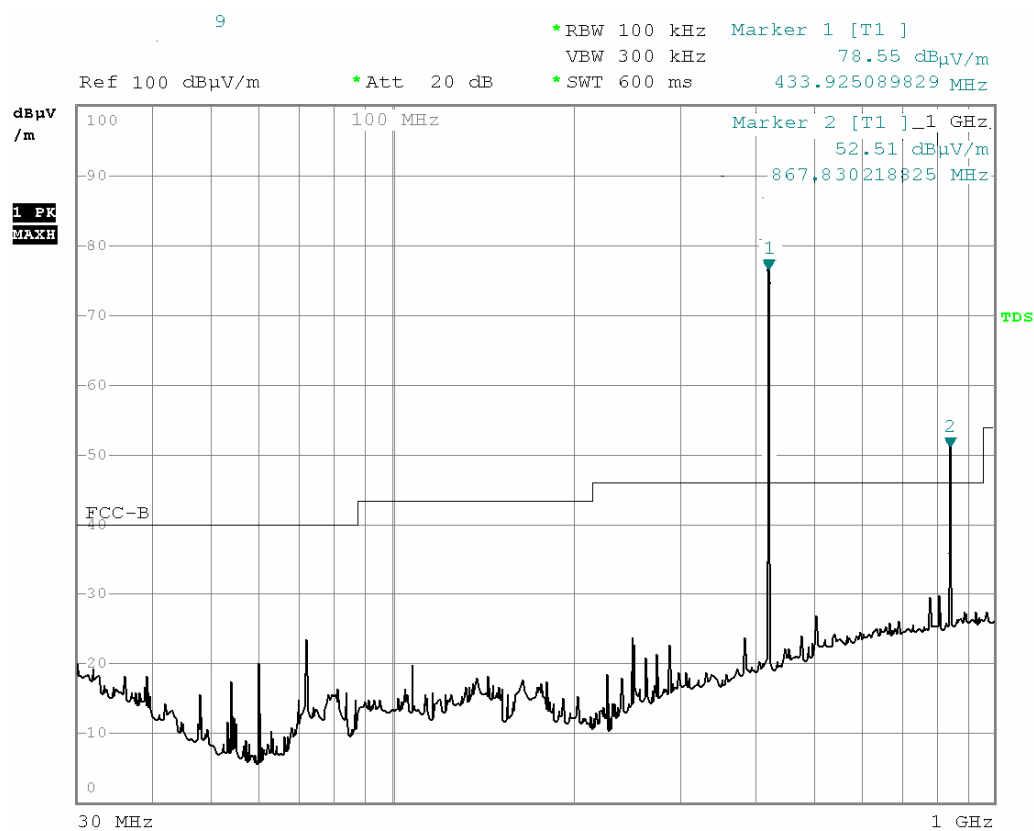
2006-8-3 Test Mode: Transmitting

Frequency MHz	Meter Reading dBuV/m	Detector PK/QP/AV	Direction Degree	Height Meter	Polar H / V	Antenna Loss dB	Cable Loss dB	Amplifier Gain dB	Corr. Ampl. dBuV/m	FCC Part 15.231 & 15.209		
										Limit dBuV/m	Margin dB	Comment
433.92	52.22	AV	65	2.8	H	16.04	1.94	0.00	70.20	72.8	-2.60	Fundamental
433.92	67.83	PK	65	2.7	H	16.04	1.94	0.00	85.81	92.8	-6.99	Fundamental
433.92	53.25	AV	190	1.0	V	16.04	1.94	0.00	71.23	72.8	-1.57	Fundamental
433.92	68.79	PK	180	1.0	V	16.04	1.94	0.00	86.77	92.8	-6.03	Fundamental
867.84	35.58	AV	190	1.0	V	22.17	3.67	20.00	41.42	52.8	-11.38	Harmonic
867.84	35.99	AV	260	1.0	H	22.17	3.67	20.00	41.83	52.8	-10.97	Harmonic
867.84	47.88	PK	185	1.0	V	22.17	3.67	20.00	53.72	72.8	-19.08	Harmonic
867.84	48.26	PK	255	1.0	H	22.17	3.67	20.00	54.10	72.8	-18.70	Harmonic
1301.76	25.90	AV	170	1.0	H	23.12	3.70	20.00	32.72	52.8	-20.08	Harmonic
1301.76	38.79	AV	170	1.0	V	23.12	3.70	20.00	45.61	52.8	-7.19	Harmonic
