NVLAP LAB CODE 200707-0

FCC PART 15.231

MEASUREMENT AND TEST REPORT

For

Tongxiang Foyin Electronic Co., Ltd

6# Jiyun Road, Economical Development Zone, Tongxiang City,
Zhejiang 314500, China

FCC ID: VRH-FY410

This Report Concerns:	Equipment Type:
☒ Original Report	Wireless Remote Control

Test Engineer:	Simon Mo simon mo
Report No.:	RSH07111251
Test Date:	2007-12-08
Report Date:	2007-12-11
Reviewed By:	EMC Manager: Green Xu Green. Xu
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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The *Tongxiang Foyin Electronic Co., Ltd*'s product, model *FY410* or the "EUT" as referred to in this report is a *Wireless Remote Control*. The EUT is measured approximately 11.5cm L x 3.8cm W x 1.5cm H, rated input voltage: DC 12V Battery.

** All measurement and test data in this report was gathered from production sample serial number: 0711013 (Assigned by BACL, Shenzhen). The EUT was received on 2007-11-12.*

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).

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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).

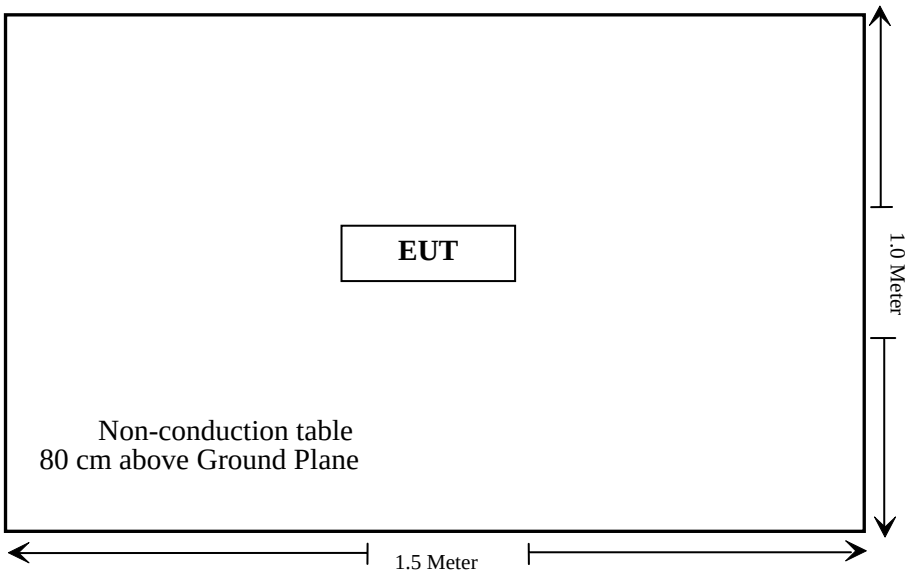
Equipment Modifications

No modifications were made to the unit tested.

Configuration of Test Setup

EUT

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliant
§15.205	Restricted Band	Compliant
§15.207 (a)	Conducted Emissions	N/A*
§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

* This equipment works using battery only, don't use Power Supply.

§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.

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.

