

FCC PART 15.231  
MEASUREMENT AND TEST REPORT  
For  
**Aurum Electronics Corp.**

No. 160, Dayong Rd., Yongkang City, Tainan Hsien, 710, Taiwan

**FCC ID: VQX-939ASD-MIC**

<b>This Report Concerns:</b> <input checked="" type="checkbox"/> Original Report		<b>Equipment Type:</b> Smart Guard Halogen Light	
<b>Test Engineer:</b>	Cinderallar Chen <i>Cinderallar Chen</i>		
<b>Report No.:</b>	RSZ07092701		
<b>Test Date:</b>	2007-10-23 to 2007-12-06		
<b>Report Date:</b>	2007-12-06		
<b>Reviewed By:</b>	EMC Manager: Boni Baniqued <i>Boni Baniqued</i>		
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**Note:** This test report is for the customer shown above and their specific product only. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Shenzhen) This report **must not** be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

## **TABLE OF CONTENTS**

<b>GENERAL INFORMATION.....</b>	<b>4</b>
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT) .....	4
OBJECTIVE .....	4
RELATED SUBMITTAL(S)/GRANT(S).....	4
TEST METHODOLOGY .....	4
TEST FACILITY .....	4
<b>SYSTEM TEST CONFIGURATION.....</b>	<b>6</b>
JUSTIFICATION .....	6
EQUIPMENT MODIFICATIONS .....	6
EXTERNAL I/O CABLE.....	6
CONFIGURATION OF TEST SETUP .....	6
BLOCK DIAGRAM OF TEST SETUP .....	7
<b>SUMMARY OF TEST RESULTS .....</b>	<b>8</b>
<b>§15.203 - ANTENNA REQUIREMENT .....</b>	<b>9</b>
STANDARD APPLICABLE .....	9
<b>§15.207 (A) - CONDUCTED EMISSIONS.....</b>	<b>10</b>
MEASUREMENT UNCERTAINTY .....	10
EUT SETUP.....	10
EMI TEST RECEIVER SETUP.....	11
TEST EQUIPMENT LIST AND DETAILS.....	11
TEST PROCEDURE .....	11
TEST RESULTS SUMMARY .....	11
TEST DATA .....	12
PLOT(S) OF TEST DATA .....	12
<b>§15.205, §15.209, §15.231 (B) - RADIATED EMISSIONS .....</b>	<b>15</b>
MEASUREMENT UNCERTAINTY .....	15
EUT SETUP.....	15
EMI TEST RECEIVER SETUP.....	15
TEST EQUIPMENT LIST AND DETAILS.....	16
TEST PROCEDURE .....	16
STANDARD APPLICABLE .....	16
CORRECTED AMPLITUDE & MARGIN CALCULATION .....	17
TEST RESULTS SUMMARY .....	17
TEST DATA .....	17
<b>§15.231(C) - 20DB BANDWIDTH TESTING.....</b>	<b>19</b>
REQUIREMENT .....	19
TEST EQUIPMENT LIST AND DETAILS.....	19
TEST PROCEDURE .....	19
TEST DATA .....	19
<b>§15.231(A) - DEACTIVATION TESTING .....</b>	<b>21</b>
REQUIREMENT .....	21
EUT SETUP.....	21
TEST EQUIPMENT LIST AND DETAILS.....	21
TEST PROCEDURE .....	21

TEST DATA .....22

**§15.231- DUTY CYCLE.....23**

LIMIT .....23

TEST EQUIPMENT LIST AND DETAILS.....23

TEST PROCEDURE .....23

TEST DATA .....23

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## GENERAL INFORMATION

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

The *Aurum Electronics Corp.*'s product, model *AEC-939ASD-MIC* or the "EUT" as referred to in this report is a *Smart Guard Halogen Light*. The EUT is measured approximately 32.0 cm L x 19.0 cm W x 18.0 cm H, rated input voltage: 120V/60Hz.

\*Note: The series products, model AEC-939ASD-MIC, AEC-939ASD, AEC-939AD, AEC-939AS, AEC-939AU, AEC-936ASD-MIC, AEC-936ASD, AEC-936AD, AEC-936AS, AEC-936AU, we select AEC-939ASD-MIC to test, the all model have same circuit diagram, PCB, only model number have difference.

*\* All measurement and test data in this report was gathered from production sample serial number: 0709050 (Assigned by BACL, Shenzhen). The EUT was received on 2007-09-27.*

### 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 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 rules.

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

No Related Submittals

### Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2003, 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 Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

### Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located in the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China.

Test site at Bay Area Compliance Laboratories Corp. (Shenzhen) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 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.: 382179. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Laboratories Corp. (Shenzhen) is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200707-0).



NVLAP LAB CODE 200707-0

The current scope of accreditations can be found at  
<http://ts.nist.gov/Standards/scopes/2007070.htm>

## SYSTEM TEST CONFIGURATION

### Justification

The system was configured for testing in a typical fashion (as normally used by a typical user).

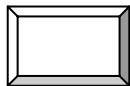
### Equipment Modifications

Bay Area Compliance Laboratories Corp. (Shenzhen) has not done any modification on the EUT.

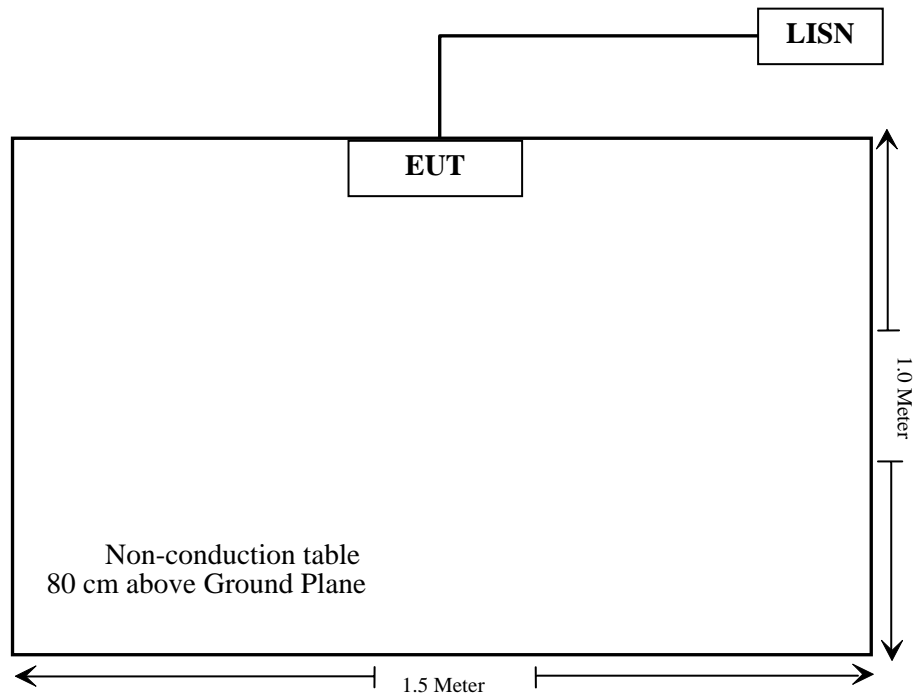
### External I/O Cable

Cable Description	Length (M)	From/Port	To
Unshielded Undetachable Power Cable	1.2	EUT	AC Mains

