

FCC PART 15.231
EMI MEASUREMENT AND TEST REPORT

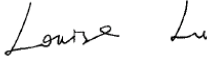
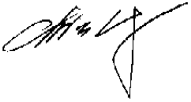
For

Suzhou Sate Auto Electronic Co., Ltd

377-12,Chenhui Rd,Pudong New Area, Shanghai, 201203,China

FCC ID: TTETPMS

November 18, 2005

This Report Concerns: <input checked="" type="checkbox"/> Original Report	Equipment Type: Tire Pressure Monitoring System
Test Engineer: Louise Lu 	
Report No.: RSZ05092701	
Test Date: November 7 -17, 2005	
Reviewed By: Chris Zeng 	
Prepared By: Bay Area Compliance Lab Corp. (ShenZhen) 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone, ShenZhen, Guangdong 518038, P.R.China Tel: +86-755-33320018 Fax: +86-755-33320008	

Note: The test report is specially limited to the above company and this particular sample only. It may not be duplicated without prior written consent of Bay Area Compliance Lab Corp. (ShenZhen). This report **must not** be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the US Government.

TABLE OF CONTENTS

GENERAL INFORMATION.....	3
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	3
OBJECTIVE	3
RELATED SUBMITTAL(S)/GRANT(S).....	3
TEST METHODOLOGY	3
TEST FACILITY	3
SYSTEM TEST CONFIGURATION.....	4
JUSTIFICATION	4
EUT EXERCISE SOFTWARE	4
SPECIAL ACCESSORIES.....	4
EQUIPMENT MODIFICATIONS	4
CONFIGURATION OF TEST SETUP	5
BLOCK DIAGRAM OF TEST SETUP	5
SUMMARY OF TEST RESULTS	6
§15.203 - ANTENNA REQUIREMENT.....	7
STANDARD APPLICABLE	7
§15.205, §15.209, §15.231 (e)- RADIATED EMISSION.....	8
MEASUREMENT UNCERTAINTY	8
EUT SETUP.....	8
TEST RECEIVER SETUP.....	8
TEST EQUIPMENT LIST AND DETAILS.....	9
TEST PROCEDURE	9
STANDARD APPLICABLE	9
CORRECTED AMPLITUDE & MARGIN CALCULATION	9
TEST RESULTS SUMMARY	10
TEST DATA	10
§15.231(c) 20DB BANDWIDTH TESTING	13
REQUIREMENT	13
TEST EQUIPMENT LIST AND DETAILS.....	13
TEST PROCEDURE	13
TEST DATA	13
§15.231(e)-DEACTIVATION TESTING	15
REQUIREMENT	15
EUT SETUP.....	15
TEST EQUIPMENT LIST AND DETAILS.....	15
TEST PROCEDURE	16
TEST DATA	16

GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The *Suzhou Sate Auto Electronic Co., Ltd* 's product, model *TPMS* or the "EUT" as referred to in this report is a Tire Pressure Monitoring System which measures approximately 7.3 cm L x 7.8 cm W x 1.8 cm H, rated input voltage: DC 3.6 V battery.

** The test data gathered are from an engineering sample, serial number: S&T013050909245, provided by the manufacturer, we receive the EUT 2005-9-27.*

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 Laboratory, 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 Lab Corp. (ShenZhen) to collect radiated and conducted emission measurement data is located in the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone, ShenZhen, Guangdong 518038, P.R.China.

Test site at Bay Area Compliance Lab 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 Lab Corp. (ShenZhen) is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200707-0). The current scope of accreditations can be found at <http://ts.nist.gov/ts/htdocs/210/214/scopes/2007070.htm>

SYSTEM TEST CONFIGURATION

Justification

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

EUT Exercise Software

N/A.

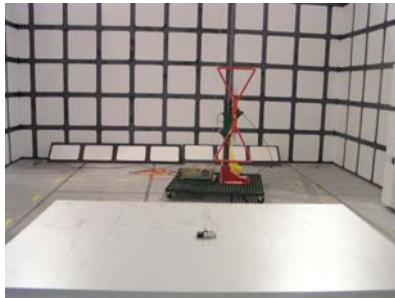
Special Accessories

The special accessories were provided by manufactures.

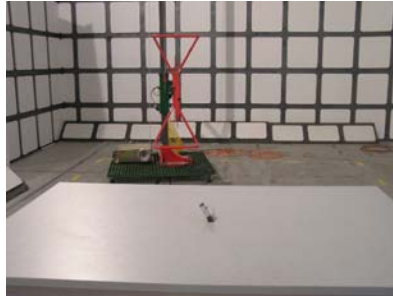
Equipment Modifications

Bay Area Compliance Lab Corp. (ShenZhen) has not done any modification on the EUT.

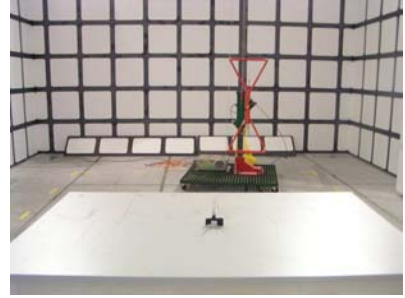
Configuration of Test Setup



Lie view



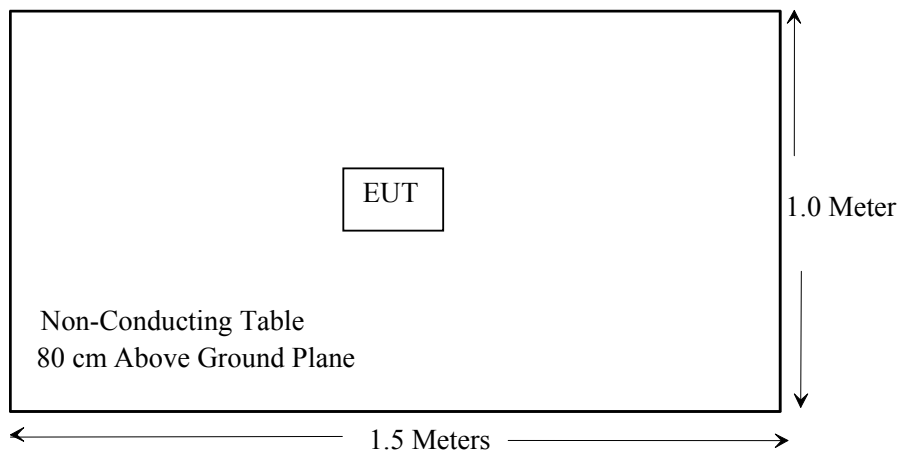
Side view



Stand view

Note: We tested lie orientation, side orientation and stand orientation, the lie orientation is the worst mode, so only the worst mode test data was included in this report.