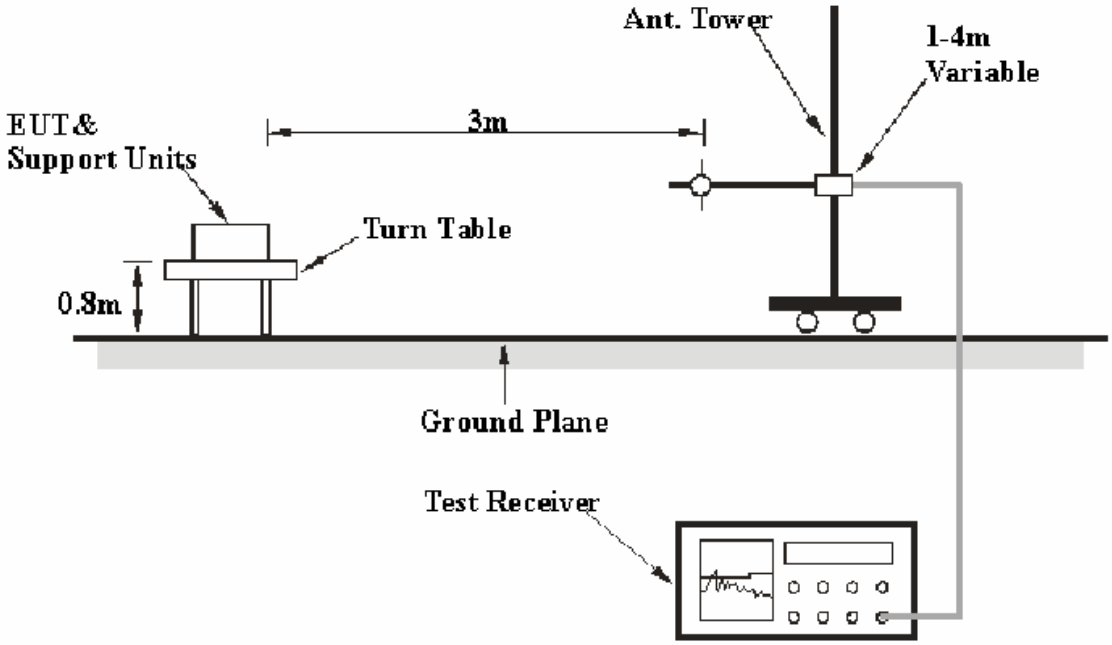
§15.205, §15.209, §15.231 (b) - RADIATED EMISSIONS

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 ±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:

Frequency Range	***RBW***	***VBW***
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	2007-11-22	2008-11-22
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	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.

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 to375 *
174-260	3,750	375
260-470	3,750 to12, 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:

Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - 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:

Margin = Limit – 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:

30-1000 MHz: 1.11 dB at **867.84 MHz** in the **Vertical** polarization.

Above 1GHz: 5.22 dB at **1301.76 MHz** in the **Vertical** polarization.

Test Data

Environmental Conditions

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

The testing was performed by Simon Mo on 2007-12-08.

Test Mode: Transmitting

30-1000 MHz:

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
867.84	70.2	AV	180	1	V	22.3	1.9	-8.21	*	59.69	60.8	1.11	Harmonic
867.84	69.9	AV	180	1	H	22.3	1.9	-8.21	*	59.39	60.8	1.41	Harmonic
433.92	95.9	AV	100	1	V	16.7	1.1	-8.21	*	78.99	80.8	1.81	Fund.
433.92	94.5	AV	100	1	H	16.7	1.1	-8.21	*	77.59	80.8	3.21	Fund.
867.84	70.2	PK	180	1	V	22.3	1.9	/	26.5	67.9	80.8	12.9	Harmonic
867.84	69.9	PK	180	1	H	22.3	1.9	/	26.5	67.6	80.8	13.2	Harmonic
433.92	95.9	PK	100	1	V	16.7	1.1	/	26.5	87.2	100.8	13.6	Fund.
433.92	94.5	PK	100	1	H	16.7	1.1	/	26.5	85.8	100.8	15	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
1301.76	53.92	AV	360	1.5	V	24.8	2.5	-8.21	*	48.78	54	5.22	Harmonic
1301.76	49.01	AV	360	1.5	H	24.8	2.5	-8.21	*	43.87	54	10.13	Harmonic
1735.68	50.57	AV	90	1.5	V	27.1	2.82	-8.21	*	48.05	60.8	12.75	Harmonic
1735.68	48.42	AV	90	1.5	H	27.1	2.82	-8.21	*	45.9	60.8	14.9	Harmonic
1301.76	53.92	PK	360	1.5	V	24.8	2.5	/	24.23	56.99	74	17.01	Harmonic
2169.6	45.07	AV	0	1	V	27.3	3.62	-8.21	*	43.59	60.8	17.21	Harmonic
2169.6	44.61	AV	0	1	H	27.3	3.62	-8.21	*	43.13	60.8	17.67	Harmonic
1301.76	49.01	PK	360	1.5	H	24.8	2.5	/	24.23	52.08	74	21.92	Harmonic
1735.68	50.57	PK	90	1.5	V	27.1	2.82	/	24.23	56.26	80.8	24.54	Harmonic
1735.68	48.42	PK	90	1.5	H	27.1	2.82	/	24.23	54.11	80.8	26.69	Harmonic
2169.6	45.07	PK	0	1	V	27.3	3.62	/	24.19	51.8	80.8	29	Harmonic
2169.6	44.61	PK	0	1	H	27.3	3.62	/	24.19	51.34	80.8	29.46	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 Simon Mo on 2007-12-08.