1301.76	40.51	PK	165	1.0	H	23.12	3.70	20.00	47.33	72.8	-25.47	Harmonic
1301.76	65.15	PK	170	1.0	V	23.12	3.70	20.00	71.97	72.8	-0.83	Harmonic
1578.80	43.67	PK	100	1.3	V	25.27	4.36	20.00	53.30	54.0*	-0.70	Others
1578.80	38.19	PK	60	1.0	H	25.27	4.36	20.00	47.82	54.0*	-6.18	Others
1735.68	24.89	AV	100	1.0	H	26.12	4.89	20.00	34.90	52.8	-17.9	Harmonic
1735.68	30.81	AV	0	3.2	V	26.12	4.89	20.00	40.82	52.8	-11.98	Harmonic
1735.68	31.43	PK	100	1.0	H	26.12	4.89	20.00	41.44	72.8	-31.36	Harmonic
1735.68	52.25	PK	5	3.3	V	26.12	4.89	20.00	62.26	72.8	-10.54	Harmonic
1906.40	40.09	PK	130	1.0	V	26.34	5.37	20.00	51.80	54.0*	-2.20	Others
1906.40	31.65	PK	90	1.1	H	26.34	5.37	20.00	43.36	54.0*	-10.64	Others
2170.00	44.77	PK	180	1.2	H	26.48	0.56	30.00	47.73	52.8*	-5.07	Harmonic
2170.00	45.20	PK	190	1.2	V	26.48	0.56	30.00	48.16	52.8*	-4.64	Harmonic

\* The corrected Peak value less than relevant Average value Limit

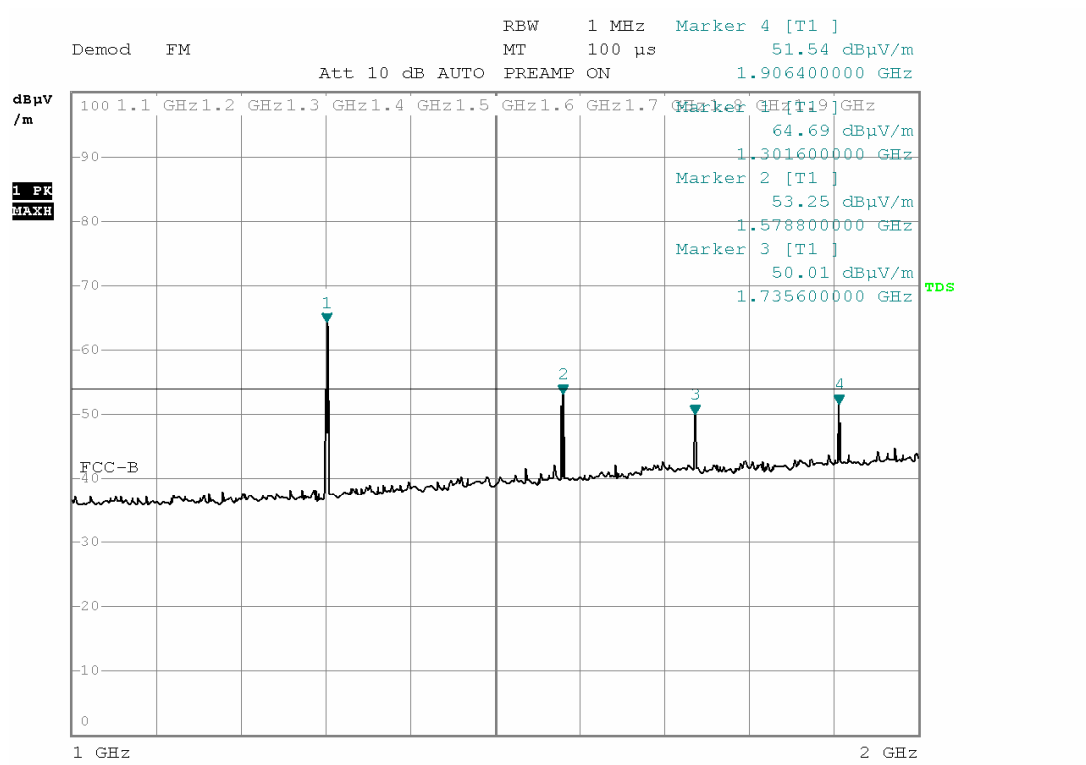
### Plot(s) of Test Data

Plot(s) of Test Data is presented hereinafter as reference.