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.231 (e)	Radiated Emission	Compliant*
§15.231 (c)	20dB Band Width Testing	Compliant
§15.231 (e)	Deactivation Testing	Compliant
§15.205	Restricted Band	Compliant
§15.209	General Requirement	Compliant
§15.203	Antenna Requirement	Compliant

* Within measurement uncertainty

§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.

This product has a permanent antenna, fulfill the requirement of this section.

Test Result: Pass

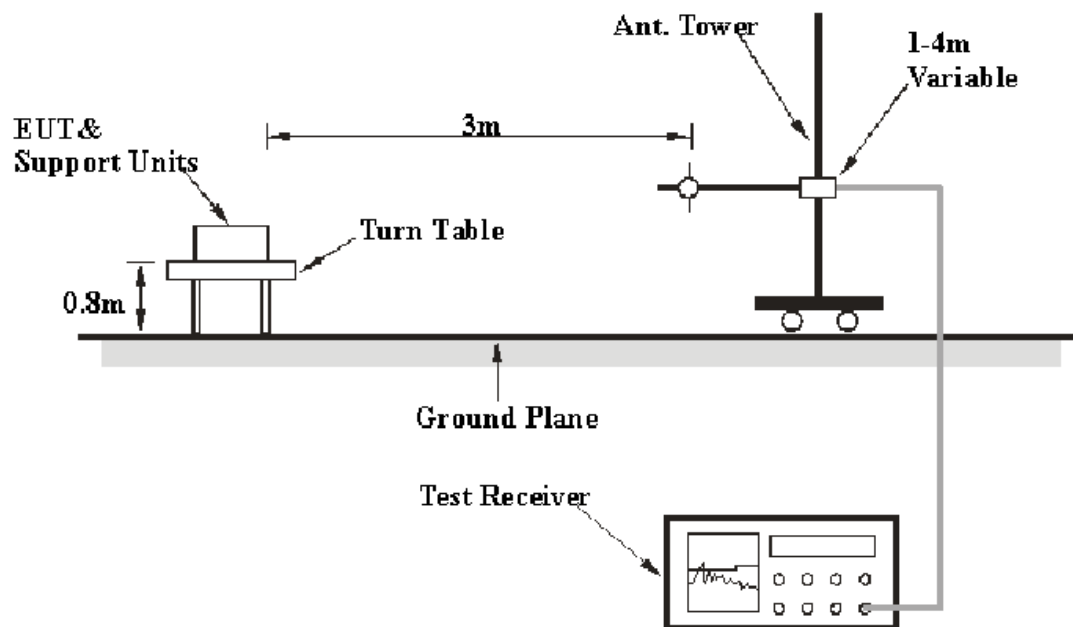
§15.205, §15.209, §15.231 (e)- RADIATED EMISSION

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 Bay Area Compliance Lab Corp. (ShenZhen) is ± 4.0 dB.

EUT Setup



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

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>Frequency Range</i>	<i>RBW</i>	<i>VBW</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
Rohde & Schwarz	Spectrum Analyzer	FSEM30	849720/019	2005-11-10	2006-11-10
HP	Amplifier	8449B	3008A00277	2005-8-17	2006-8-17
Sunol Sciences	Horn Antenna	DRH-118	A052604	2005-7-20	2006-7-20
HP	Amplifier	HP8447E	1937A01046	2005-8-17	2006-8-17
Rohde & Schwarz	Test Receiver	ESCI	100035	2005-8-17	2006-8-17
Sunol Sciences	Broadband Antenna	JB1	A040904-2	2005-4-28	2006-4-28

* **Statement of Traceability:** Bay Area Compliance Lab 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(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
260-470.....	1,500 to 5,000 \1\.....	150 to 500 \1\
Above 470	5,000.....	500

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 -7dB means the emission is 7dB below the limit. 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 15.231, with the worst margin reading of:

30 -1000MHz: -2.60 dB at 433.95 MHz in the Horizontal polarization.
1-5 GHz: -16.4 dB at 1301.85 MHz in the Vertical polarization.

Test Data

Environmental Conditions

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

The testing was performed by Louise Lu on 2005-11-15.