### Configuration of Test Setup



**EUT**

**Block Diagram of Test Setup**

**SUMMARY OF TEST RESULTS**

<b>FCC Rules</b>	<b>Description of Test</b>	<b>Result</b>
§15.203	Antenna Requirement	Compliant
§15.205	Restricted Band	Compliant
§15.207 (a)	Conducted Emissions	Compliant
§15.209	General Requirement	Compliant
§15.231 (b)	Radiated Emissions	Compliant
§15.231 (c)	20dB Band Width Testing	Compliant
§15.231 (a)(1)	Deactivation Testing	Compliant
§15.231	Duty Cycle	Compliant



## **§15.203 - ANTENNA REQUIREMENT**

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### **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.

The antenna of the EUT is an integral antenna (PCB antenna) which, in accordance to the above section, is considered sufficient to comply with the provision of this section.

**Result:** Compliant.

Please refer to the internal photos of EUT.

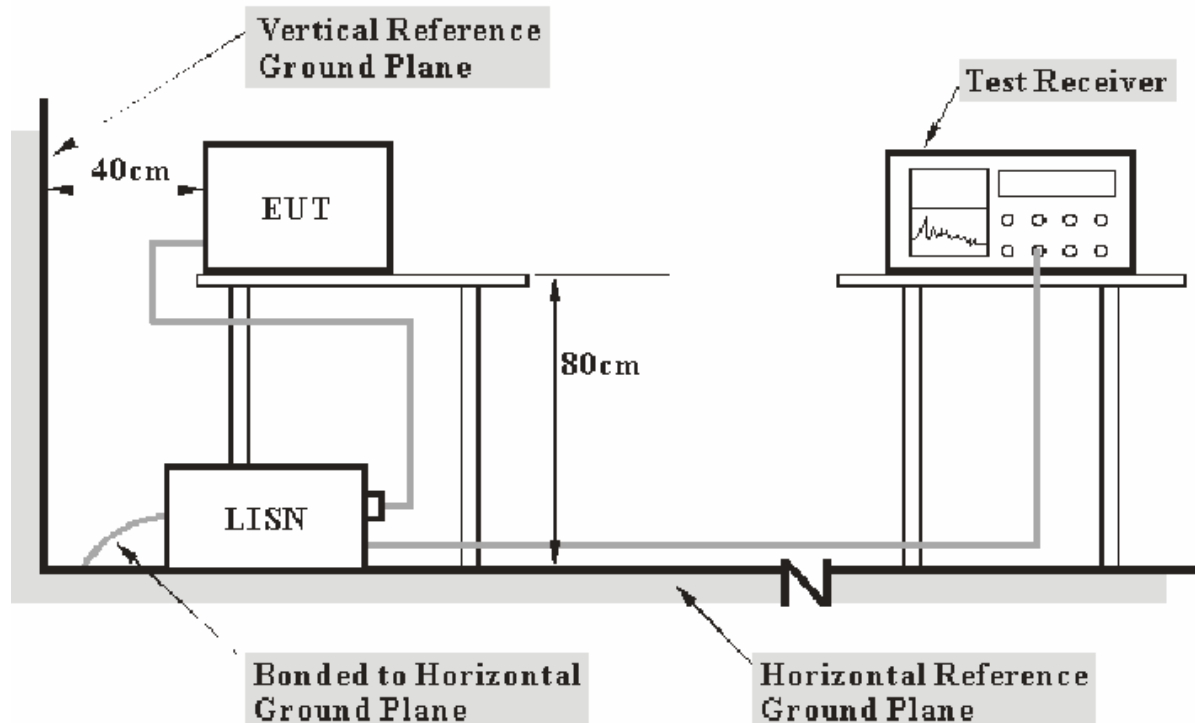
## §15.207 (a) - CONDUCTED EMISSIONS

### Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at Bay Area Compliance Laboratories Corp. (Shenzhen) is  $\pm 2.4$  dB.

### EUT Setup



- Note:**
1. Support units were connected to second LISN.
  2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.4-2003 measurement procedure. The specification used was with the FCC Part 15 Class B limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The EUT was connected to a 120 VAC/60 Hz power source.

## EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

<i><b>Frequency Range</b></i>	<i><b>IF B/W</b></i>
150 kHz – 30 MHz	9 kHz

## Test Equipment List and Details

<b>Manufacturer</b>	<b>Description</b>	<b>Model</b>	<b>Serial Number</b>	<b>Calibration Date</b>	<b>Calibration Due Date</b>
Com-Power	L.I.S.N.	LI-200	12005	N/A	N/A
Com-Power	L.I.S.N.	LI-200	12208	N/A	N/A
Rohde & Schwarz	EMI Test Receiver	ESCS30	DE25330	2007-03-26	2008-03-26
Rohde & Schwarz	L.I.S.N.	ESH2-Z5	892107/021	2007-03-26	2008-03-26

\* Com-Power's LISN were used as the supporting equipment.

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

## Test Procedure

During the conducted emission test, the EUT was connected to the outlet of the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

## Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207, with the worst margin reading of:

**1.20 dB at 27.1150 MHz in the Neutral conductor mode.**

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

<b>Temperature:</b>	25 ° C
<b>Relative Humidity:</b>	54%
<b>ATM Pressure:</b>	100.0 kPa

*The testing was performed by Cinderallar Chen on 2007-10-23.*

*Test Mode: Lighting & Videotape*

Line Conducted Emissions				FCC Part 15.207	
Frequency (MHz)	Amplitude (dBμV)	Detector (QP/AV)	Phase (Live/Neutral)	Limit (dBμV)	Margin (dB)
27.1150	48.80	AV	Neutral	50.00	1.20
27.1150	48.60	AV	Live	50.00	1.40
24.0000	44.40	AV	Live	50.00	5.60
24.0000	43.00	AV	Neutral	50.00	7.00
27.1150	52.70	QP	Neutral	60.00	7.30
0.5700	38.50	AV	Neutral	46.00	7.50
27.1150	51.40	QP	Live	60.00	8.60
0.4050	37.10	AV	Live	47.75	10.65
0.3800	36.90	AV	Neutral	50.00	13.10
0.1900	40.60	AV	Neutral	54.04	13.44
12.0000	36.00	AV	Neutral	50.00	14.00
0.5700	41.90	QP	Neutral	56.00	14.10
0.4050	43.50	QP	Live	57.75	14.25
0.8100	31.20	AV	Live	46.00	14.80
24.0000	45.00	QP	Live	60.00	15.00
12.0000	34.70	AV	Live	50.00	15.30
24.0000	43.70	QP	Neutral	60.00	16.30
0.3800	42.40	QP	Neutral	60.00	17.60
0.1900	46.40	QP	Neutral	64.04	17.64
0.8100	37.40	QP	Live	56.00	18.60
1.6100	26.10	AV	Live	46.00	19.90
12.0000	38.30	QP	Neutral	60.00	21.70
1.6100	33.40	QP	Live	56.00	22.60
12.0000	37.30	QP	Live	60.00	22.70

