

APPLICATION CERTIFICATION  
On Behalf of  
Zhongshan Victon Electronic Technology Co., Ltd.

Tire Pressure Monitoring System  
Model No.: VT-8012

FCC ID: WZVVT8012

Prepared for : Zhongshan Victon Electronic Technology Co., Ltd.  
Address : No. 9, Hubin Middle Road, Zhongshan City, Guangdong  
China

Prepared by : ACCURATE TECHNOLOGY CO. LTD  
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Report Number : ATE20082353  
Date of Test : December 17-22, 2008  
Date of Report : December 22, 2008

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APPENDIX I ( TEST CURVES) (8 pages)

## Test Report Certification

Applicant : Zhongshan Victon Electronic Technology Co., Ltd.  
 Manufacturer : Zhongshan Victon Electronic Technology Co., Ltd.  
 EUT Description : Tire Pressure Monitoring System  
     (A) MODEL NO.: VT-8012  
     (B) SERIAL NO.: N/A  
     (C) POWER SUPPLY: DC 3.0V (sub-lithium effect battery 1×)

Measurement Procedure Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.231 & ANSI C63.4: 2003

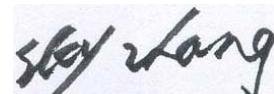
The device described above is tested by ACCURATE TECHNOLOGY CO. LTD to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C Section 15.231 limits. The measurement results are contained in this test report and ACCURATE TECHNOLOGY CO. LTD is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC requirements.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of ACCURATE TECHNOLOGY CO. LTD.

Date of Test :

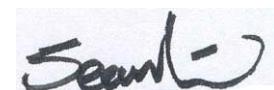
December 17-22, 2008

Prepared by :



(Engineer)

Approved & Authorized Signer :



(Manager)

## 1. GENERAL INFORMATION

### 1.1. Description of Device (EUT)

EUT : Tire Pressure Monitoring System

Model Number : VT-8012

Operation Frequency : 433.92MHz

Power Supply : DC 3.0V (sub-lithium effect battery 1 ×)

Applicant : Zhongshan Victon Electronic Technology Co., Ltd.

Address : No. 9, Hubin Middle Road, Zhongshan City, Guangdong China

Manufacturer : Zhongshan Victon Electronic Technology Co., Ltd.

Address : No. 9, Hubin Middle Road, Zhongshan City, Guangdong China

Date of sample received : December 15, 2008

Date of Test : December 17-22, 2008

## 1.2.Description of Test Facility

EMC Lab	: Accredited by TUV Rheinland Shenzhen
	Listed by FCC The Registration Number is 752051
	Listed by Industry Canada The Registration Number is 5077A-2
	Accredited by China National Accreditation Committee for Laboratories The Certificate Registration Number is L3193
Name of Firm	: ACCURATE TECHNOLOGY CO. LTD
Site Location	: F1, Bldg. A, Changyuan New Material Port, Keyuan Rd. Science & Industry Park, Nanshan, Shenzhen, Guangdong P.R. China

## 1.3.Measurement Uncertainty

Conducted Emission Expanded Uncertainty = 2.23dB, k=2

Radiated emission expanded uncertainty = 3.08dB, k=2  
(9kHz-30MHz)

Radiated emission expanded uncertainty = 4.42dB, k=2  
(30MHz-1000MHz)

Radiated emission expanded uncertainty = 4.06dB, k=2  
(Above 1GHz)

## 2. MEASURING DEVICE AND TEST EQUIPMENT

**Table 1: List of Test and Measurement Equipment**

Kind of equipment	Manufacturer	Type	S/N	Calibrated until
EMI Test Receiver	Rohde&Schwarz	ESCS30	100307	03.29.2009
EMI Test Receiver	Rohde&Schwarz	ESPI3	101526/003	03.29.2009
Spectrum Analyzer	Agilent	E7405A	MY45115511	03.29.2009
Pre-Amplifier	Rohde&Schwarz	CBLU118354 0-01	3791	03.31.2009
Loop Antenna	Schwarzbeck	FMZB1516	1516131	03.28.2009
Bilog Antenna	Schwarzbeck	VULB9163	9163-323	03.29.2009
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-655	12.19.2009
Horn Antenna	Schwarzbeck	BBHA9170	9170-359	10.09.2009
LISN	Rohde&Schwarz	ESH3-Z5	100305	03.29.2009
LISN	Schwarzbeck	NSLK8126	8126431	03.29.2009