Test Mode: Transmitting

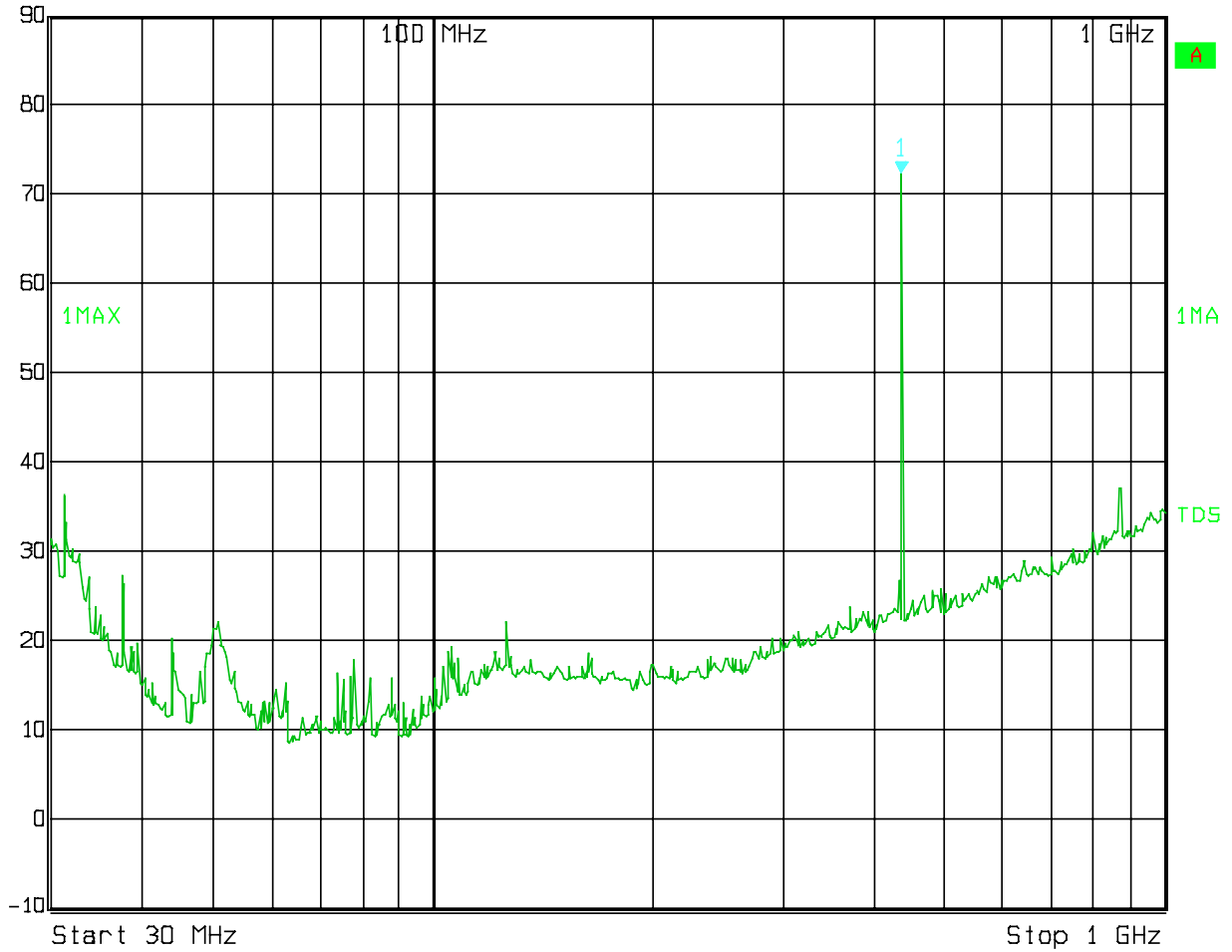
Frequency MHz	Meter Reading dBuV/m	Detector PK/QP /AV	Direction Degree	Height Meter	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier Gain dB	Corr. Ampl. dBuV/m	FCC Part 15.231		
										Limit dBuV/m	Margin dB	Remark
30 -1000MHz												
433.95	75.80	AV	289	1.0	H	16.8	4.1	26.50	70.2	72.8	-2.6*	Fundamental
433.95	71.90	AV	45	1.2	V	16.8	4.1	26.50	66.3	72.8	-6.5	Fundamental
433.95	77.90	PK	289	1.0	H	16.8	4.1	26.50	72.3	92.8	-20.5	Fundamental
433.95	73.40	PK	60	1.0	V	16.8	4.1	26.50	67.8	92.8	-25.0	Fundamental
867.90	35.40	PK	45	1.0	V	22.2	6.3	26.70	37.2	72.8	-35.6	Harmonic
867.90	35.00	PK	180	1.2	H	22.2	6.3	26.70	36.8	72.8	-36.0	Harmonic
1-5 GHz												
1301.85	48.01	PK	45	1.2	V	23.3	2.6	36.33	37.6	54.0	-16.4	Harmonic
1301.85	47.53	PK	45	1.0	H	23.3	2.6	36.33	37.1	54.0	-16.9	Harmonic
2603.70	46.75	PK	60	1.0	V	28.1	3.7	34.00	44.6	72.8	-28.3	Harmonic
2603.70	46.23	PK	60	1.0	H	28.1	3.7	34.00	44.0	72.8	-28.8	Harmonic
2169.75	46.57	PK	45	1.0	H	28.4	3.4	35.16	43.2	72.8	-29.6	Harmonic
2169.75	45.86	PK	45	1.2	V	28.4	3.4	35.16	42.5	72.8	-30.3	Harmonic
1735.80	46.76	PK	180	1.2	V	25.0	3.4	36.33	38.8	72.8	-34.0	Harmonic
1735.80	46.44	PK	180	1.2	H	25.0	3.4	36.33	38.5	72.8	-34.3	Harmonic

* Within measurement uncertainty

Horizontal:



Ref Lvl 90 dB μ V
Marker 1 [T1] 72.28 dB μ V
436.39561381 MHz
RBW 100 kHz
VBW 300 kHz
RF Att 10 dB
SWT 500 ms
Unit dB μ V

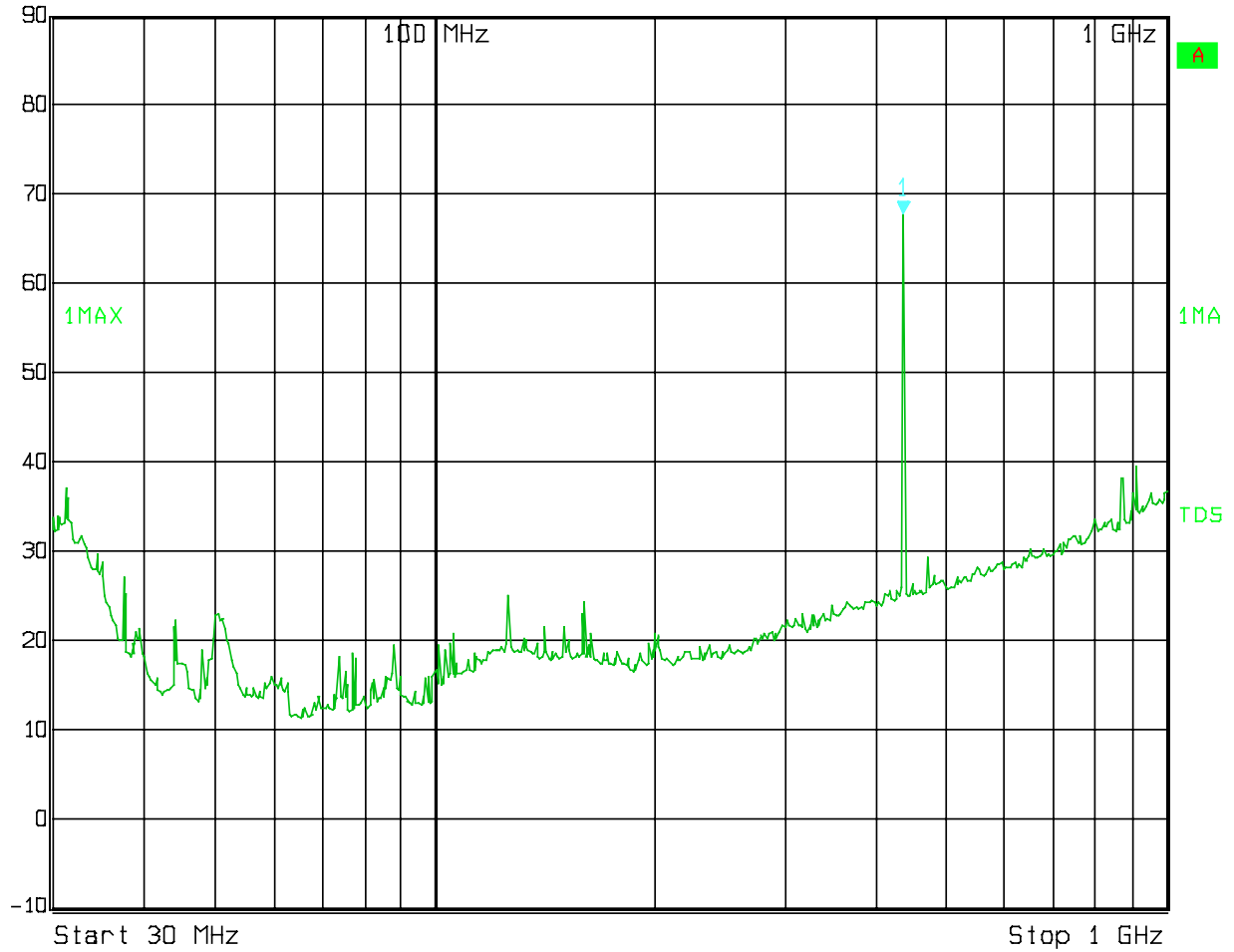


Date: 15.NOV.2005 12:08:05

Vertical:



Ref Lvl 90 dB μ V
Marker 1 [T1] 436.39561381 MHz 67.77 dB μ V
RBW 100 kHz RF Att 10 dB
VBW 300 kHz
SWT 500 ms Unit dB μ V



Date: 15.NOV.2005 11:55:46

§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
HP	Amplifier	HP8447E	1937A01046	2005-8-17	2006-8-17
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2005-8-17	2006-8-17
Sunol Sciences	Broadband Antenna	JB1	A040904-2	2005-4-28	2006-4-28

* **Statement of Traceability:** Bay Area Compliance Lab 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:	50%
ATM Pressure:	1032mbar

The testing was performed by Louise Lu on 2005-11-17.

Test Mode: Transmitting

Frequency MHz	Bandwidth Emission KHz	Limit KHz
433.95	72.645	1.085

Limit=Frequency×0.25%=433.95×0.25%=1.085KHz

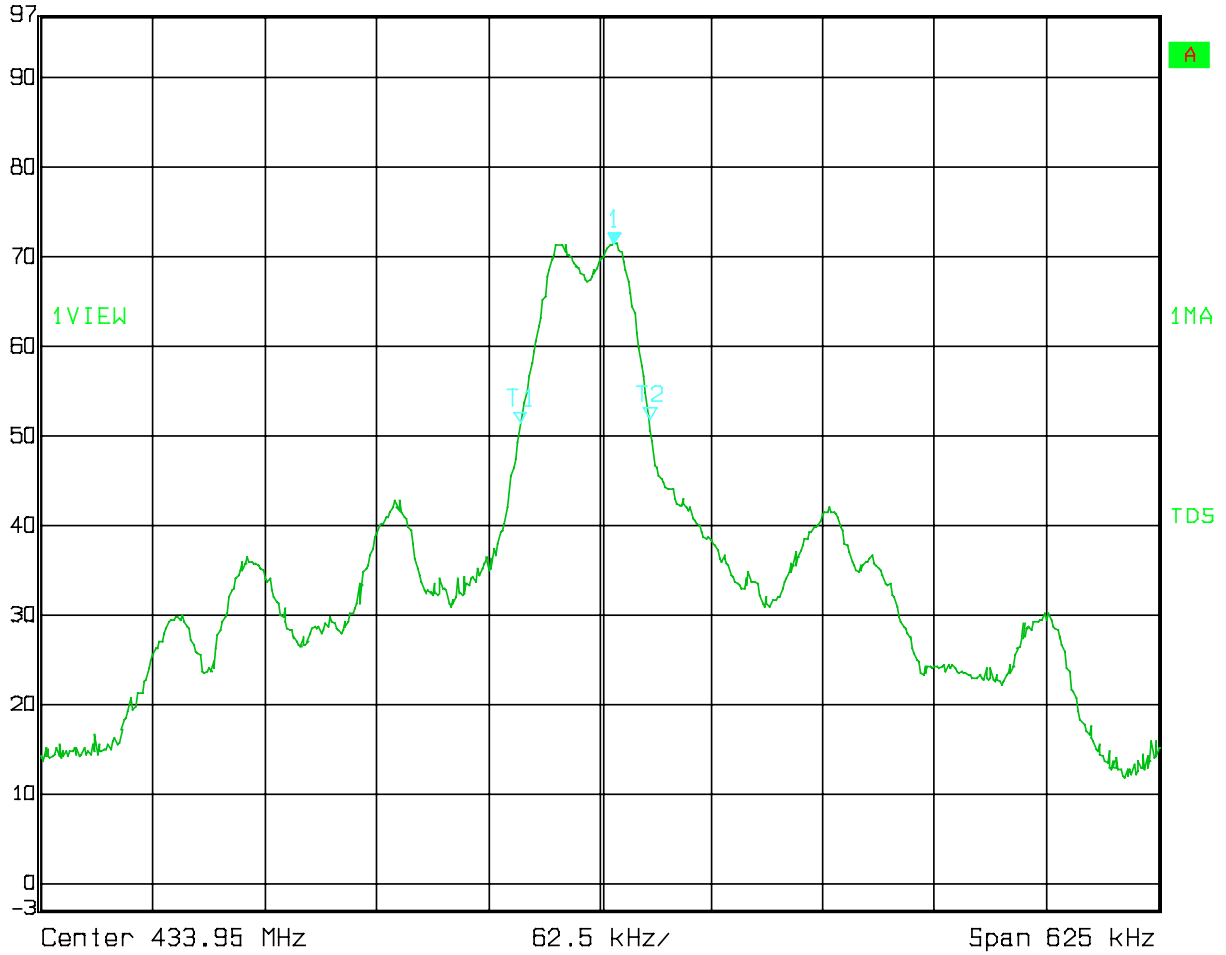
Refer to the attached plots.