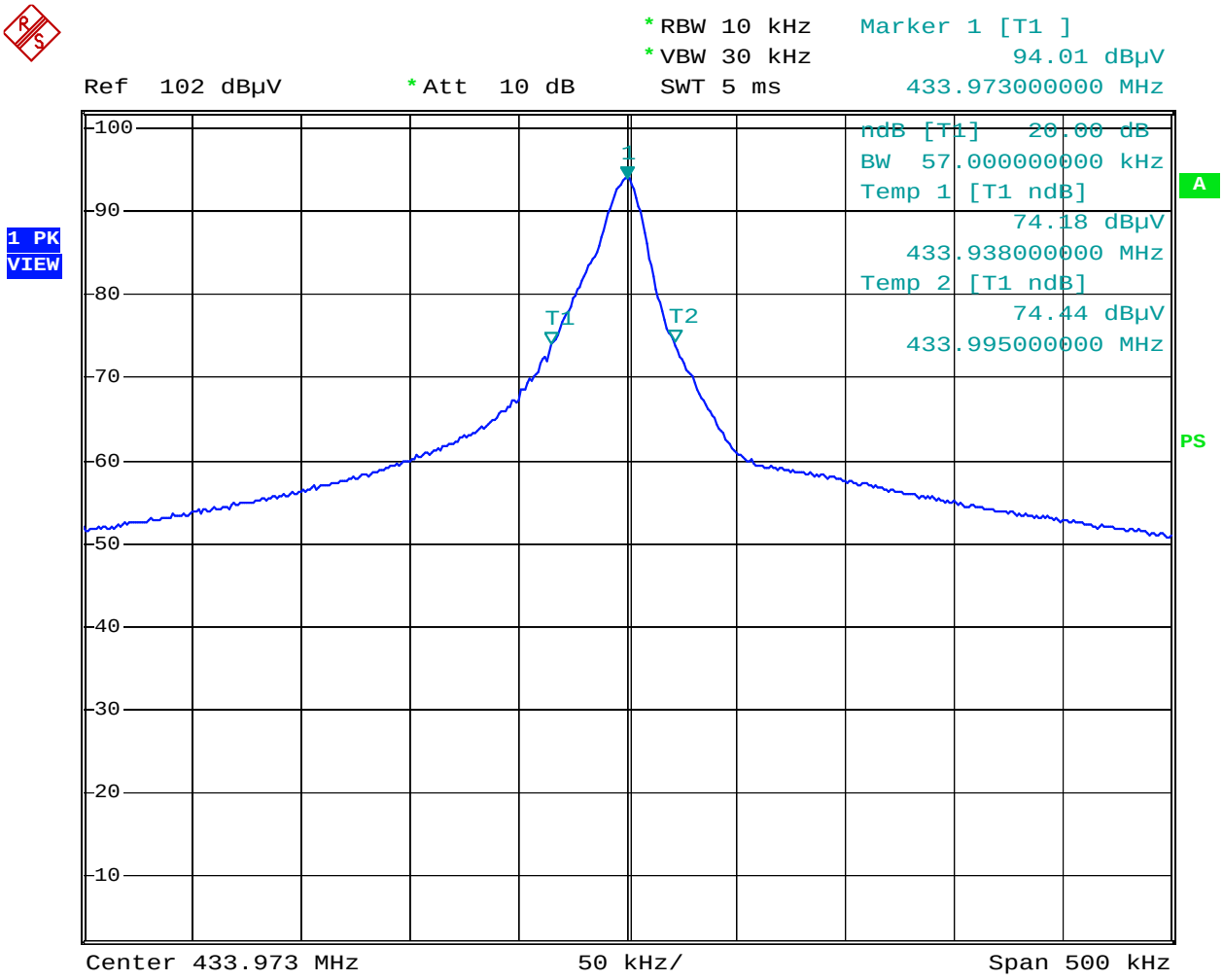
20 dB BW Limit = Frequency × 0.25%= 433.92 × 0.25% = 1.0848 MHz