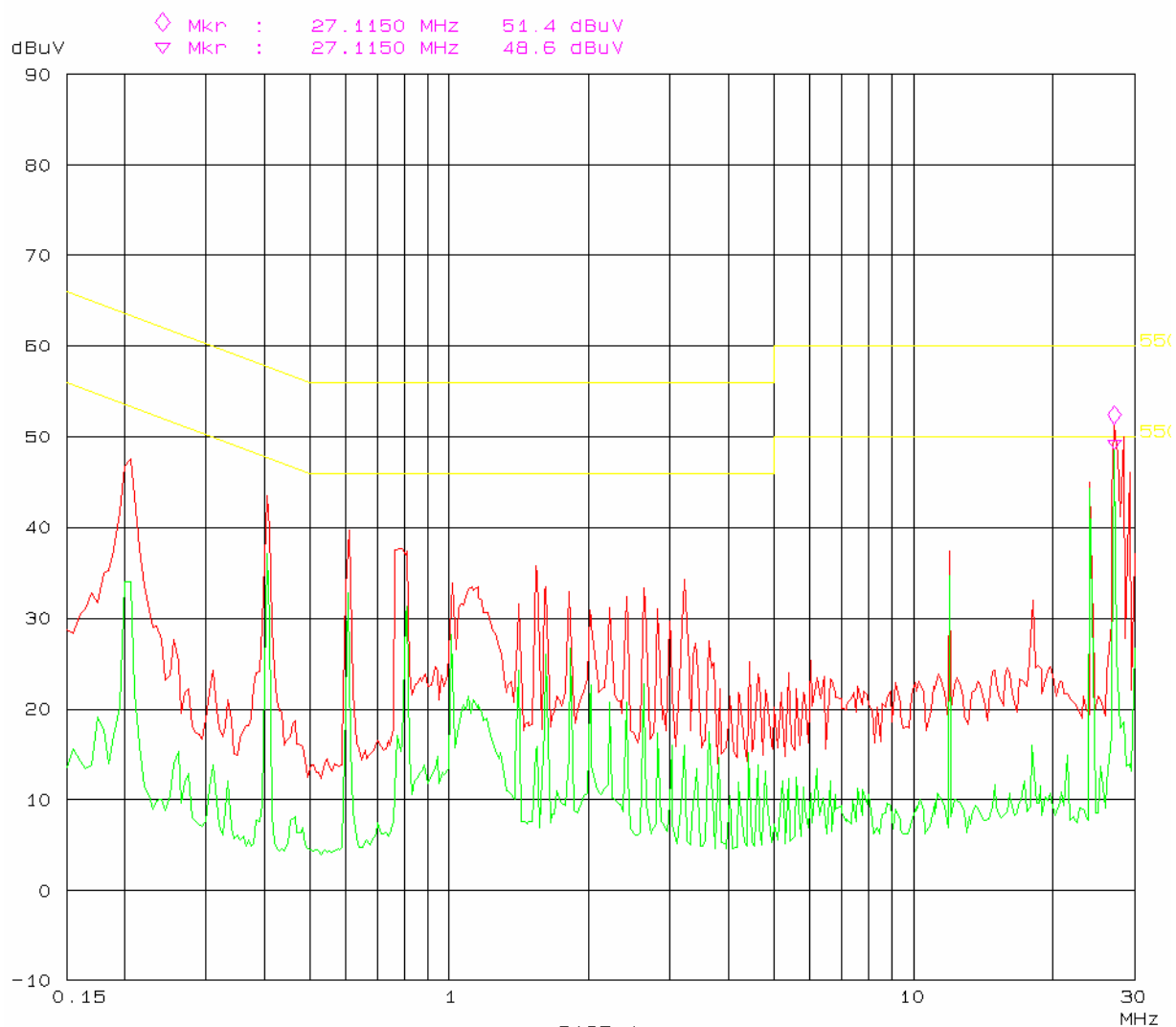
**Plot(s) of Test Data**

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

Conducted Emission Test  
FCC15 B

23. Oct 07 09:01

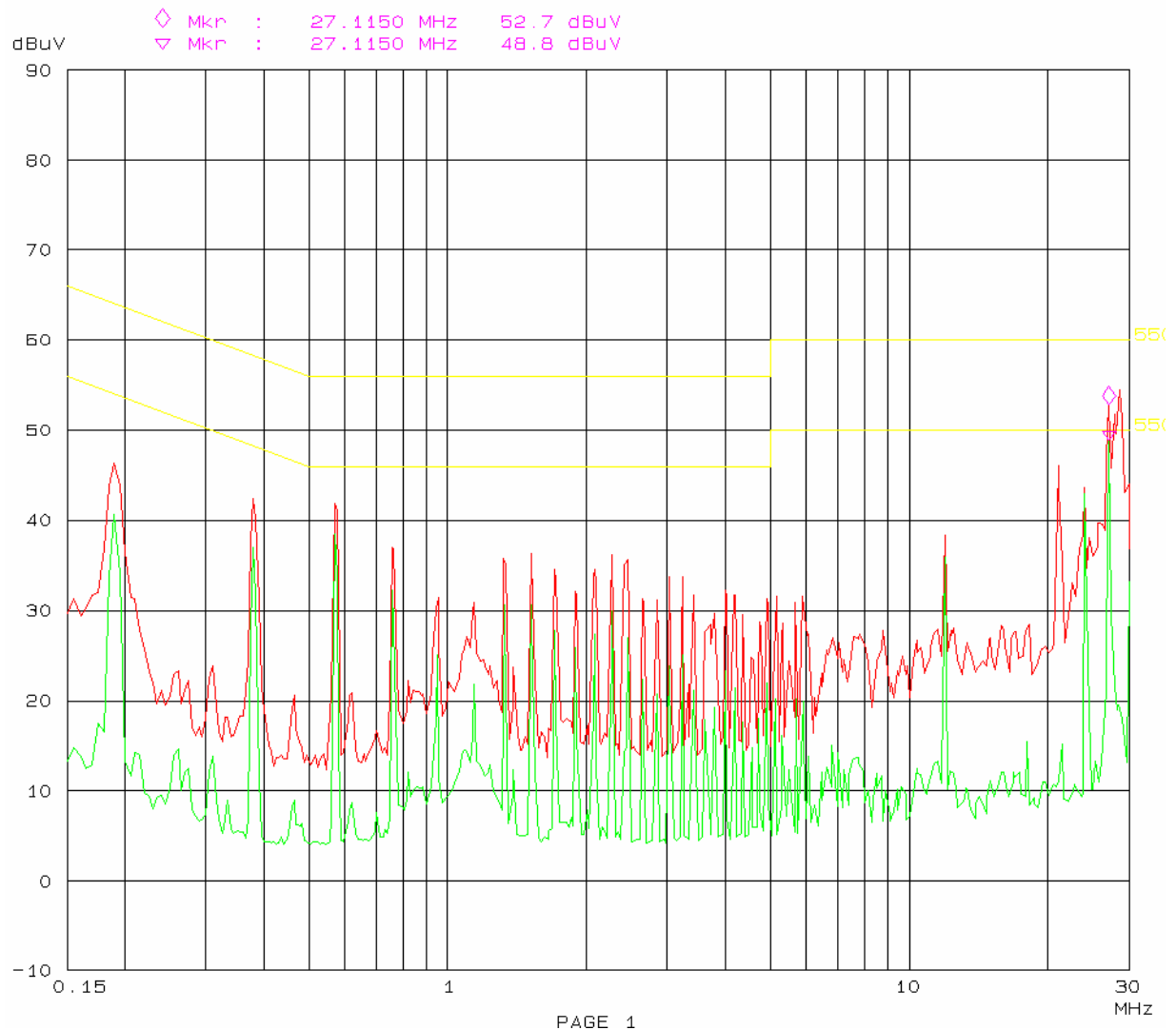
EUT: Smart Guard Halogen Light M/N: AEC-939ASD-MIC  
Manuf: Aurum  
Op Cond: Running  
Operator: Cinderallar  
Test Spec: AC 120V/60Hz L  
Comment: temp: 26 Humi 56%