Ref Lvl
97 dB μ V

Marker 1 [T1 ndB]
ndB 20.00 dB
BW 72.64529058 kHz

RBW 10 kHz RF Att 10 dB
VBW 30 kHz
SWT 500 ms Unit dB μ V



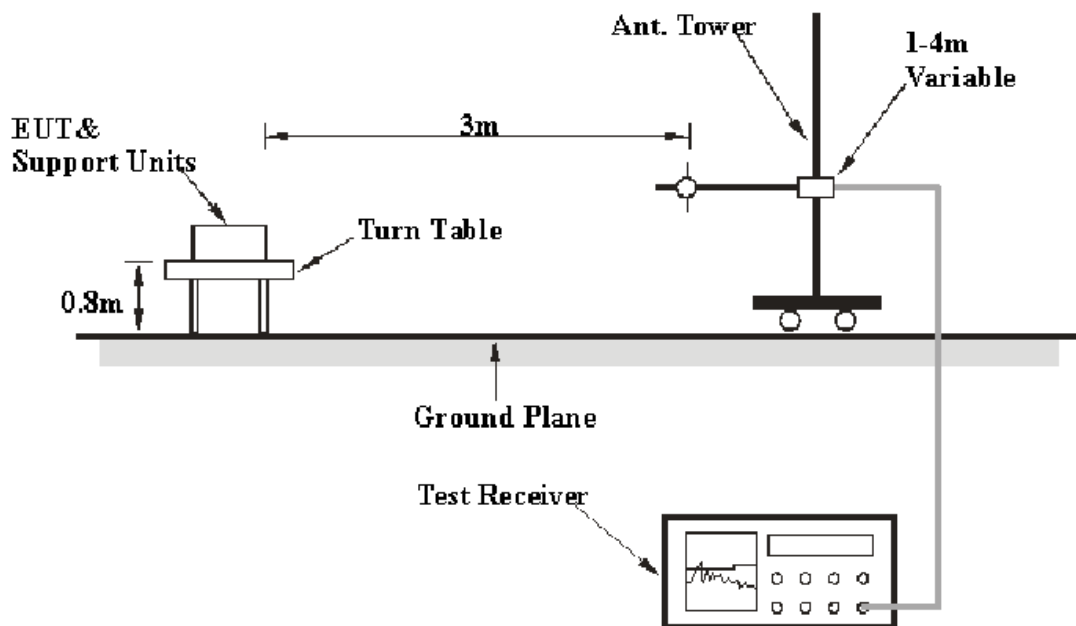
Date: 17.NOV.2005 09:13:01

§15.231(e)-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 A test site, using the setup accordance with the ANSI C63.4 - 2003. The specification used was the FCC 15.231(e) limits.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	HP8447E	1937A01046	2005-8-17	2006-8-17
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2005-8-17	2006-8-17
Sunol Sciences	Broadband Antenna	JB1	A040904-2	2005-4-28	2006-4-28

* **Statement of Traceability:** Bay Area Compliance Lab 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:	27 ° C
Relative Humidity:	56%
ATM Pressure:	1032mbar

The testing was performed by Louise Lu on 2005-11-15~2005-11-17.

Test Mode: Transmitting

Transmission Time:

Frequency (Fundamental)	Transmission (Turn on)	Limit	Margin	Result
433.95 MHz	0.038 s	1 s	-0.962 s	Pass

Silent Time:

Frequency (Fundamental)	Transmission (Turn off)	Limit > Turn on*30 times	Margin	Limit 2 >10 s	Result
433.95 MHz	12.1843 s	1.14 s	-11.0443 s	12.1843 s	Pass
433.95 MHz	373.94 s	1.14 s	-372.8 s	373.94 s	Pass
433.95 MHz	1106.212 s	1.14 s	-1105.072 s	1106.212 s	Pass

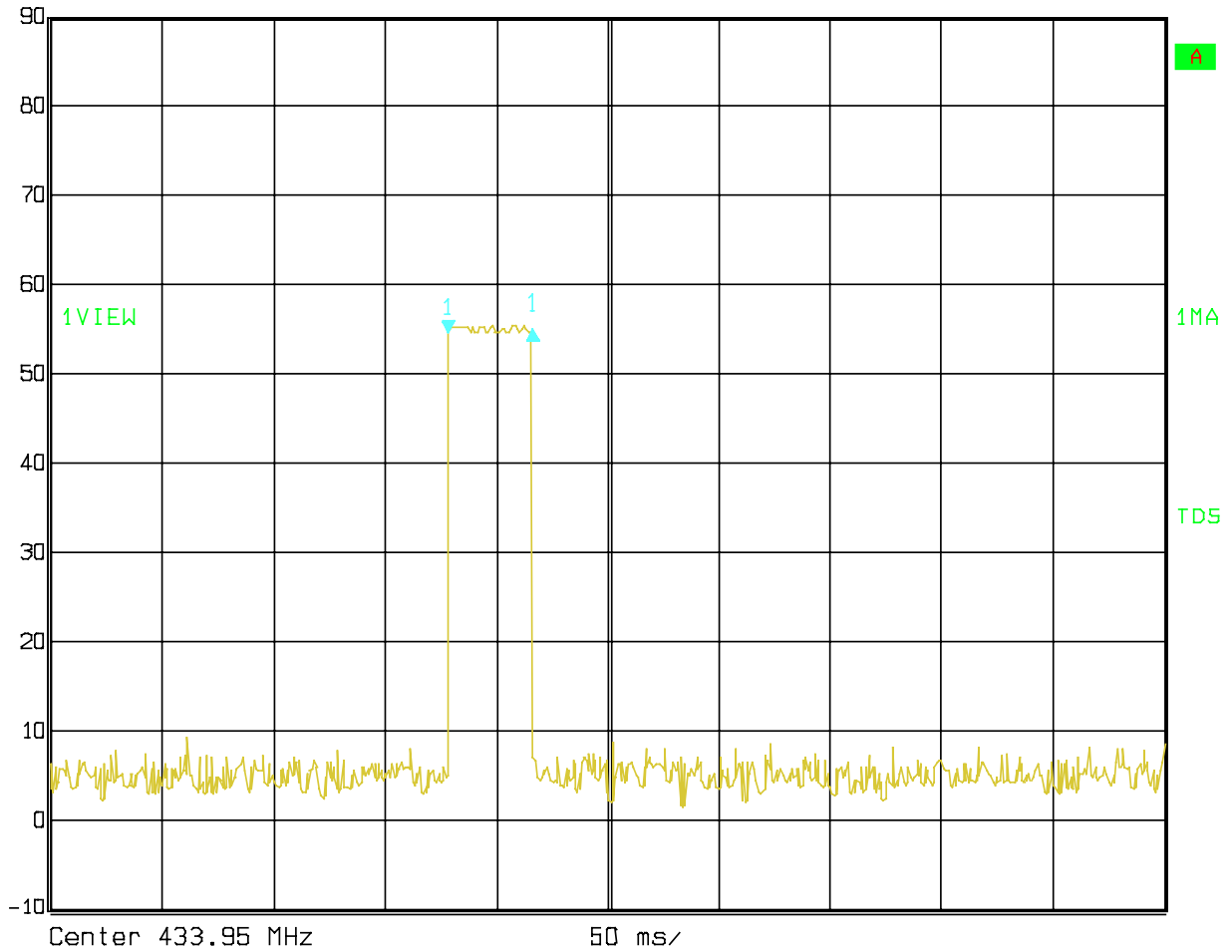
Refer to the attached plots.