Test Result: Compliant.

Please refer to the following table and plot.

Channel Frequency (MHz)	20dB Bandwidth (MHz)	Limit (MHz)	Result
433.92	0.057	1.0848	Compliant

20 dB Bandwidth



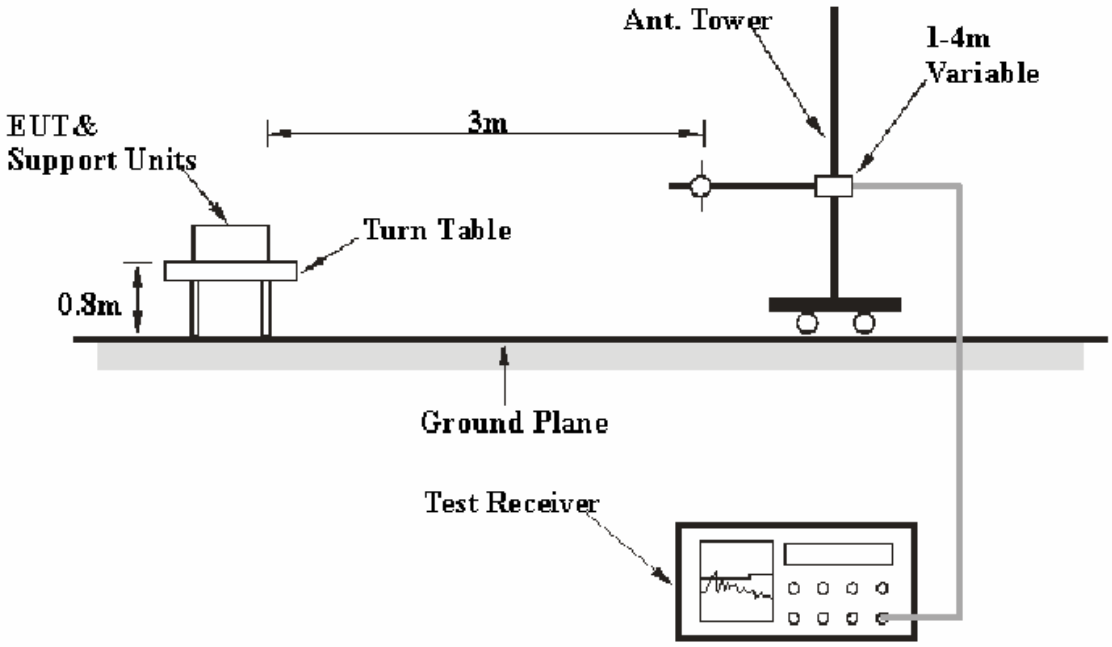
20dB BandWidth

§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

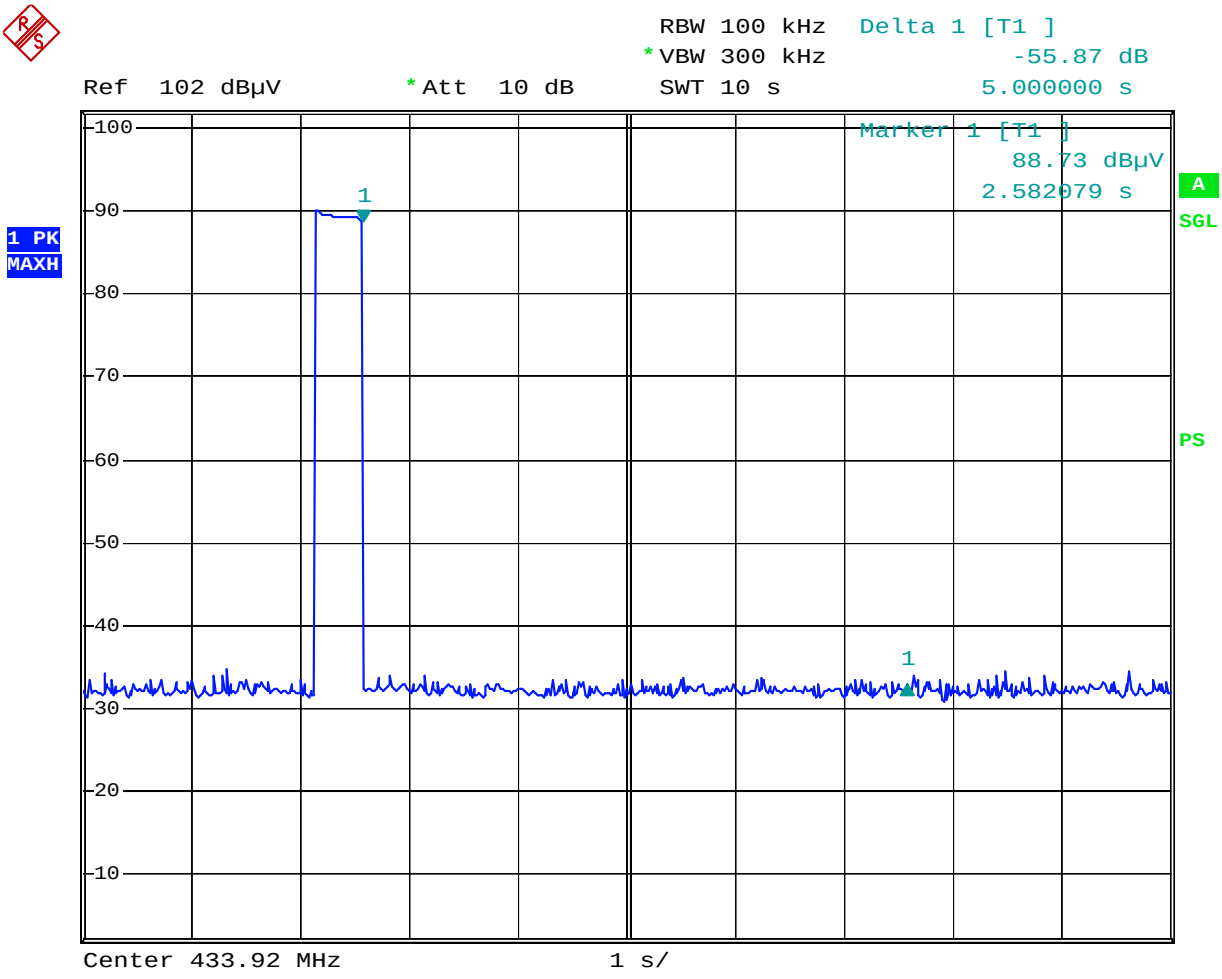
Temperature:	25 ° C
Relative Humidity:	56%
ATM Pressure:	100.2kPa

The testing was performed by Simon Mo on 2007-12-08.

Test Mode: Transmitting

Test Result: Compliant.

Please refer to the following plot.



Deactivation time

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§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:	56%
ATM Pressure:	100.2kPa

The testing was performed by Simon Mo on 2007-12-08.