Conducted Emission Test  
FCC15 B

23. Oct 07 09:13

EUT: Smart Guard Halogen Light M/N: AEC-939ASD-MIC  
Manuf: Aurum  
Op Cond: Running  
Operator: Cinderallan  
Test Spec: AC 120V/60Hz N  
Comment: temp:26 Humi 56%



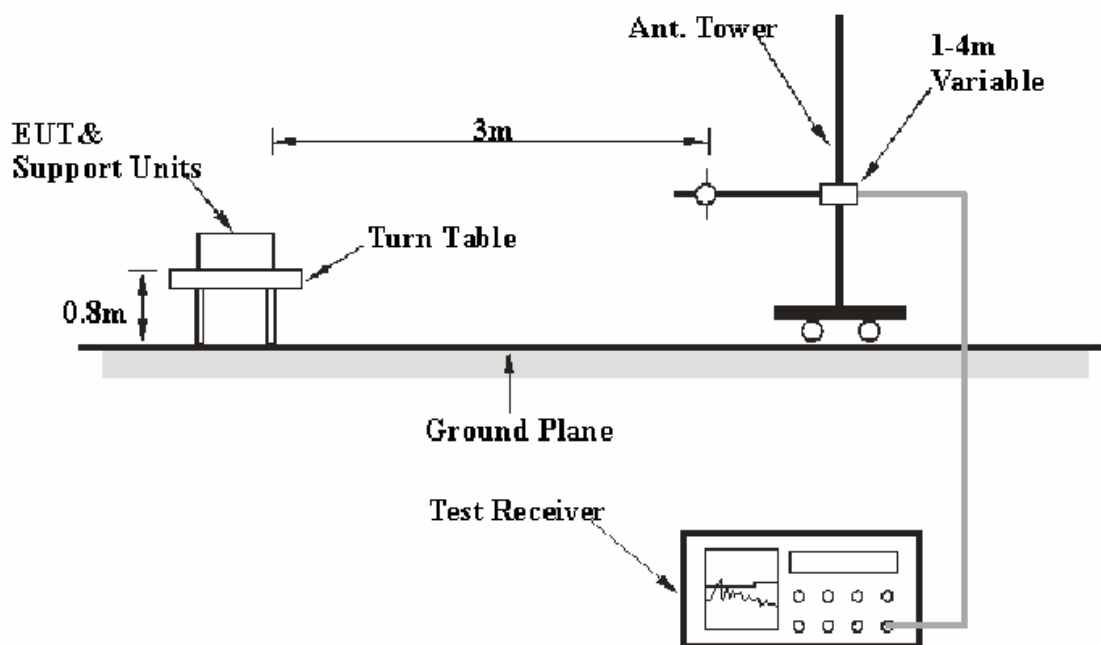
## §15.205, §15.209, §15.231 (b) - RADIATED EMISSIONS

### 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 Bay Area Compliance Laboratories Corp. (Shenzhen) 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.

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

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

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	Spectrum Analyzer	8564E	3943A01781	2006-11-22	2007-11-22
HP	Amplifier	8449B	3008A00277	2007-09-29	2008-09-29
Sunol Sciences	Horn Antenna	DRH-118	A052604	2007-07-20	2008-07-20
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2007-09-29	2008-09-29
HP	Amplifier	8447E	1937A01046	2006-11-15	2007-11-15
Sunol Sciences	Bilog Antenna	JB1	A040904-2	2007-08-14	2008-08-14

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

### 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(b), the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Fundamental frequency (MHz)	Field Strength of Fundamental (Microvolts /meter)	Field Strength of spurious emissions ((Microvolts /meter)
40.66-40.70	2,250	225
70-130	1,250	125
130-174	1,250 to 3,370 *	125 to 375 *
174-260	3,750	375
260-470	3,750 to 12,500 *	375 to 1,250 *
Above 470	12,500	1,250

\* Linear interpolations for frequency range 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 Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

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

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

## Test Results Summary

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

**30-1000MHz: 14.069 dB at 868.08 MHz in the Horizontal polarization.**

**Above 1GHz: 26.619 dB at 1736 MHz in the Vertical polarization.**

## Test Data

### Environmental Conditions

Temperature:	25 ° C
Relative Humidity:	56%
ATM Pressure:	100.2kPa

*The testing was performed by Cinderallar Chen on 2007-10-23.*

*Test Mode: Transmitting*

**30-1000MHz:**

Freq. (MHz)	Meter Reading (dBuV)	Detector (PK/AV)	Direction (Degree)	Antenna			Cable Loss (dB)	Duty cycle factor (dB)	Pre- Amp. (dB)	Corrected Amp. (dB uV/m)	FCC Part 15.231		
				Height (m)	Polar (H/V)	Factor (dB/m)					Limit (dBuV/m)	Margin (dB)	Remarks
868.08	55.86	PK	45	1.2	H	22.2	3.93	-8.59	26.67	46.73	60.8	14.069	Harmonic
868.08	50.53	PK	60	1.0	V	22.2	3.93	-8.59	26.67	41.40	60.8	19.399	Harmonic
433.92	71.86	AV	35	1.2	H	16.8	3.12	-8.59	27.36	55.83	80.8	24.969	Fund.
868.08	55.86	PK	45	1.2	H	22.2	3.93	0	26.67	55.32	80.8	25.480	Harmonic
433.92	67.17	AV	180	1.2	V	16.8	3.12	-8.59	27.36	51.14	80.8	29.659	Fund.
868.08	50.53	PK	60	1.0	V	22.2	3.93	0	26.67	49.99	80.8	30.810	Harmonic
433.92	71.86	PK	35	1.2	H	16.8	3.12	0	27.36	64.42	100.8	36.380	Fund.
433.92	67.17	PK	180	1.2	V	16.8	3.12	0	27.36	59.73	100.8	41.070	Fund.