Ref Lvl
90 dB μ V

Delta 1 [T1]
0.57 dB
38.076152 ms

RBW 10 kHz RF Att 10 dB
VBW 30 kHz
SWT 500 ms Unit dB μ V



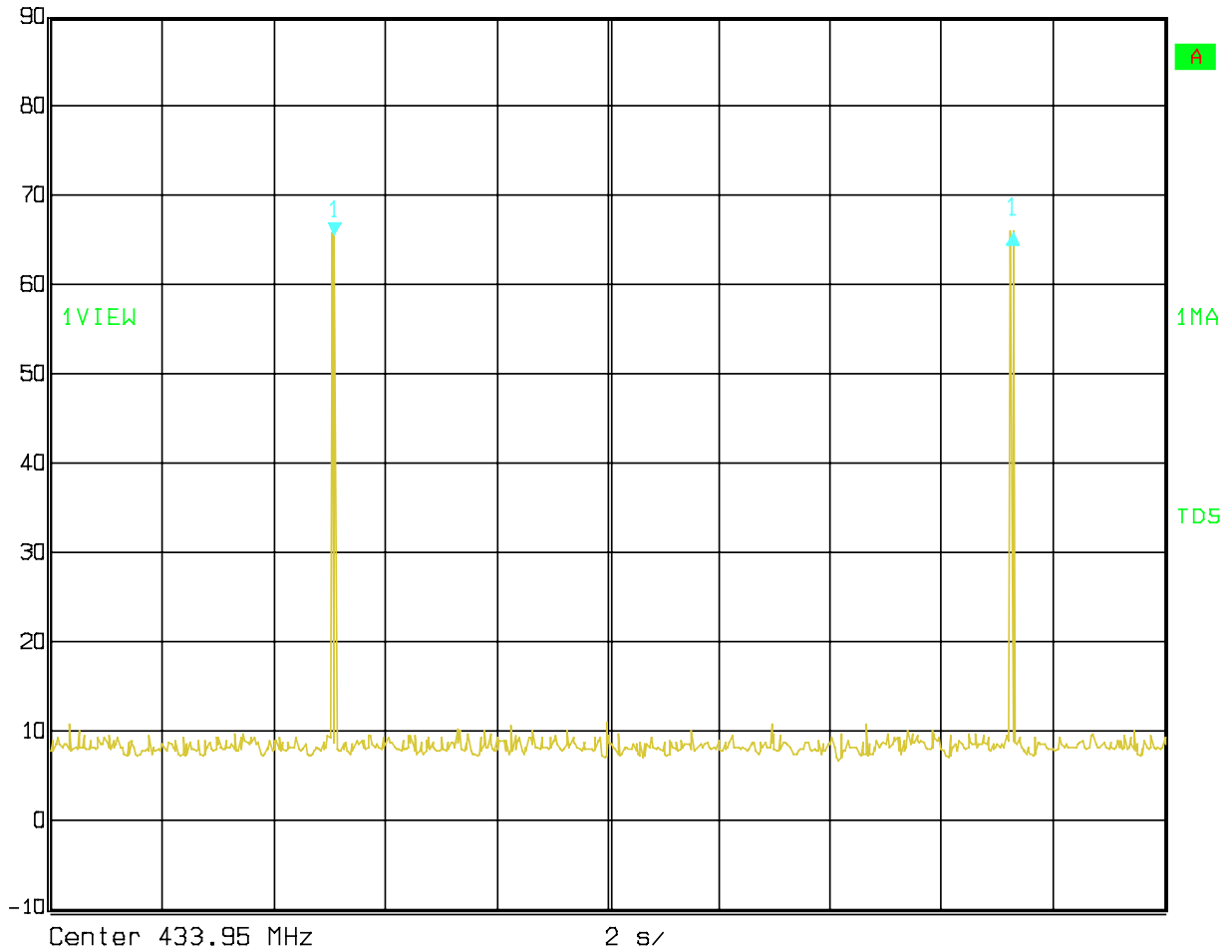
Date: 15.NOV.2005 10:40:14



Ref Lvl
90 dB μ V

Delta 1 [T1]
0.25 dB
12.184369 s

RBW 10 kHz RF Att 10 dB
VBW 30 kHz
SWT 20 s Unit dB μ V



Date: 15.NOV.2005 10:29:42



Ref Lvl
90 dB μ V

Delta 1 [T1]

