

**FCC PART 15.231**  
**MEASUREMENT AND TEST REPORT**  
**FOR**

**Suzhou Sate Auto Electronic Co., Ltd.**

5F-138, Qingyun Road, Zhangjiang Hi-Tech Zone, Pudong New Area,  
Shanghai, 201203, P. R. China

**FCC ID: TTETP027A**

<b>Report Concerns:</b> Original Report	<b>Equipment Type:</b> Smart Booster
<b>Model:</b>	<u>TBS01</u>
<b>Report No.:</b>	<u>STR08118054I</u>
<b>Test/Witness Engineer:</b>	<i>John Shi</i>
<b>Test Date:</b>	<u>2008-11-12 to 2008-11-24</u>
<b>Issue Date:</b>	<u>2008-11-25</u>
<b>Prepared By:</b>	<p style="text-align: center;"><b>SEM.Test Compliance Service Co., Ltd.</b>  3/F, Jinbao Commerce Building, Xin'an Fanshen Road,  Bao'an District, Shenzhen, P.R.C. (518101)</p>
<b>Approved &amp; Authorized By:</b>	<p style="text-align: center;"><i>Jandy So</i></p> <hr/> <p style="text-align: center;">Jandy So / PSQ Manager</p>

Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by SEM.Test Compliance Service Co., Ltd.

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## 1. GENERAL INFORMATION

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

Applicant:	Suzhou Sate Auto Electronic Co., Ltd.
Address of applicant:	5F-138, Qingyun Road, Zhangjiang Hi-Tech Zone, Pudong New Area, Shanghai, 201203, P. R. China
Manufacturer:	Suzhou Sate Auto Electronic Co., Ltd.
Address of manufacturer:	5F-138, Qingyun Road, Zhangjiang Hi-Tech Zone, Pudong New Area, Shanghai, 201203, P. R. China

#### General Description of E.U.T

Items	Description
EUT Description:	Smart Booster
Trade Name:	S&T
Model No.:	TBS01
Adding Model:	TBS02
Rated Voltage:	DC12V/24V
Output Power:	< 0dBm
Frequency Range:	434.10MHz
Antenna Type:	Integral Antenna
Size:	18.0X11.5X5.0 cm
Comment:	Periodic Operation Device
For more information refer to the circuit diagram form and the user's manual.	

*The test data is gathered from a production sample, provided by the manufacturer, the other models listed in the report have different appearance only of TBS01 without circuit and electronic construction changed, declared by the manufacturer.*

### 1.2 Test Standards

The following report is prepared on behalf of the Suzhou Sate Auto Electronic Co., Ltd. in accordance with FCC Part 15, Subpart C, and section 15.231, 15.203, 15.205 and 15.209 of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 15, Subpart C, and section 15.231, 15.203, 15.205 and 15.209 of the Federal Communication Commissions rules.

**Maintenance of compliance** is the responsibility of the manufacturer. Any modification of the product, which result in lowering the emission/immunity, should be checked to ensure compliance has been maintained.

### 1.3 Related TestSetup Informations

The EUT is test accompanying with the 434.1MHz sensor, which give the incoming signal to the EUT. Then the EUT forwards the 434.1 MHz to another receiver. The EUT only transmits when it decodes an incoming signal from the specific transmitter. The device meet the output level limits regardless of the input levels as the testing.

### 1.4 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.

The equipment under test (EUT) was configured to measure its highest possible emission level. Test was carried out together with the authorized transmitter and the transmitter's signal was configured to its highest level as an input signal to the EUT.

### 1.5 Test Facility

The 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 files which the Registration No.: **994117**.

Measurement required was performed at laboratory of SEM. Test Compliance Service Co., Ltd. at 3/F, Jinbao Commerce Building, Xin'an Fanshen Road, Bao'an District, Shenzhen, P.R.C

### 1.6 EUT Exercise Software

The EUT exercise program used during the testing was designed to exercise the system components. The test software, provided by the customer, is started while the whole system is running.