**Above 1GHz:**

Freq. (MHz)	Meter Reading (dBuV)	Detector (PK/AV)	Direction (Degree)	Antenna			Cable Loss (dB)	Duty cycle factor (dB)	Pre- Amp. (dB)	Corrected Amp. (dB uV/m)	FCC Part 15.231/209		
				Height (m)	Polar (H/V)	Factor (dB/m)					Limit (dBuV/m)	Margin (dB)	Remarks
1736	46.41	PK	45	1.0	V	27.1	4.26	-8.59	35	34.181	60.8	26.619	Harmonic
1736	45.37	PK	45	1.2	H	27.1	4.26	-8.59	35	33.141	60.8	27.659	Harmonic
2604	42.96	PK	45	1.0	H	28.5	4.53	-8.59	35	32.401	60.8	28.399	Harmonic
2172	43.39	PK	45	1.0	V	27.3	4.38	-8.59	35	31.481	60.8	29.319	Harmonic
2172	43.33	PK	45	1.0	H	27.3	4.38	-8.59	35	31.421	60.8	29.379	Harmonic
2604	39.97	PK	45	1.2	V	28.5	4.53	-8.59	35	29.411	60.8	31.389	Harmonic
1300	40.73	PK	45	1.2	V	26.8	4.15	-8.59	35	28.091	60.8	32.709	Harmonic
1300	39.54	PK	45	1.0	H	26.8	4.15	-8.59	35	26.901	60.8	33.899	Harmonic
1736	46.41	PK	45	1.0	V	27.1	4.26	0	35	42.77	80.8	38.030	Harmonic
1736	45.37	PK	45	1.2	H	27.1	4.26	0	35	41.73	80.8	39.070	Harmonic
2604	42.96	PK	45	1.0	H	28.5	4.53	0	35	40.99	80.8	39.810	Harmonic
2172	43.39	PK	45	1.0	V	27.3	4.38	0	35	40.07	80.8	40.730	Harmonic
2172	43.33	PK	45	1.0	H	27.3	4.38	0	35	40.01	80.8	40.790	Harmonic
2604	39.97	PK	45	1.2	V	28.5	4.53	0	35	38	80.8	42.800	Harmonic
1300	40.73	PK	45	1.2	V	26.8	4.15	0	35	36.68	80.8	44.120	Harmonic
1300	39.54	PK	45	1.0	H	26.8	4.15	0	35	35.49	80.8	45.310	Harmonic

**Note:**

\* AV value based on the duty cycle correction factor

AV = PK + Duty cycle Factor.

Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - Amplifier Gain

Margin = Limit – Corrected Amplitude

## §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 Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2007-09-29	2008-09-29
HP	Amplifier	8447E	1937A01046	2007-11-15	2008-11-15
Sunol Sciences	Bilog Antenna	JB1	A040904-2	2007-08-14	2008-08-14

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

### 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:	56%
ATM Pressure:	100.2kPa

*The testing was performed by Cinderallar Chen on 2007-12-05.*

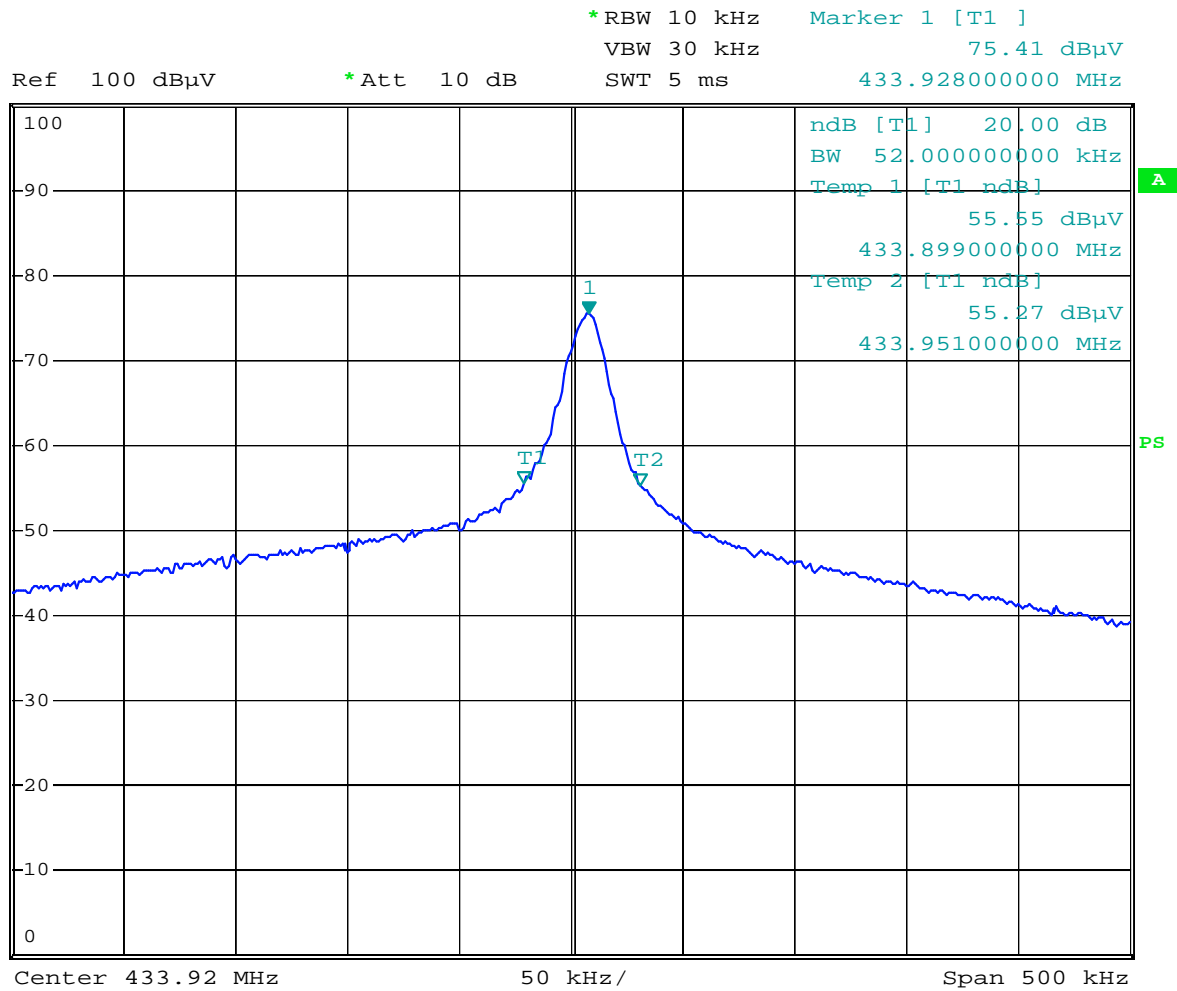
**20 dB BW Limit** = Frequency  $\times$  0.25% = 433.92  $\times$  0.25% = 1.0848 MHz

**Test Result:** Compliant.

Please refer to the following table and plot.