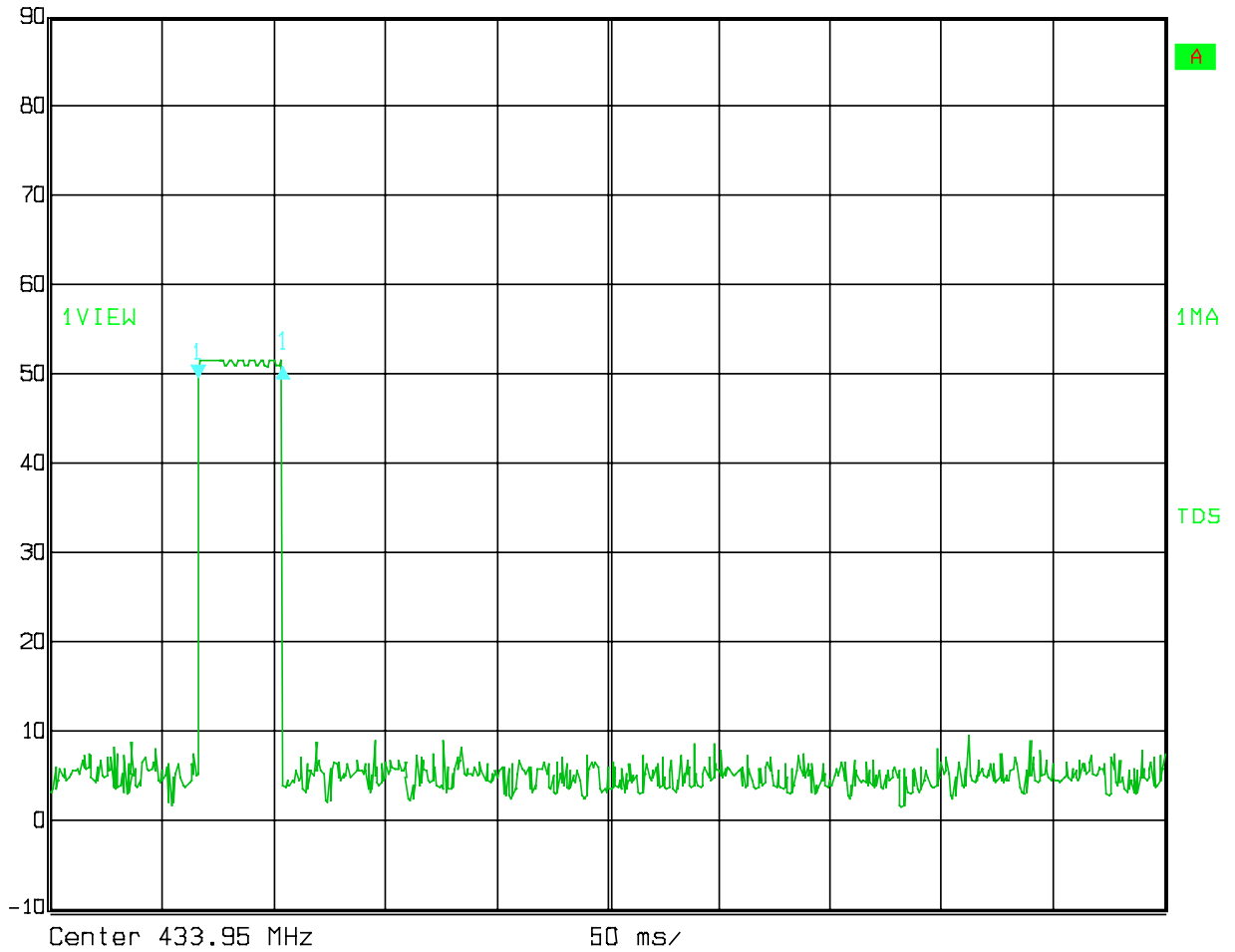
1.21 dB

38.076152 ms

RBW 10 kHz RF Att 10 dB

VBW 30 kHz

SWT 500 ms Unit dB μ V



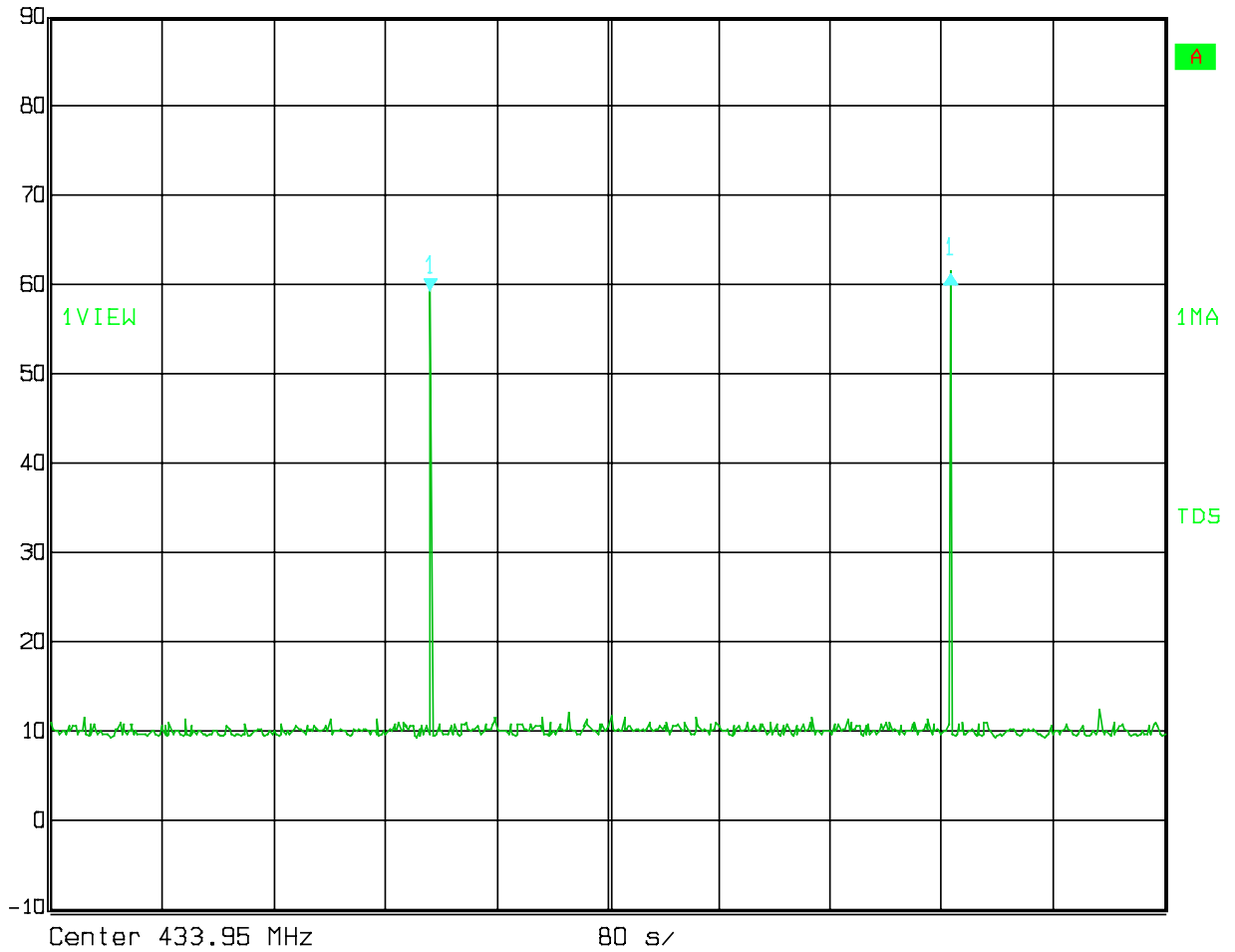
Date: 15.NOV.2005 11:31:26



Ref Lvl
90 dB μ V

Delta 1 [T1]
2.03 dB
373.947896 s

RBW 10 kHz RF Att 10 dB
VBW 30 kHz
SWT 800 s Unit dB μ V



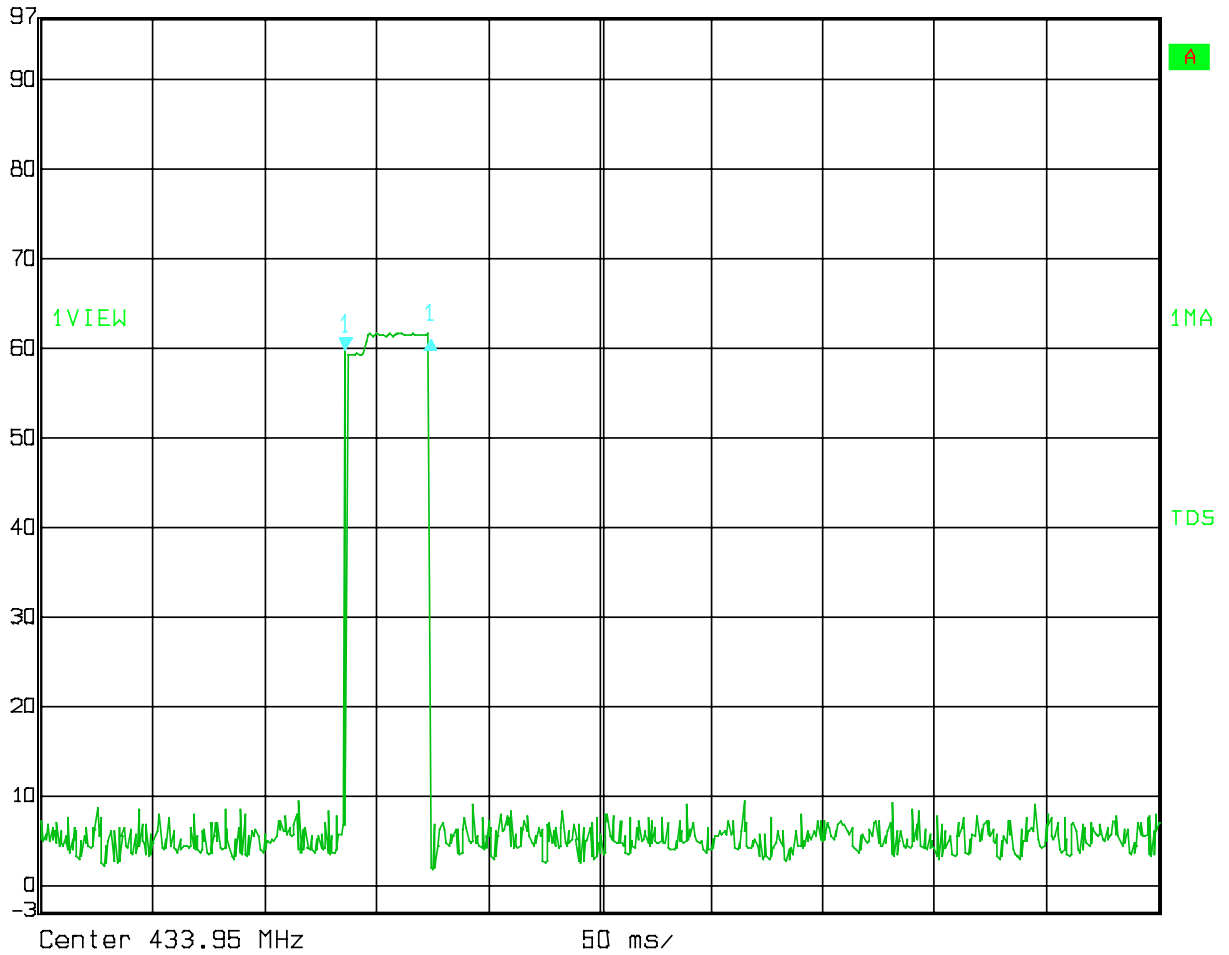