### 1.7 Accessories Equipment List and Details

Manufacturer	Description	Model	Serial Number
/	/	/	/

### 1.8 EUT Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Cord/Without Cord
DC Power Cable	2.6	Unshielded	Without Cord

## 2. SUMMARY OF TEST RESULTS

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<b>Description of Test</b>	<b>Result</b>
§15.203 Antenna Requirement	Compliant
§15.205 Restricted Band	Compliant
§15.209 General Requirement	Compliant
§15.231 (e) Deactivation Testing	Compliant
§15.231 (c) 20dB Band Width Testing	Compliant
§15.231 (e) Radiated Emission	Compliant

### **3. §15.203 - ANTENNA REQUIREMENT**

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#### **3.1 Standard Applicable**

According to FCC 15.203, 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.

#### **3.2 Test Result**

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

## 4. §15.205, §15.209, §15.231 (e)- RADIATED EMISSION

### 4.1 Measurement Uncertainty

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement is  $\pm 3.0$  dB.

### 4.2 Standard Applicable

According to §15.231(e), 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.....	1000.....	100
70-130.....	500.....	50
130-174.....	\1\ 500 to 1500 .....	\1\ 50 to 150
174-260.....	1500.....	150
260-470.....	\1\ 1500 to.....	\1\ 150 to 500
	5000	
Above 470.....	5000.....	500

\1\ Linear interpolations.

The limits on the field strength of the spurious emissions in the above table are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in §15.209, whichever limit permits a higher field strength.

compliance with the provisions of §15.205 shall be demonstrated using the measurement instrumentation specified in that section.

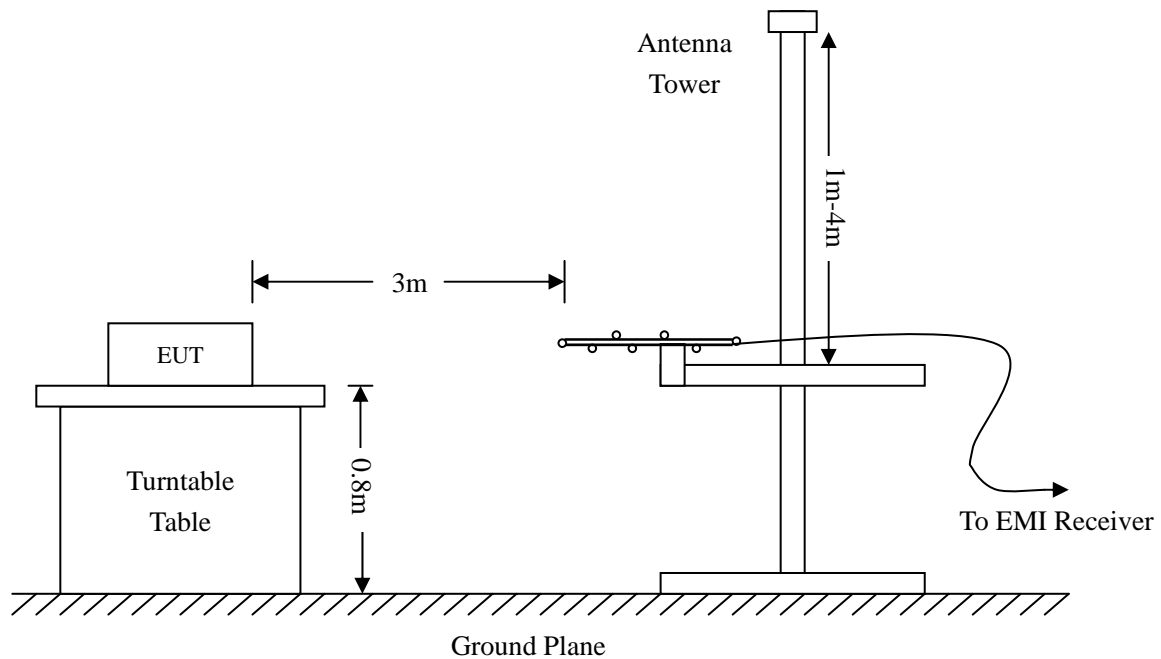
### 4.3 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	ROHDE&SCHWARZ	FSEA20	DE25181	2008-01-25	2009-01-24
Positioning Controller	C&C	CC-C-1F	N/A	2008-01-25	2009-01-24
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2008-01-25	2009-01-24
Horn Antenna	SCHWARZBECK	BBHX 9120	9120-426	2008-01-25	2009-01-24
RF Switch	EM	EMSW18	SW060023	2008-01-25	2009-01-24
Amplifier	Agilent	8447F	3113A06717	2008-01-25	2009-01-24
Coaxial Cable	SCHWARZBECK	AK9513	9513-10	2008-01-25	2009-01-24
EMI Test Receiver	ROHDE&SCHWARZ	ESPI	25498514	2008-01-25	2009-01-24