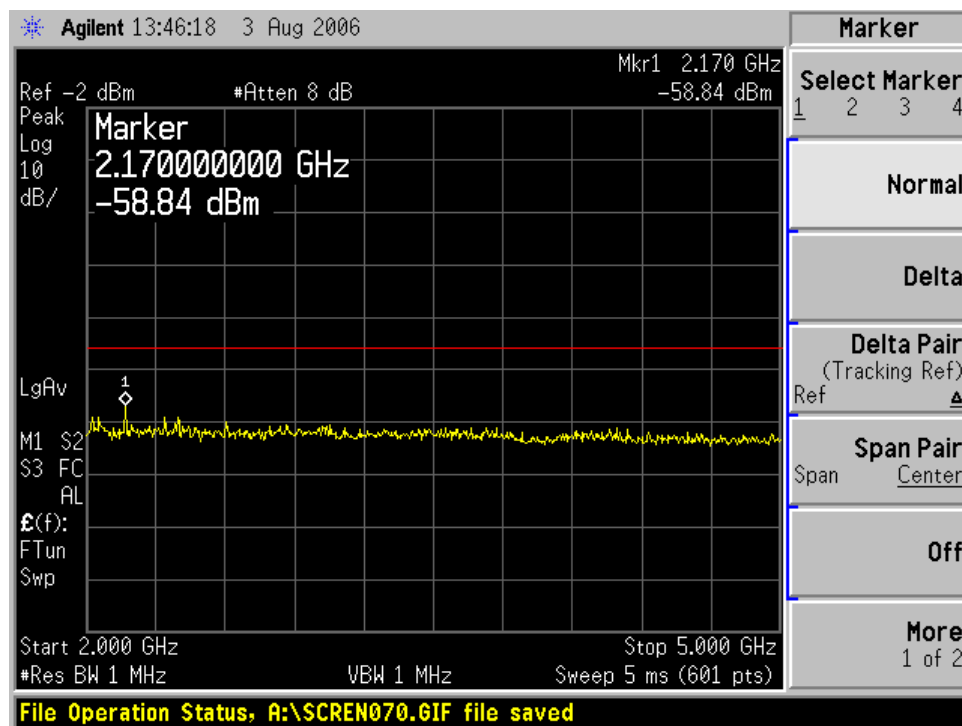


ABC

Date: 3.AUG.2006 11:02:19



ABC  
Date: 3.AUG.2006 11:56:41



## §15.231(C) 20DB BANDWIDTH TESTING

---

### Requirement

Per 15.231( c ),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. Bandwidth is determined at the points 20 dB down from the modulated carrier.

### Test Procedure

With the EUT's antenna attached, the EUT's 20dB Bandwidth power was received by the test antenna which was connected to the spectrum analyzer with the START and STOP frequencies set to the EUT's operation band.