Date: 15.NOV.2005 11:22:34



Ref Lvl
97 dB μ V

Delta 1 [T1]
1.34 dB
38.076152 ms

RBW 10 kHz RF Att 10 dB
VBW 30 kHz
SWT 500 ms Unit dB μ V



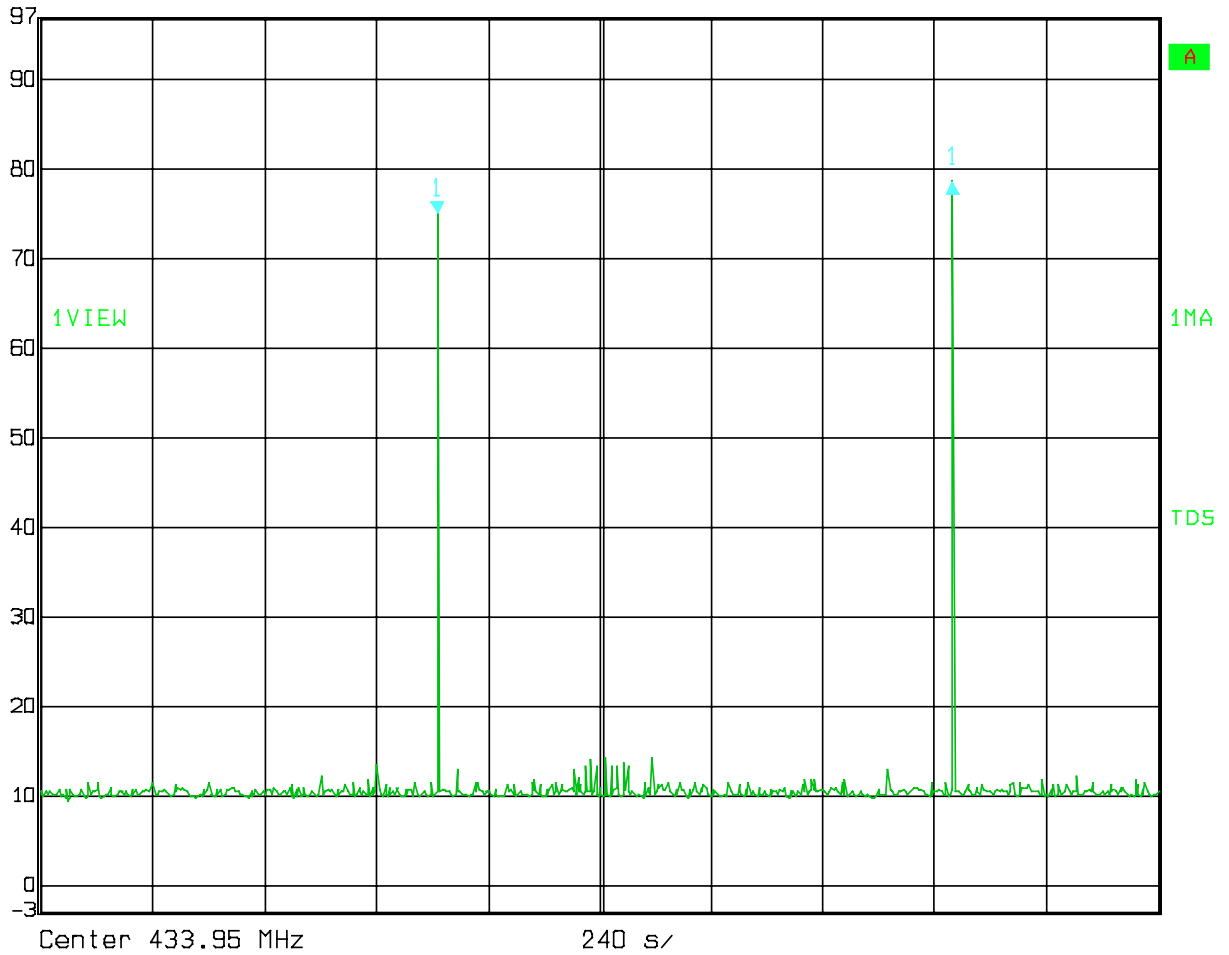
Date: 17.NOV.2005 08:59:19



Ref Lvl
97 dB μ V

Delta 1 [T1]
3.51 dB
1.106212 ks

RBW 10 kHz RF Att 10 dB
VBW 30 kHz
SWT 2400 s Unit dB μ V



Date: 16.NOV.2005 17:55:20