Channel Frequency (MHz)	20dB Bandwidth (MHz)	Limit (MHz)	Result
433.92	0.052	1.0848	Compliant

## 20 dB Bandwidth

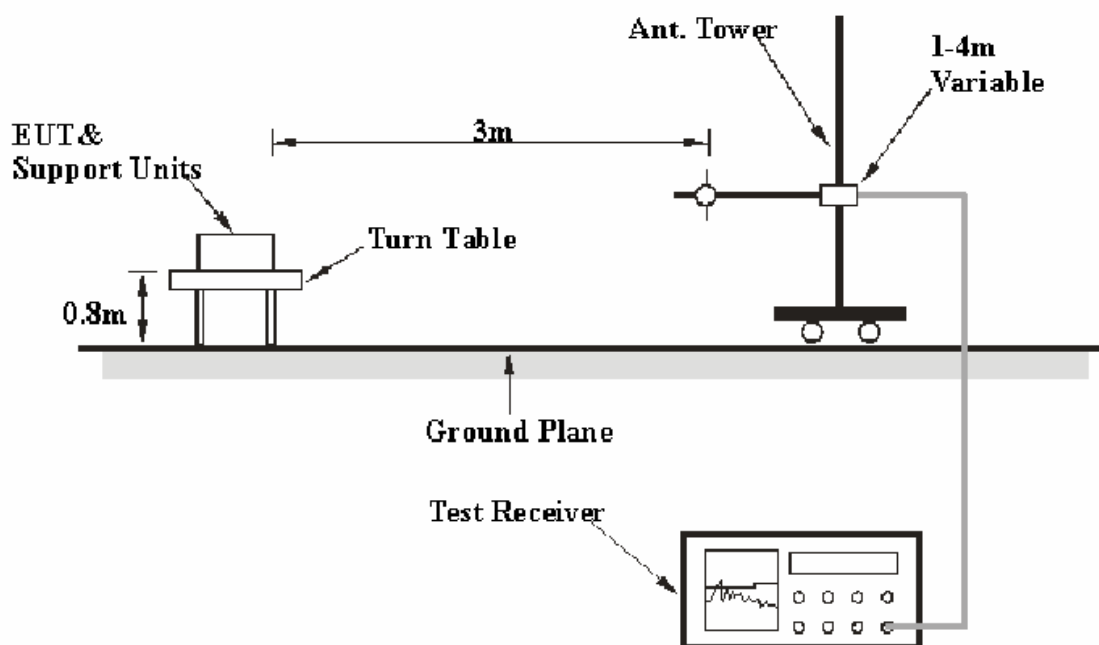
1 PK  
VIEW

## §15.231(a) - DEACTIVATION TESTING

### Requirement

Per 15.231(a) (1), a manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

### 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(a) limits.

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2007-09-29	2008-09-29
HP	Amplifier	8447E	1937A01046	2007-11-15	2008-11-15
Sunol Sciences	Bilog Antenna	JB1	A040904-2	2007-08-14	2008-08-14

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

### 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:	103.2kPa

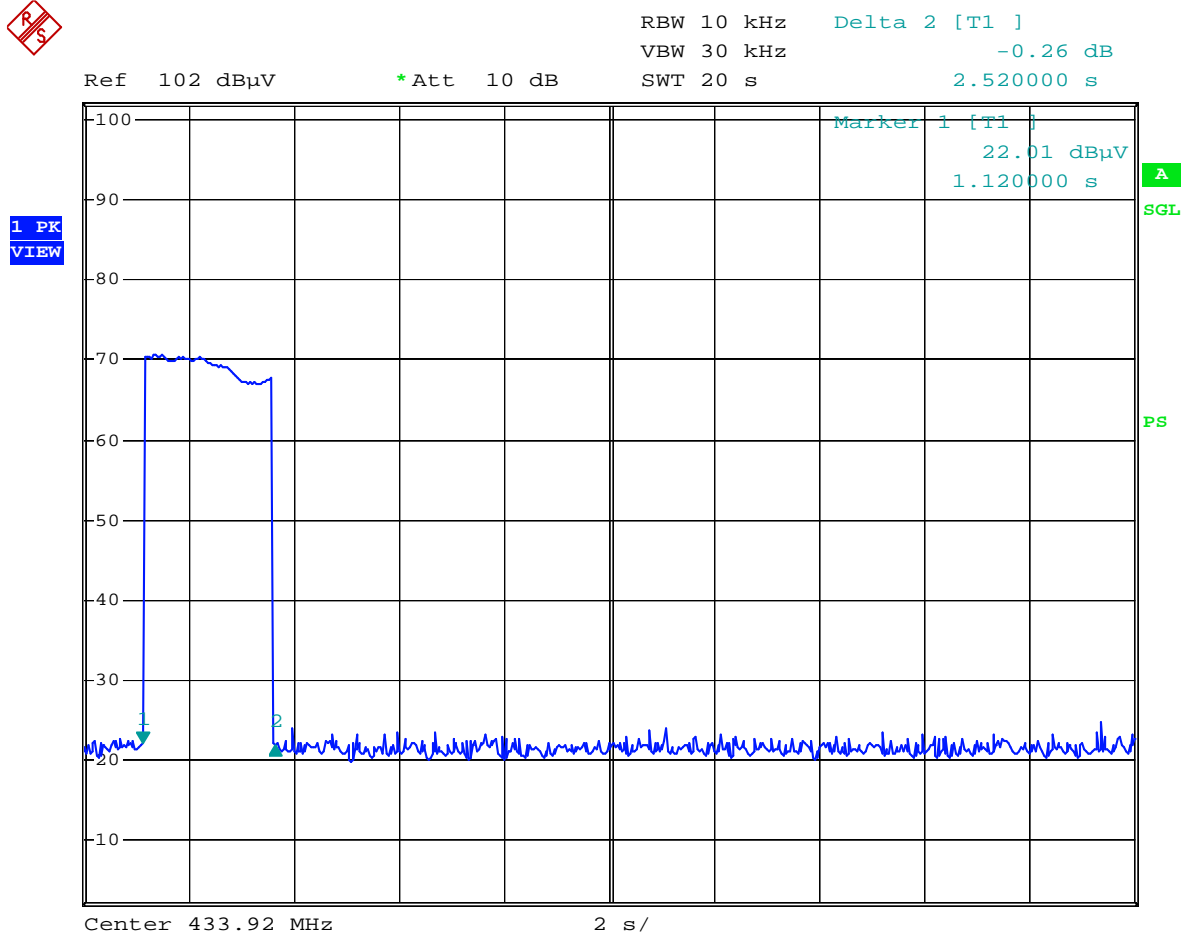
The testing was performed by Cinderallar Chen on 2007-12-05.