### Test Data

#### Environmental Conditions

Temperature: 25 ° C  
Relative Humidity: 60%  
ATM Pressure: 1009mbar

*The testing was performed by Xiting Shi on 2006-8-22.*

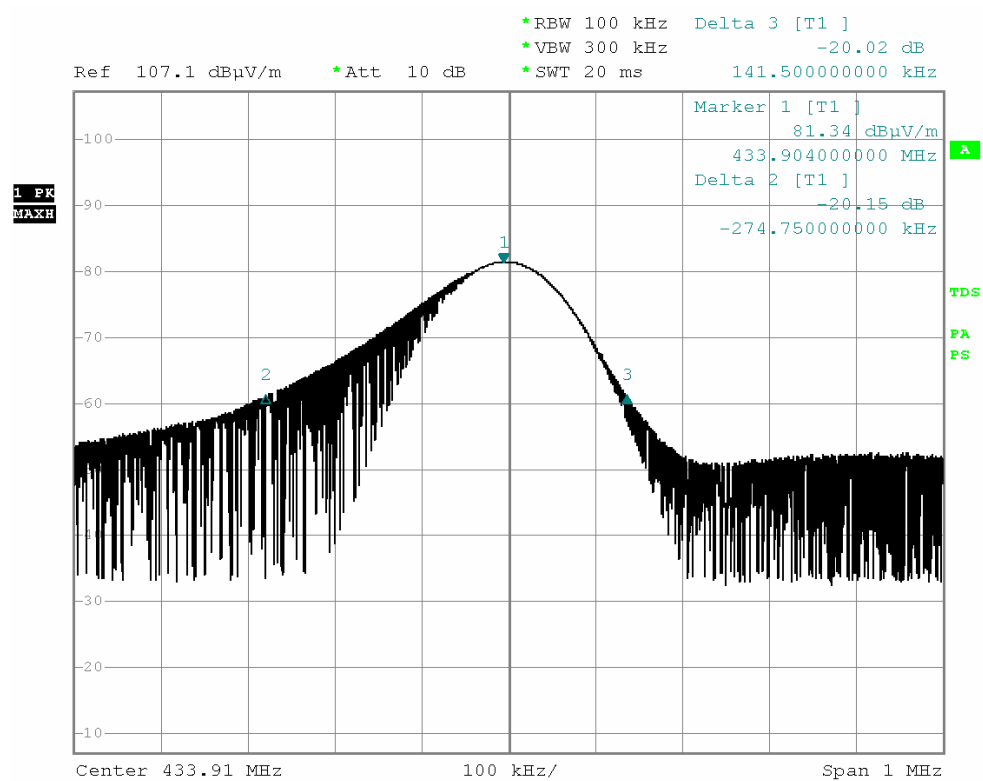
*Test Mode: Transmitting*

Frequency (MHz)	20dB Bandwidth (kHz)	Limit (kHz)	Result
433.92	141.5	1084.80	PASS

Limit=Frequency×0.25%= 433.92×0.25%= 1084.80 kHz Test

Result :Pass

Refer to the attached plots.



ABC

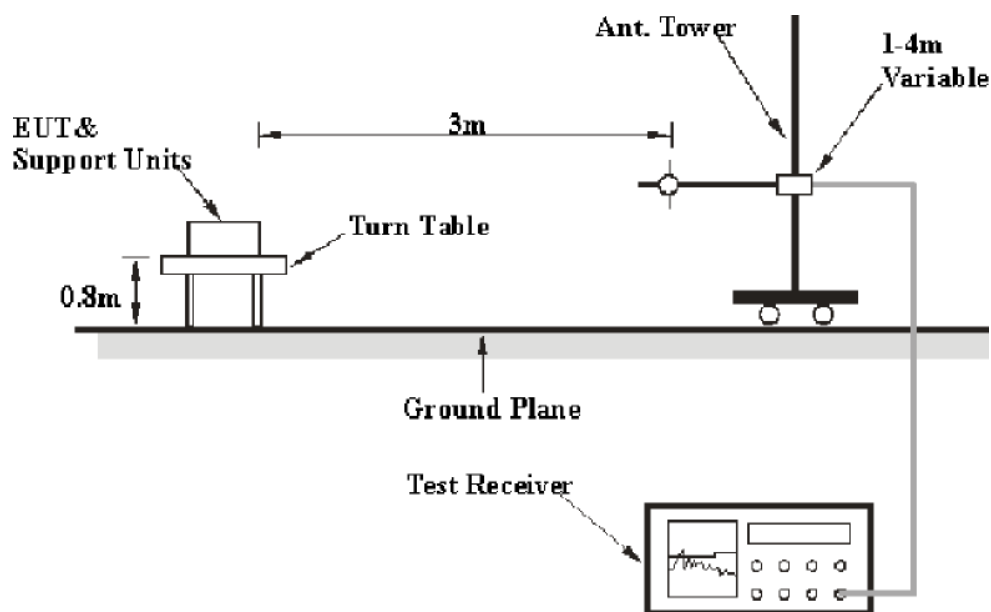
Date: 3.AUG.2006 16:32:06

## §15.231(E)1-DEACTIVATION TESTING

### Requirement

Per 15.231(e), In addition, devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

### EUT Setup



The deactivation test was performed in the 3 meters chamber B test site, using the setup accordance with the ANSI C63.4 - 2003. The specification used was the FCC 15.231(e) limits.

### Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

### Test Data

#### Environmental Conditions

Temperature: 25 °C  
Relative Humidity: 50%  
ATM Pressure: 1032mbar



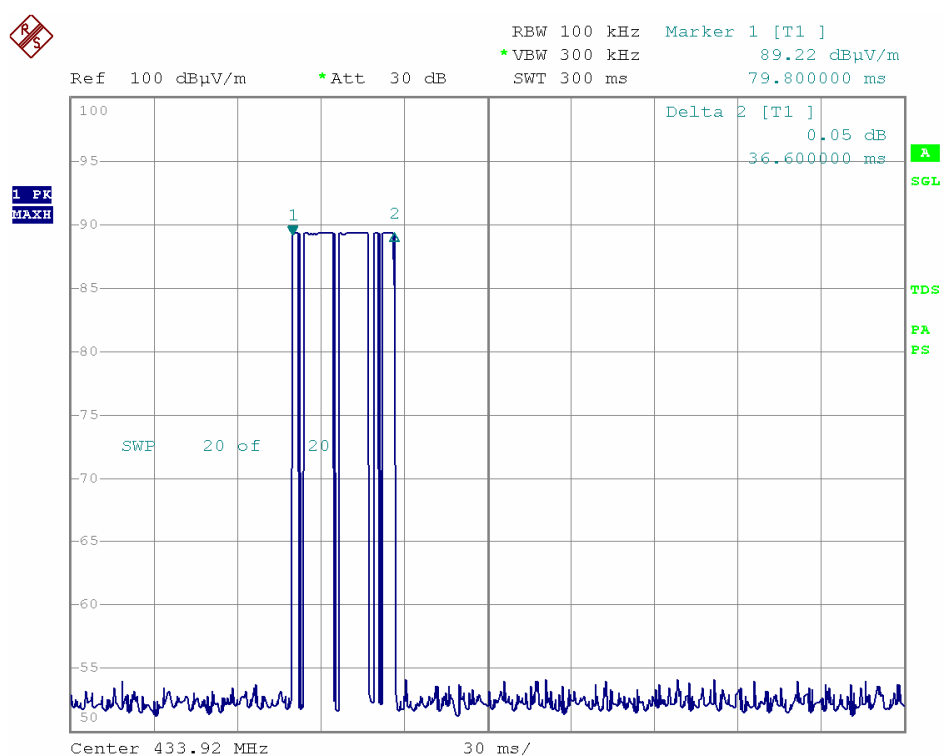
The testing was performed by Xiting Shi on 2006-8-3.

Test Mode: Transmitting

Frequency (M Hz)	Transmitting Time (Second)		Limit (Second)	Result
433.92	T <sub>on</sub>	0.0366	1	PASS
433.92	Silent	11.12	1.098*	PASS
			10	