### 3. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
Section 15.207	Conducted Emission	N/A
Section 15.231(e)	Radiated Emission	Compliant
Section 15.231(c)	20dB Bandwidth	Compliant
Section 15.231(e)	Release Time Measurement	Compliant

## 4. THE FIELD STRENGTH OF RADIATION EMISSION

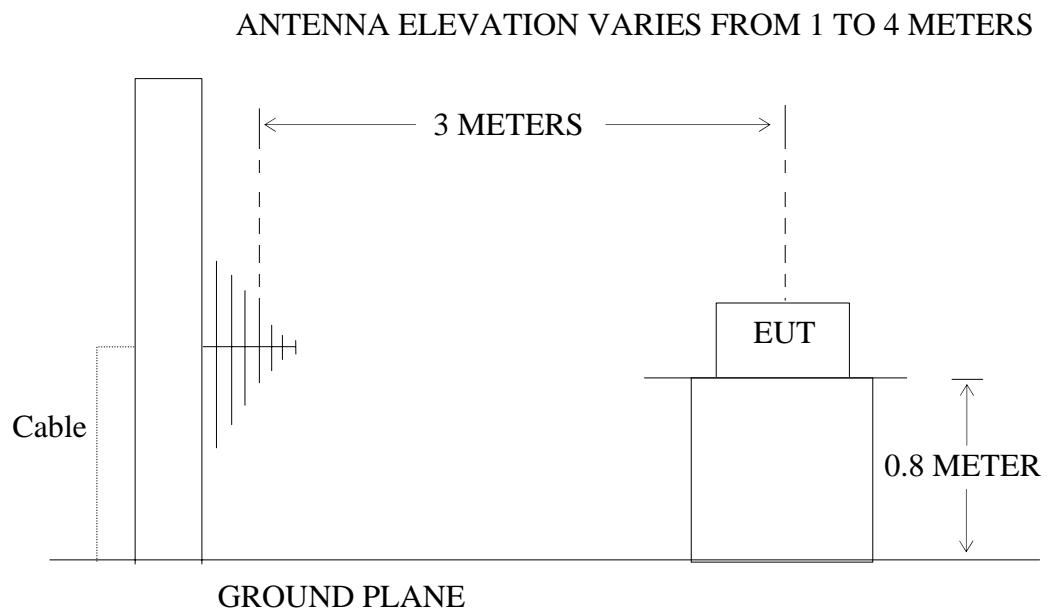
### 4.1. Block Diagram of Test Setup

#### 4.1.1. Block diagram of connection between the EUT and simulators



(EUT: Tire Pressure Monitoring System)

#### 4.1.2. Semi-anechoic Chamber Test Setup Diagram



(EUT: Tire Pressure Monitoring System)

## 4.2.The Field Strength of Radiation Emission Measurement Limits

### 4.2.1.Radiation Emission Measurement Limits According to Section 15.231(e)

Frequency Range of Fundamental [MHz]	Field Strength of Fundamental Emission [Average] [ $\mu$ V/m]	Field Strength of Spurious Emission [Average] [ $\mu$ V/m]
40.66-40.70	1000	100
70-130	500	50
130-174	500 - 1500	50-150
174-260	1500	150
260-470	1500-5000	150-500
Above 470	5000	500

Where F is the frequency in MHz, The formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174MHz,  $\mu$ V/m at 3 meters=22.72727(F)-2454.545; For the band 260-470MHz,  $\mu$ V/m at 3 meters=16.6667(F)-2833.3333. The maximum permissible unwanted emission level is 20dB below the maximum permitted fundamental level.