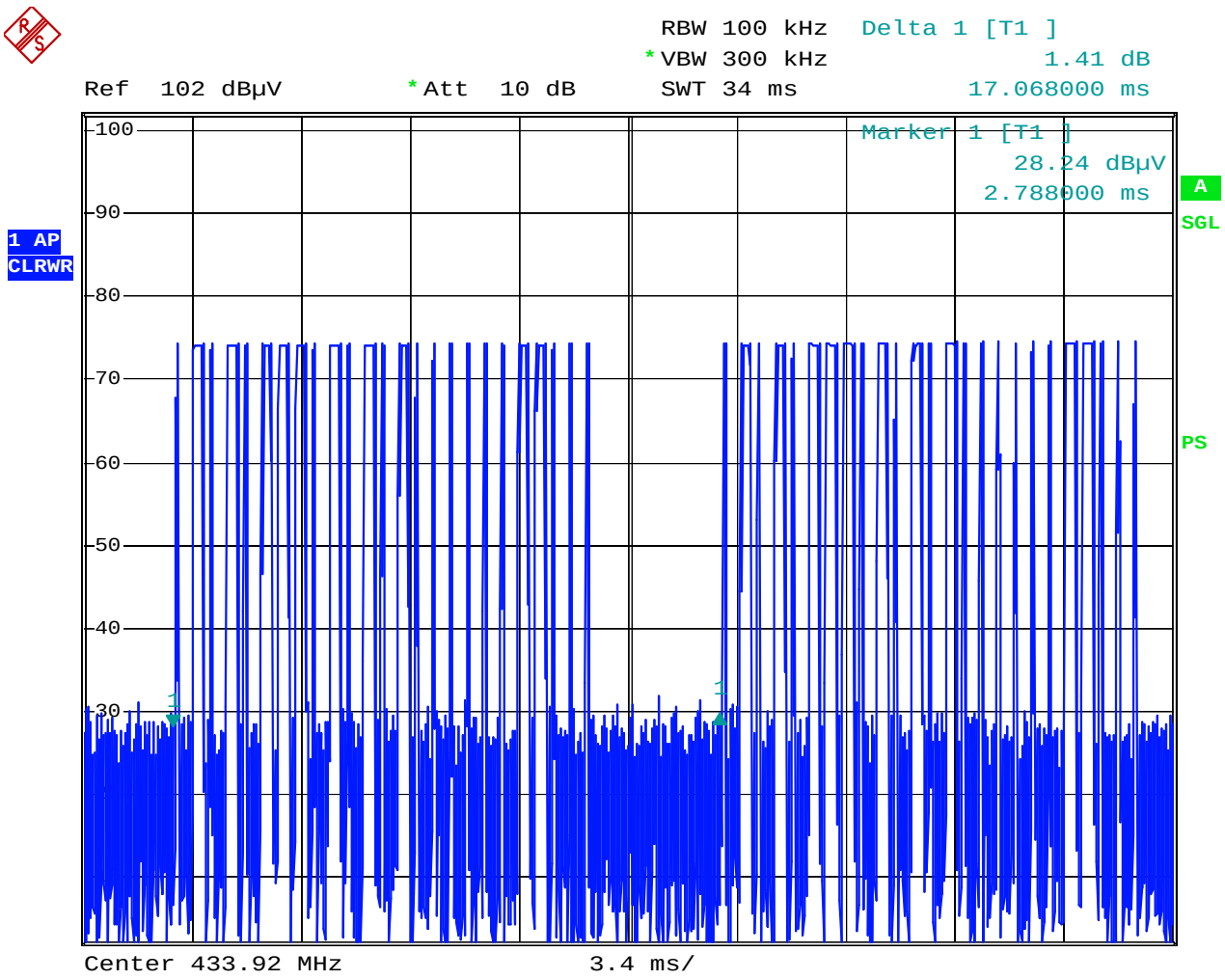
Test Mode: Transmitting

Ton=10*0.4158+15*0.165=6.633ms

Duty cycle factor =20 Log (ton/tp) = 20*log (6.633/17.086)= -8.21dB

AV=PK +Duty cycle factor

Test Result: Compliant.