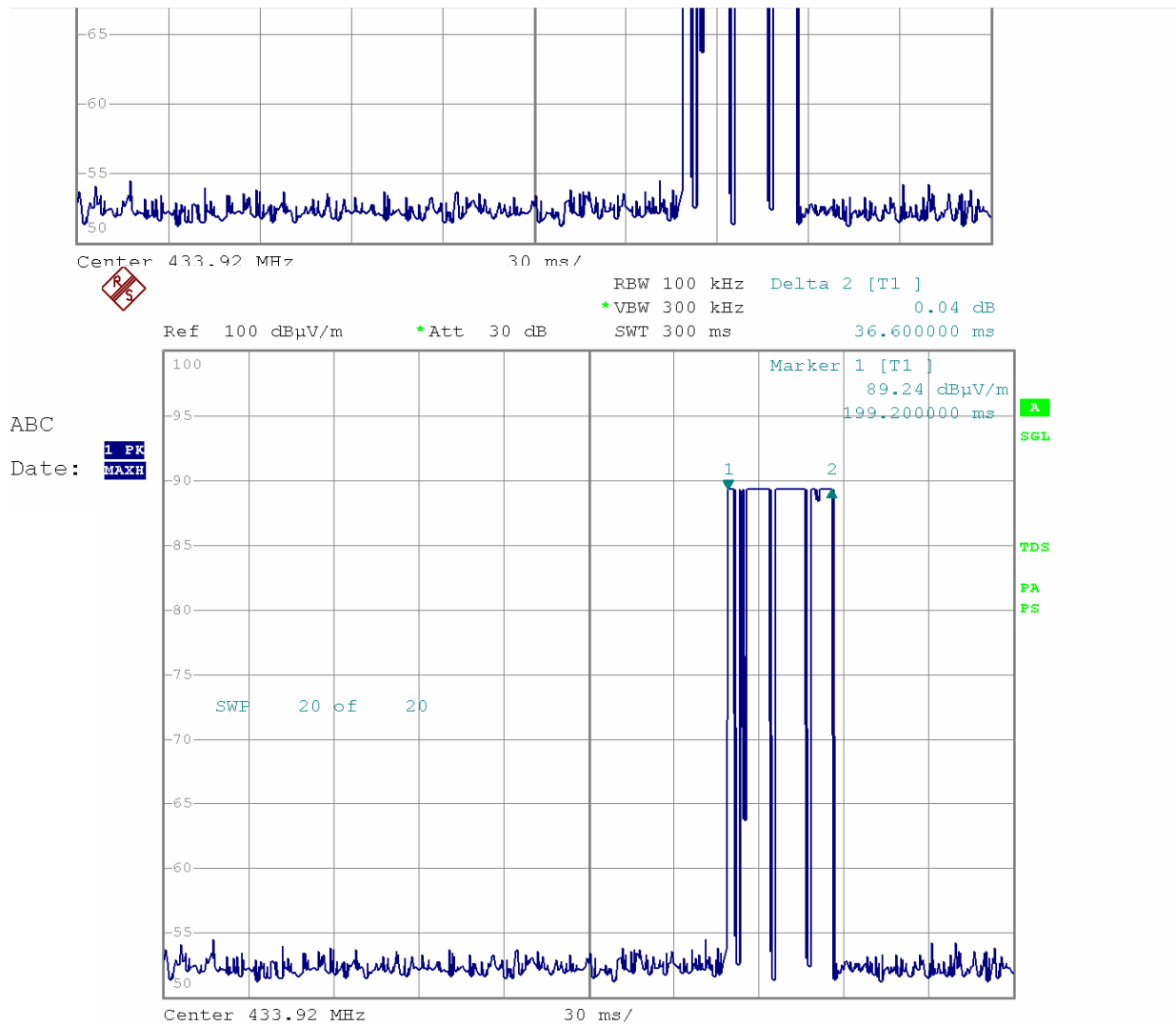
\*:0.0366x30=1.098

Refer to the attached plots.