**Statement of Traceability:** All calibrations have been performed per the NVLAP requirements traceable to the NIST.

### 4.4 Test Procedure

The setup of EUT is according with per ANSI C63.4-2003 measurement procedure. The specification used was with the FCC Part 15.205 15.231(b) and FCC Part 15.209 Limit.





#### 4.5 Corrected Amplitude & Margin Calculation

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

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Ant. Loss} + \text{Cab. Loss} - \text{Ampl. Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dB $\mu$ V means the emission is 6dB $\mu$ V below the maximum limit for Class B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{FCC Part 15.231 Limit}$$

#### 4.6 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	53 %
ATM Pressure:	1011 mbar

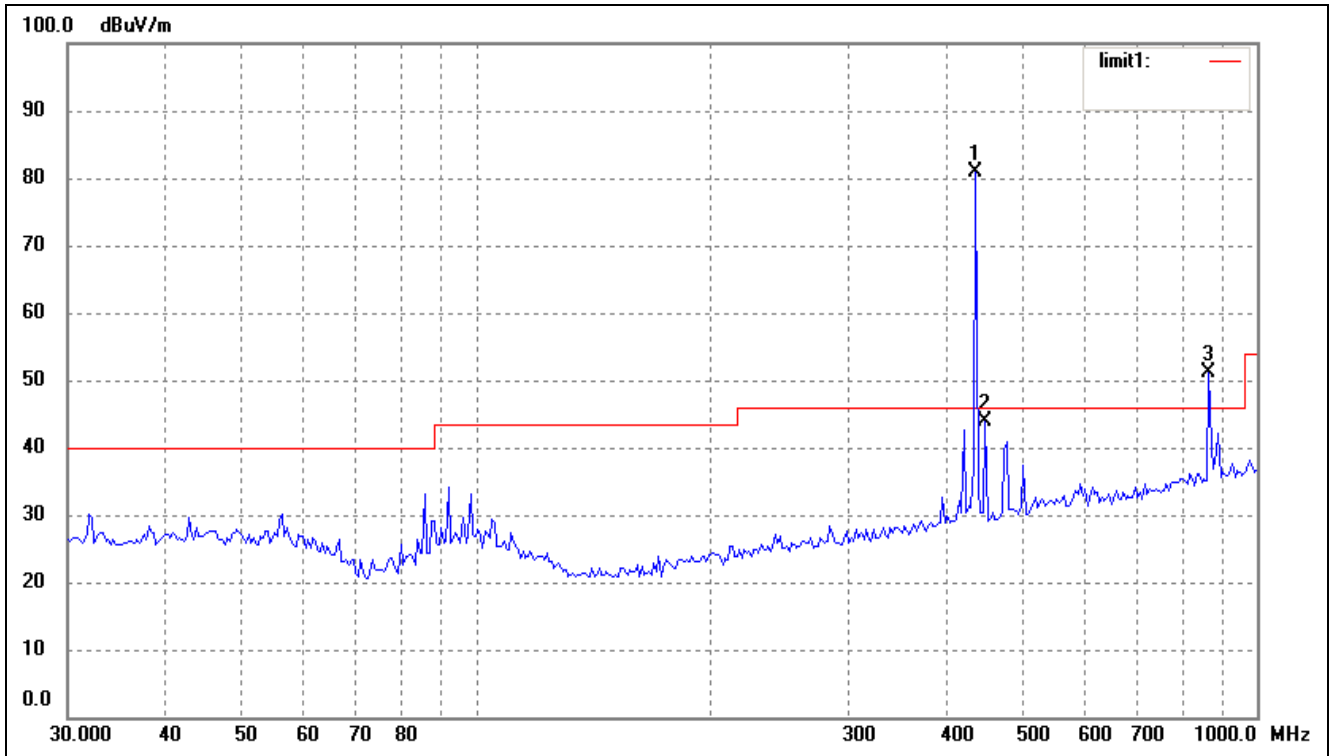
#### 4.7 Summary of Test Results/Plots

According to the data below, the FCC Part 15.205, 15.209 and 15.231 standards, and had the worst margin of:

**-0.79 dB $\mu$ V at 434.10 MHz in the Horizontal polarization, (Ave) 30 MHz to 5 GHz, 3Meters**

**Plot of Radiation Emissions Test (Below 1 G)**

Horizontal

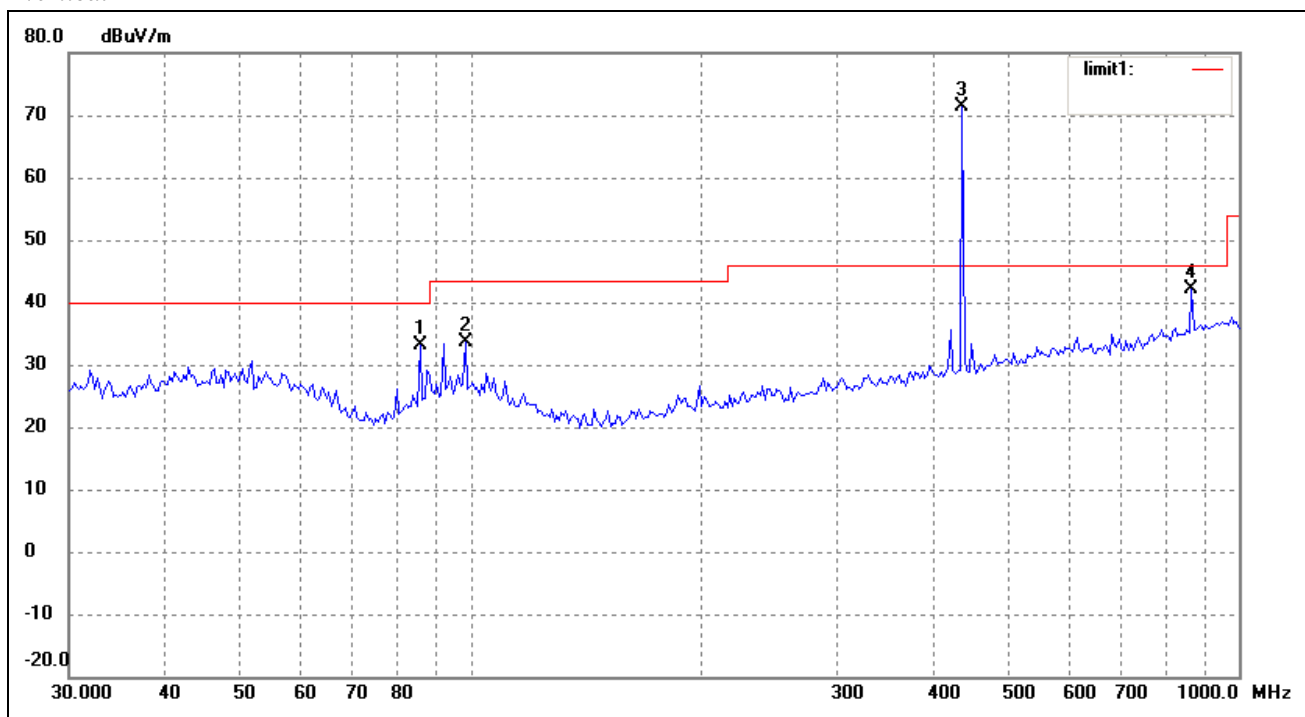


No.	Frequency (MHz)	Reading (dBuV/m)	Corr. Factor (dB)	Dutycycle Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Deg. (°)	Height (cm)	Remark
1	434.1000	64.02	16.88	N/A	80.90	92.87	-11.97	360	100	peak
2	448.3960	27.05	16.92	N/A	43.97	46.00	-2.03	220	100	peak
3	868.2000	28.90	22.17	N/A	51.07	72.87	-21.80	360	100	peak
	434.1000	/	/	-8.82	72.08	72.87	-0.79	360	100	Ave
	868.2000	/	/	-8.82	42.25	52.87	-10.62	360	100	Ave

Above 1GHz

No.	Frequency MHz	Reading dBuV/m	Corr. Factor (dB)	Dutycycle Factor (dB)	Result dBuV/m	Limit dBuV/m	Margin dB	Deg. (°)	Height (cm)	Remark
1	1302.30	29.32	26.95	N/A	56.27	74.00	-17.73	45	100	Peak
2	1736.40	28.64	27.77	N/A	56.41	74.00	-17.59	310	100	Peak
	1302.30	/	/	-8.82	47.45	54.00	-6.55	360	100	Ave
	1736.40	/	/	-8.82	47.59	54.00	-6.41	360	100	Ave

Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Corr. Factor (dB)	Dutycycle Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Deg. (°)	Height (cm)	Remark
1	86.0795	21.31	11.74	N/A	33.05	40.00	-6.95	360	100	peak
2	98.3752	19.53	14.15	N/A	33.68	43.50	-9.82	210	200	peak
3	434.1000	54.46	16.88	N/A	71.34	92.87	-21.53	360	100	peak