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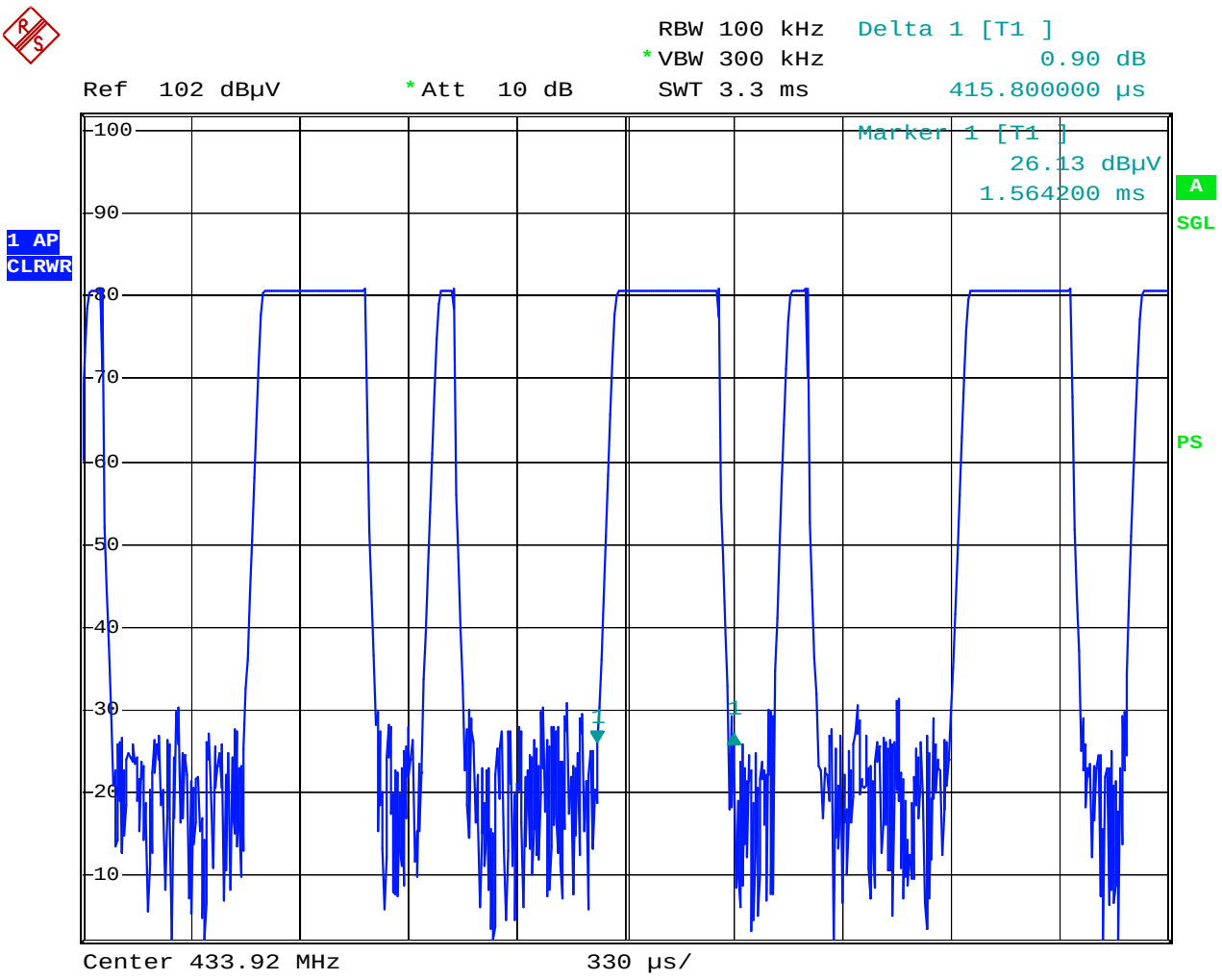