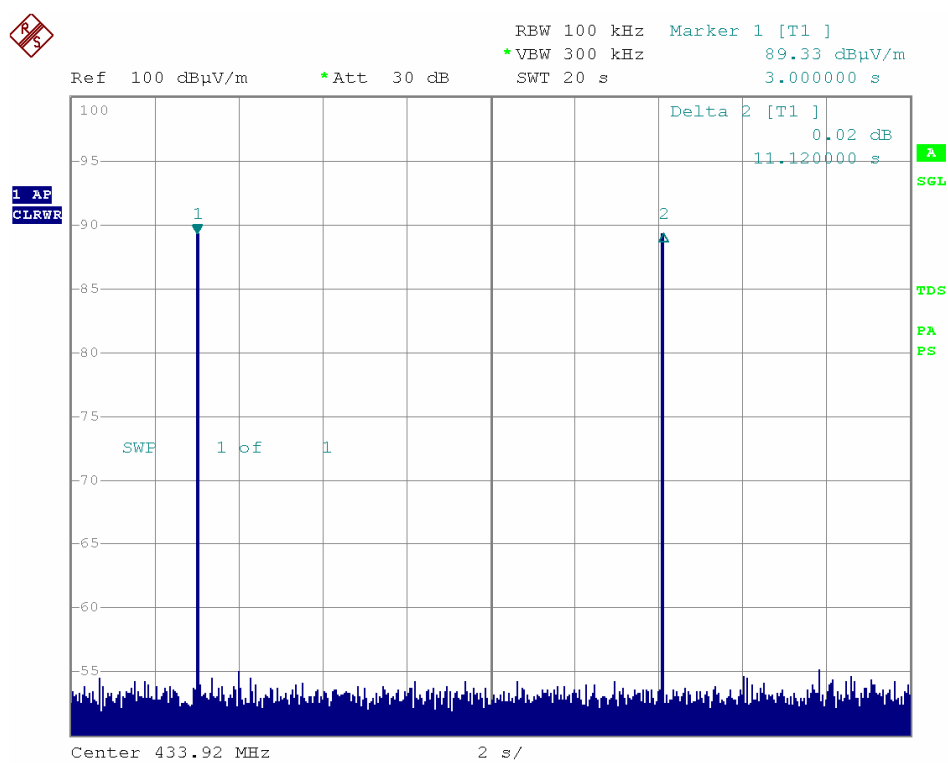
ABC

Date: 3.AUG.2006 15:57:19



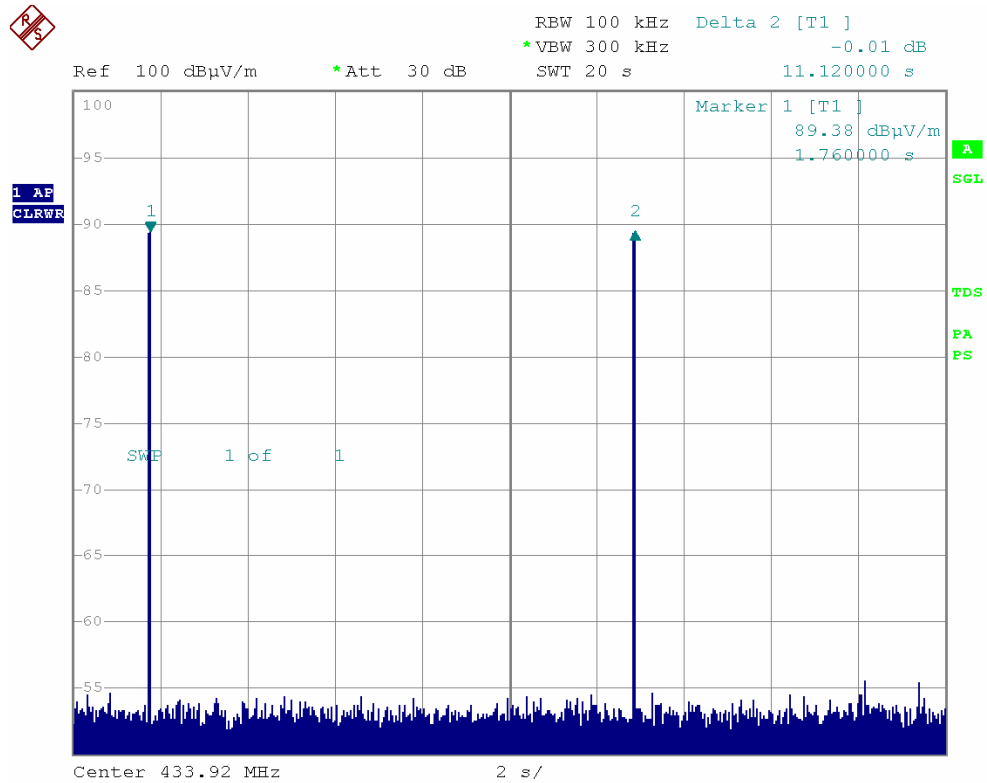
ABC

Date: 3.AUG.2006 15:55:57



ABC

Date: 3.AUG.2006 15:42:54



ABC

Date: 3.AUG.2006 15:39:28

## **Appendix A – EUT BLOCK DIAGRAM**

---

## **Appendix B –EUT SCHEMATICS**

---

## **Appendix C – FCC ID LABEL**

---

## **Appendix D – EUT EXTERNAL PHOTOS**

---



## **Appendix E – EUT INTERNAL PHOTOS**

---

## **Appendix F – EUT TEST PHOTOS**

---

## **Appendix G – EUT OPERATING DESCRIPTON**

---

## **Appendix H – EUT USERS MANUAL**

---