### 4.2.2.Restricted Band Radiation Emission Measurement Limits According to FCC part 15 Section 15.205 and Section15.209.

## 4.3.Configuration of EUT on Measurement

The following equipment are installed on Radiated Emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

### 4.3.1. Tire Pressure Monitoring System (EUT)

Model Number : VT-8012  
 Serial Number : N/A  
 Manufacturer : Zhongshan Victon Electronic Technology Co., Ltd.

## 4.4.Operating Condition of EUT

### 4.4.1.Setup the EUT and simulator as shown as Section 4.1.

### 4.4.2.Turn on the power of all equipment.

### 4.4.3.Let the EUT work in measuring modes (TX) measure it.

#### 4.5. Test Procedure

The EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bi-log antenna) is used as receiving antenna. Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission levels, all of the EUT location must be manipulated according to ANSI C63.4 on radiated emission measurement.

The bandwidth of test receiver (R&S ESI26) is set at 120kHz in 30-1000MHz, and 1MHz in 1000-5000MHz.

The frequency range from 30MHz to 5000MHz is checked.

## 4.6. The Field Strength of Radiation Emission Measurement Results

**PASS.**

The frequency range 30MHz to 5000MHz is investigated.

Date of Test:	December 17, 2008	Temperature:	25°C
EUT:	Tire Pressure Monitoring System	Humidity:	49%
Model No.:	VT-8012	Power Supply:	DC 3.0V
Test Mode:	TX	Test Engineer:	Joe

### Fundamental Emission

Frequency (MHz)	Reading (dB $\mu$ V/m)	Factor Corr.	Average Factor	Result(dB $\mu$ V/m)		Limit(dB $\mu$ V/m)		Margin(dB)		Polarization
	PEAK	(dB)	(dB)	AV	PEAK	AV	PEAK	AV	PEAK	
433.9319	49.84	22.95	-3.8	68.99	72.79	72.8	92.8	-3.81	-20.01	Horizontal
433.9319	47.13	22.95	-3.8	66.28	70.08	72.8	92.8	-6.52	-22.72	Vertical

### Spurious Emission

Frequency (MHz)	Reading (dB $\mu$ V/m)	Factor Corr.	Average Factor	Result(dB $\mu$ V/m)		Limit(dB $\mu$ V/m)		Margin(dB)		Polarization
	PEAK	(dB)	(dB)	AV	PEAK	AV	PEAK	AV	PEAK	
*1301.792	65.28	-12.20	-3.8	49.28	53.08	54.0	74.0	-4.72	-20.92	Horizontal
1735.718	62.48	-10.39	-3.8	48.29	52.09	52.8	72.8	-4.51	-20.71	
2169.643	59.08	-8.38	-3.8	46.90	50.70	52.8	72.8	-5.90	-22.10	
2603.567	51.66	-6.72	-3.8	41.14	44.94	52.8	72.8	-11.66	-27.86	
*1301.792	63.92	-12.20	-3.8	47.92	51.72	54.0	74.0	-6.08	-22.28	Vertical
1735.718	60.97	-10.39	-3.8	46.78	50.58	52.8	72.8	-6.02	-22.22	
2169.643	58.14	-8.38	-3.8	45.96	49.76	52.8	72.8	-6.84	-23.04	
2603.567	53.74	-6.72	-3.8	43.22	47.02	52.8	72.8	-9.58	-25.78	

Note:

1. Emissions attenuated more than 20 dB below the permissible value are not reported.

2. \*: Denotes restricted band of operation.

Measurements were made using a peak detector and average detector. Any emission Above 1000MHz and falling within the restricted bands of FCC Part 15 Section 15.205 were compliance with the emission limit of FCC Part 15 Section 15.209.