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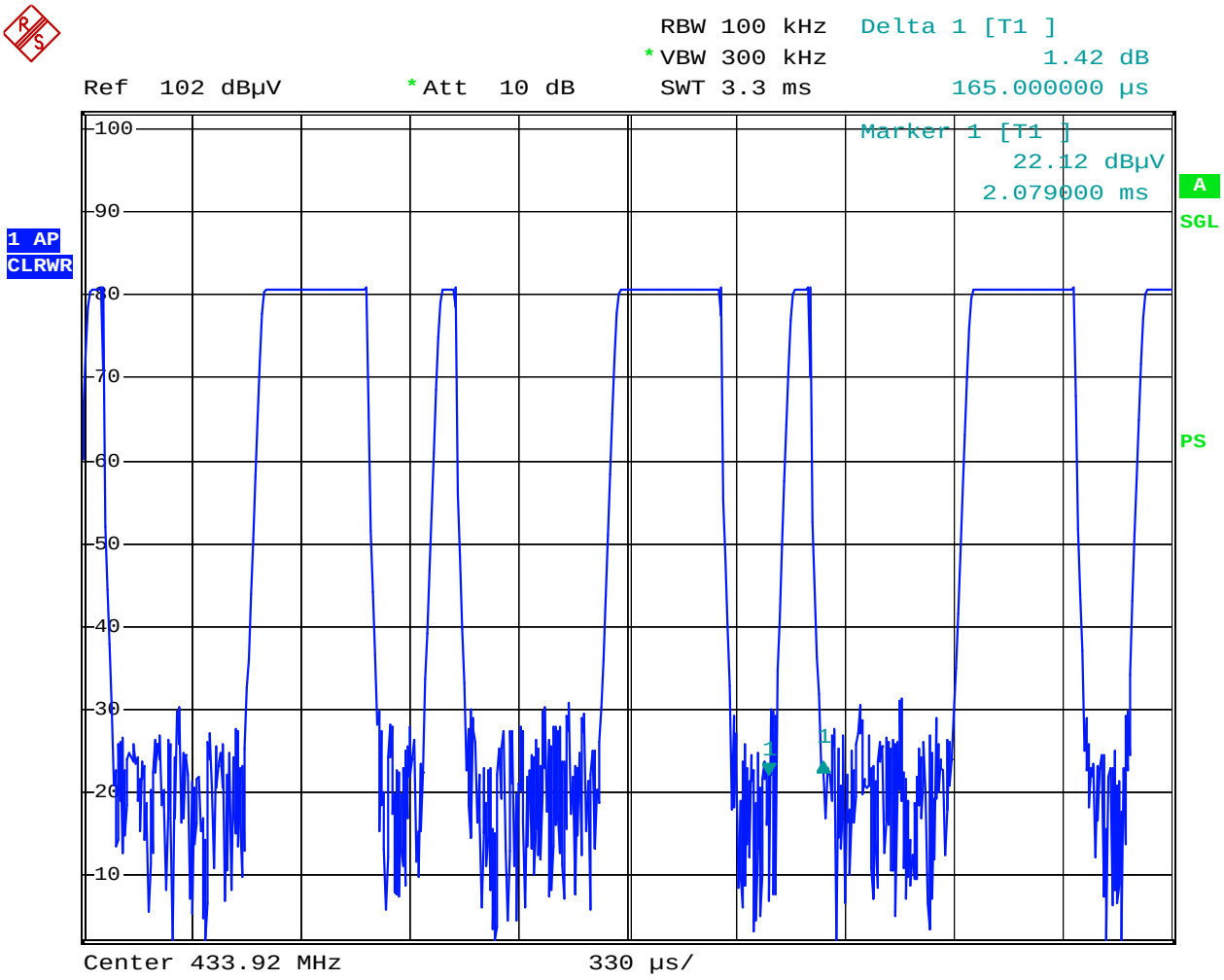

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