Test Mode: Transmitting

Deactivation time=2.52 S<5 S

**Test Result:** Compliant.

Please refer to the following plot.



Deactivation Testing

Date: 5.DEC.2007 02:38:05

## §15.231- DUTY CYCLE

### Limit

Nil (No dedicated limit specified in the Rules).

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2007-09-29	2008-09-29

\* **Statement of Traceability:** Bay Area Compliance Laboratory Corp. (ShenZhen) attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

### Test Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer=operating frequency.
4. Set the spectrum analyzer as RBW, VBW=100 kHz, Span=0Hz, Adjust Sweep=100ms.
5. Repeat above procedures until all frequency measured was complete.

### Test Data

#### Environmental Conditions

Temperature:	25 ° C
Relative Humidity:	50%
ATM Pressure:	103.2kPa

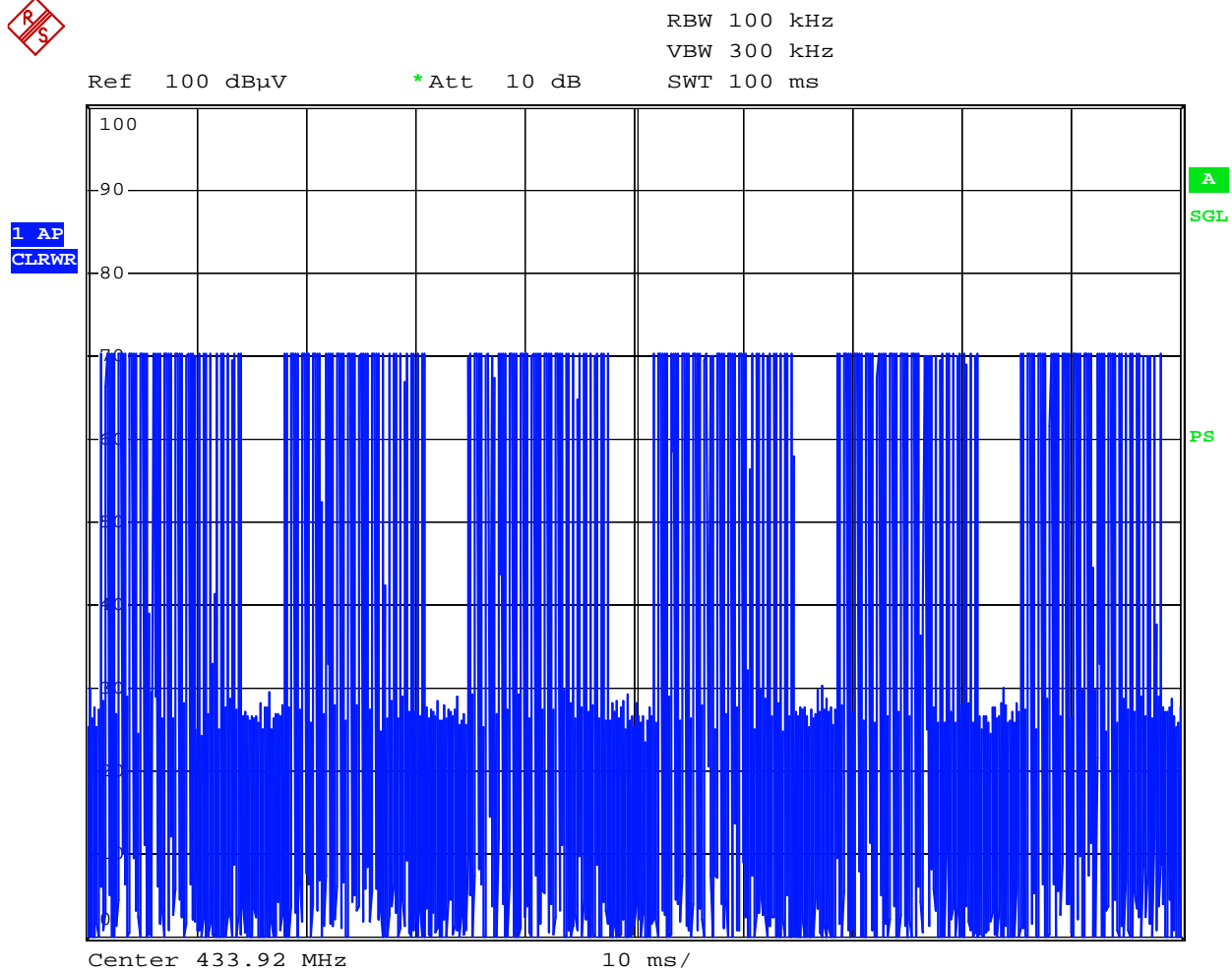
*The testing was performed by Cinderallar Chen on 2007-12-05, 2007-12-06.*