4	868.2000	19.97	22.17	N/A	42.14	72.87	-30.73	360	100	peak
	434.1000	/	/	-8.82	62.52	72.87	-10.53	360	100	Ave
	868.2000	/	/	-8.82	33.32	52.87	-19.55	360	100	Ave

Above 1GHz

No.	Frequency (MHz)	Reading (dBuV/m)	Corr. Factor (dB)	Dutycycle Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Deg. (°)	Height (cm)	Remark
1	1302.30	24.41	26.95	N/A	51.36	74.00	-22.64	0	100	peak
2	1736.40	24.09	27.77	N/A	51.86	74.00	-22.14	0	100	peak
	1302.30	/	/	-8.82	42.54	54.00	-11.46	360	100	Ave
	1736.40	/	/	-8.82	43.04	54.00	-10.96	360	100	Ave

Note: The EUT was tested in all three orthogonal planes and frequency range 30MHz to the tenth harmonics.

Emissions attenuated closely to the noise base are not reported.

The fundamental frequency is 434.1MHz, so the fundamental and spurious emissions radiated limit base on the the operating frequency 434MHz.

## 5. §15.231(c) 20dB BANDWIDTH TESTING

### 5.1 Standard Applicable

According to FCC 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.

### 5.2 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date	Due. Date
Agilent	Spectrum Analyzer	E4402B	US41192821	2008-01-25	2009-01-24
EMI Test Receiver	ROHDE&SCHW ARZ	ESPI	25498514	2008-01-25	2009-01-24
ETS	Receiver Antenna	2175	57337	2008-01-25	2009-01-24
ETS	50 ohm Coaxial Cable	SUCOFLEX 104	25498514	2008-01-25	2009-01-24