*Test Mode: Transmitting*

$Ton = 8 * 0.426 + 17 * 0.168 = 6.264ms$

Duty cycle factor =  $20 \log (ton/tp) = 20 * \log (6.264/16.84) = -8.59$

$AV = PK + \text{Duty cycle factor}$



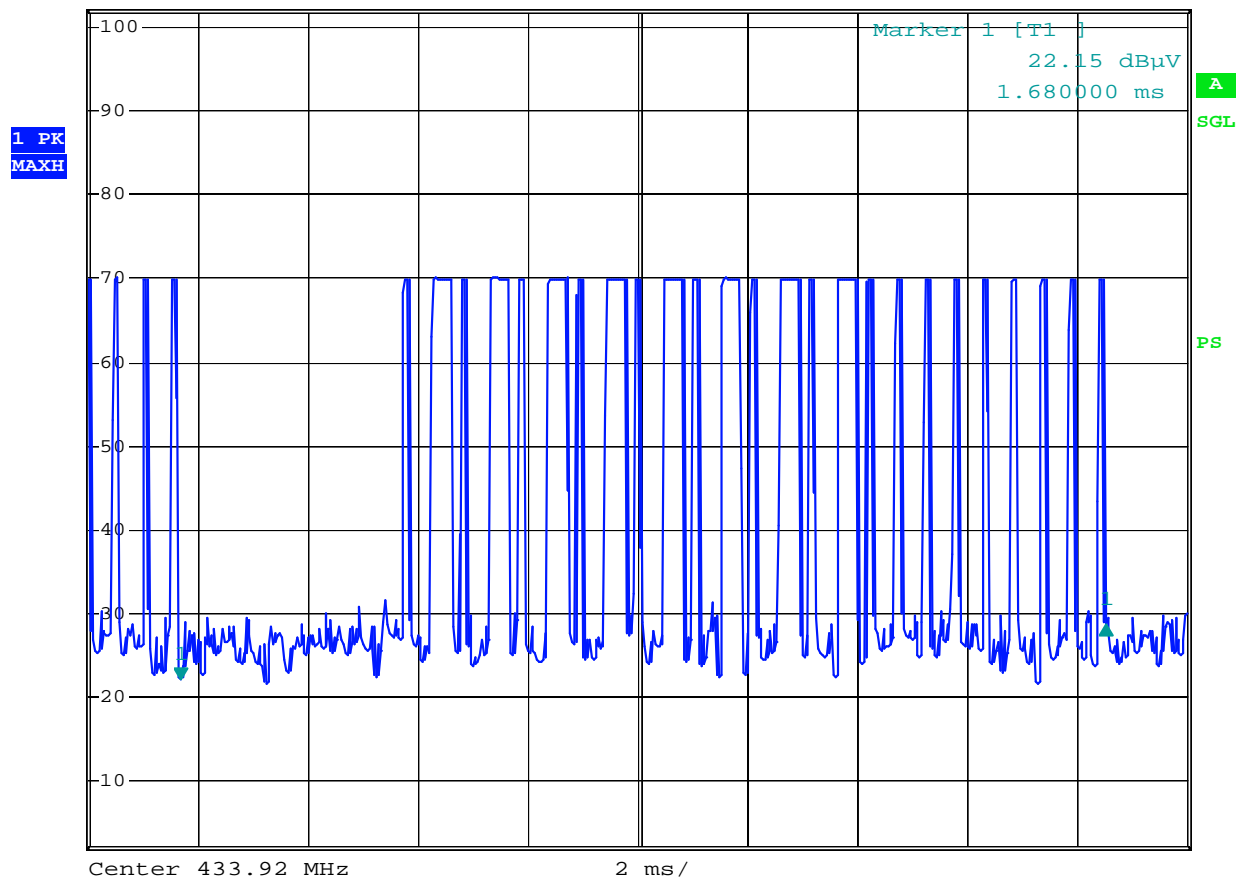
Duty Cycle

Date: 6.DEC.2007 05:41:51



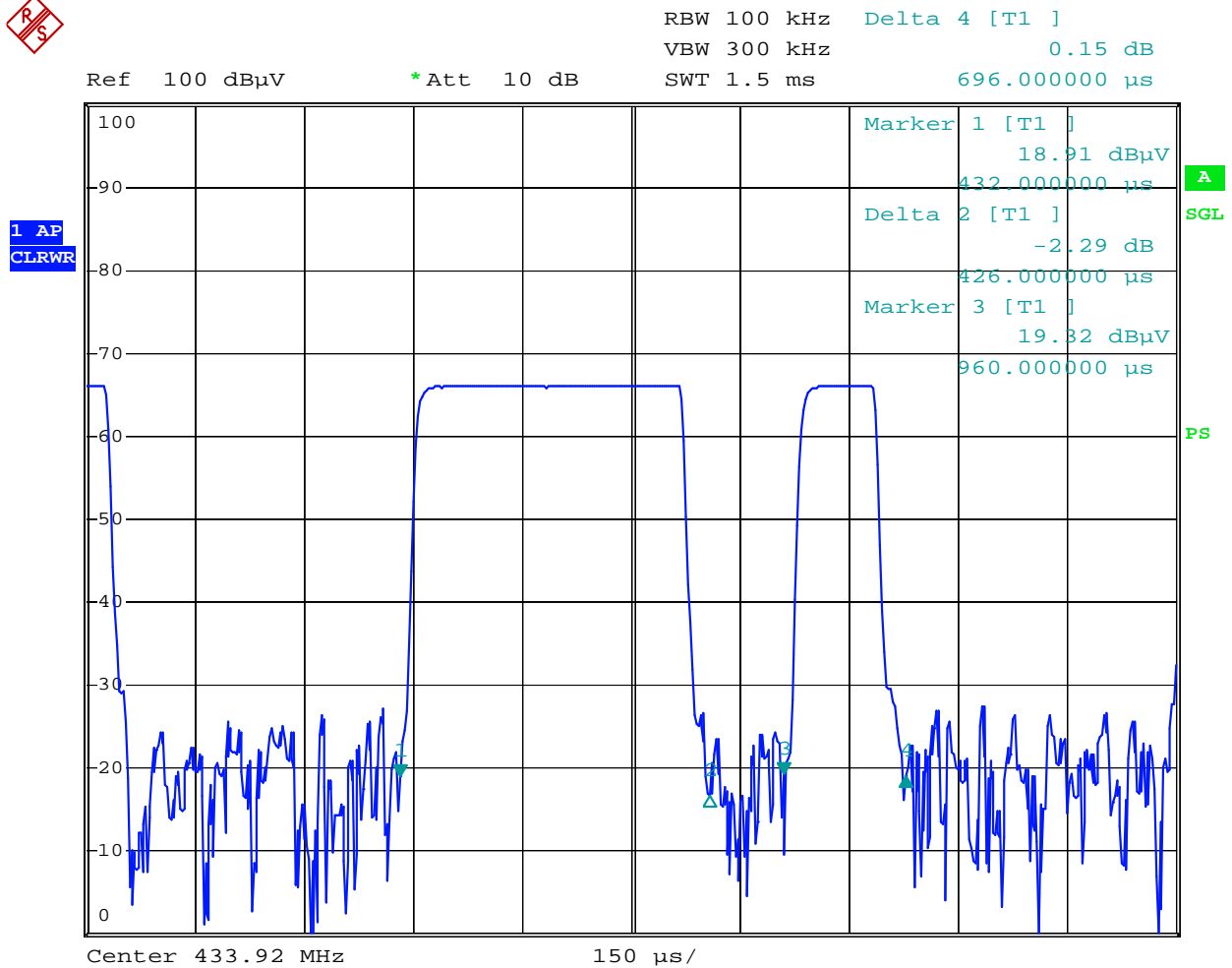


RBW 100 kHz Delta 1 [T1 ]  
VBW 300 kHz 6.50 dB  
Ref 102 dBμV \*Att 10 dB SWT 20 ms 16.840000 ms



T2

Date: 5.DEC.2007 02:23:38



Duty Cycle

Date: 6.DEC.2007 05:45:50

\*\*\*\*\* END OF REPORT \*\*\*\*\*