**Statement of Traceability:** All calibrations have been performed per the NVLAP requirements traceable to the NIST.

### 5.3 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.

### 5.4 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	52%
ATM Pressure:	1011 mbar

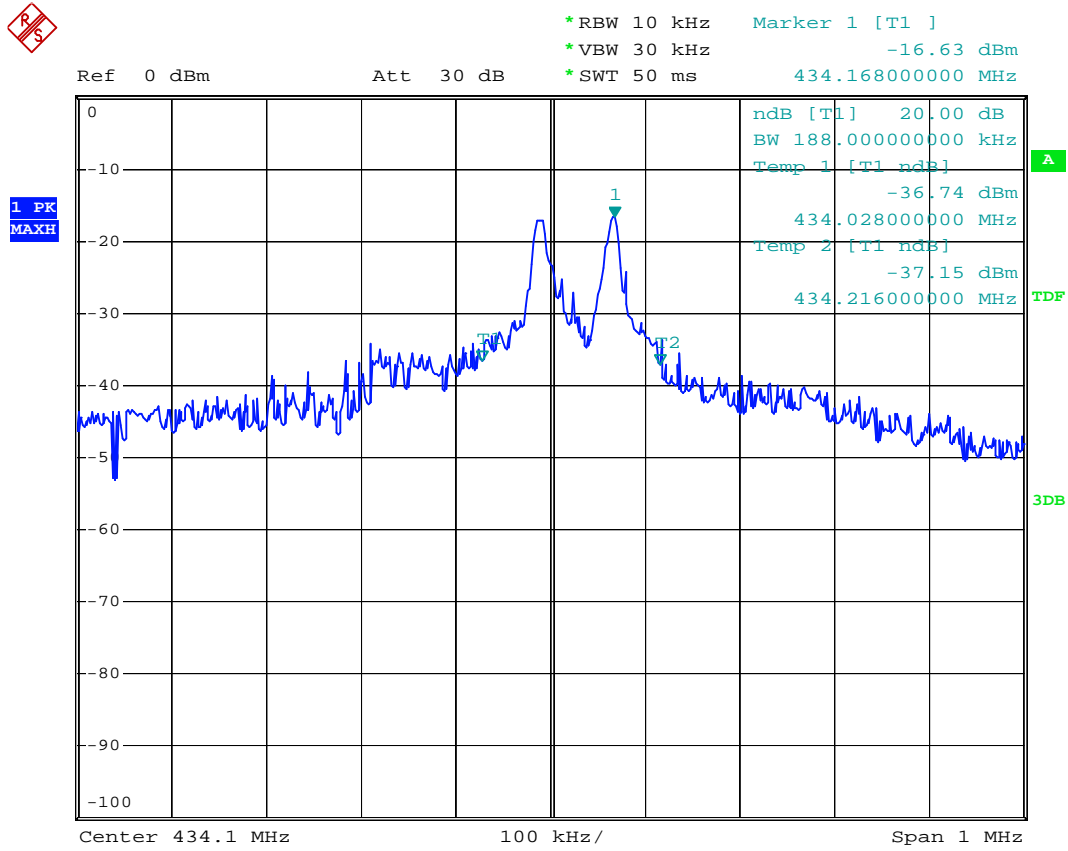
### 5.5 Summary of Test Results/Plots

Frequency MHz	20dB Bandwidth KHz	Limit kHz
434.10	188	1085

Limit=Frequency×0.25%=434.12×0.25%=1085 kHz

**Test Result Pass**

Refer to the attached plots.



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## 6. §15.231(e)-DEACTIVATION TESTING

### 6.1 Standard Applicable

According to FCC 15.231 (e) 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.

### 6.2 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date	Due. Date
Agilent	Spectrum Analyzer	E4402B	US41192821	2008-01-25	2009-01-24
EMI Test Receiver	ROHDE&SCHW ARZ	ESPI	25498514	2008-01-25	2009-01-24
Receiver Antenna	ETS	2175	57337	2008-01-25	2009-01-24
50 ohm Coaxial Cable	ETS	SUCOFLEX 104	25498514	2008-01-25	2009-01-24

**Statement of Traceability:** All calibrations have been performed per the NVLAP requirements traceable to the NIST.

### 6.3 Test Procedure

With the EUT's antenna attached, the EUT's output signal was received by the test antenna, which was connected to the spectrum analyzer. Set the center frequency to 434.10MHz, than set the spectrum analyzer to Zero Span for the release time reading.

### 6.4 Environmental Conditions

Temperature:	26 °C
Relative Humidity:	52%
ATM Pressure:	1011 mbar

### 6.5 Summary of Test Results/Plots

Maximum transmission time in exceed 100ms pulse train:

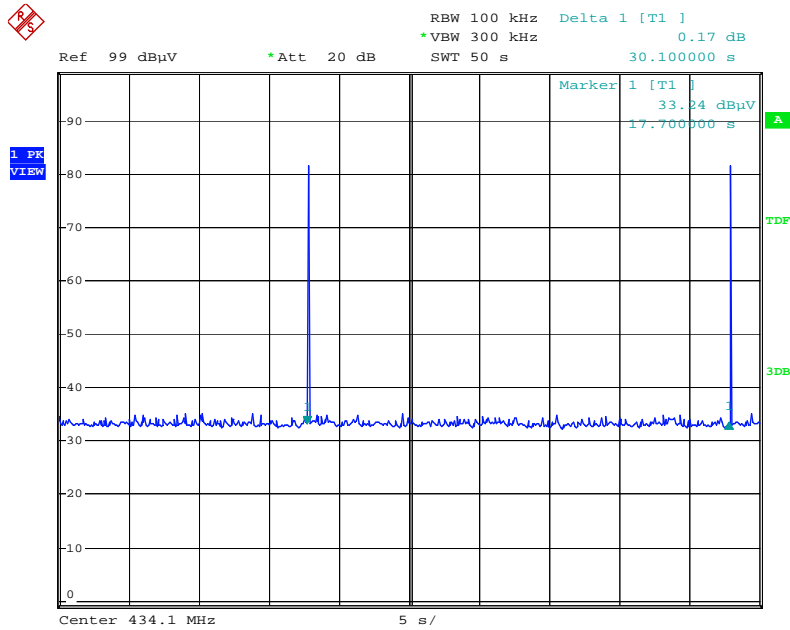
Ton = 36.2ms

So

Factor =  $20 * \log(Ton/100) = 20 * \log(36.2/100) = -8.82dB$

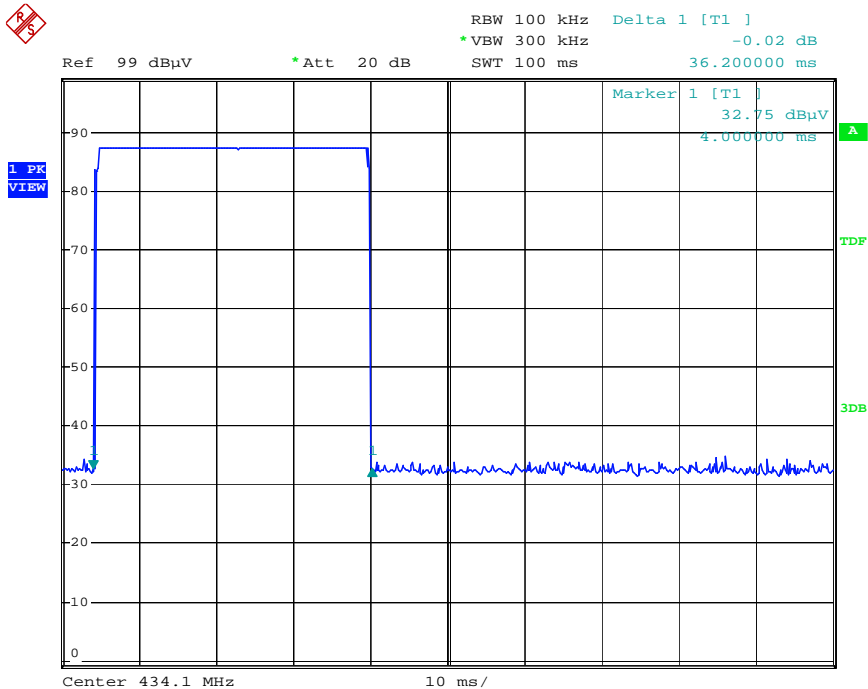
Refer to the attached plots.

Silent Time =30.1s >10s



Date: 22.NOV.2008 11:24:52

Transmission Time=0.0362s <1s



Date: 22.NOV.2008 11:26:26

**Result: Pass**