3. The field strength is calculated by adding the antenna factor, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is as follows:

Result = Reading + Corrected Factor

Where Corrected Factor = Antenna Factor + Cable Loss + High Pass Filter Loss – Amplifier Gain

4. FCC Limit for Average Measurement =  $16.6667(433.830)-2833.3333 = 4397.1812\mu$ V/m = 72.8dB $\mu$ V/m

5. The spectral diagrams in appendix 1 display the measurement of peak values with corrected factors counted.

## 5. 20DB OCCUPIED BANDWIDTH

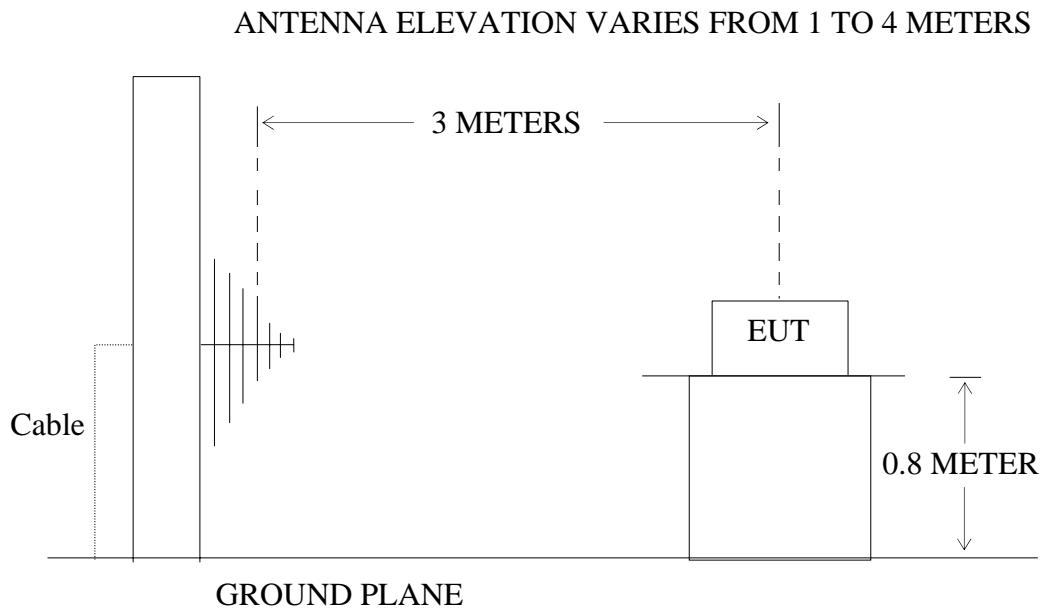
### 5.1. Block Diagram of Test Setup

#### 5.1.1. Block diagram of connection between the EUT and simulators



(EUT: Tire Pressure Monitoring System)

#### 5.1.2. Semi-anechoic Chamber Test Setup Diagram



(EUT: Tire Pressure Monitoring System)

### 5.2. The Bandwidth of Emission Limit According To FCC Part 15 Section

#### 15.231(c)

The bandwidth of emission shall be no wider than 0.25% of the center frequency. Therefore, the bandwidth of the emission limit is  $433.92\text{MHz} \times 0.25\% = 1084.8\text{kHz}$ . Bandwidth is determined at the two points 20 dB down from the top of modulated carrier.

### 5.3.EUT Configuration on Measurement

The following equipment are installed on the bandwidth of emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

#### 5.3.1. Tire Pressure Monitoring System (EUT)

Model Number : VT-8012  
Serial Number : N/A  
Manufacturer : Zhongshan Victon Electronic Technology Co., Ltd.

### 5.4.Operating Condition of EUT

5.4.1. Setup the EUT and simulator as shown as Section 5.1.

5.4.2. Turn on the power of all equipment.

5.4.3. Let the EUT work in measuring mode (TX) measure it.

### 5.5.Test Procedure

5.5.1. Set SPA Center Frequency = Fundamental frequency, RBW = 10kHz, VBW = 30kHz, Span = 500kHz.

5.5.2. Set SPA Max hold. Mark peak, -20dB

## 5.6. Measurement Result

**The EUT does meet the FCC requirement.**

-20dB bandwidth = 130.0 kHz < 1084.8kHz.

The spectral diagrams in appendix I.

## 6. DURATION TIME AND SILENT PERIOD MEASUREMENT

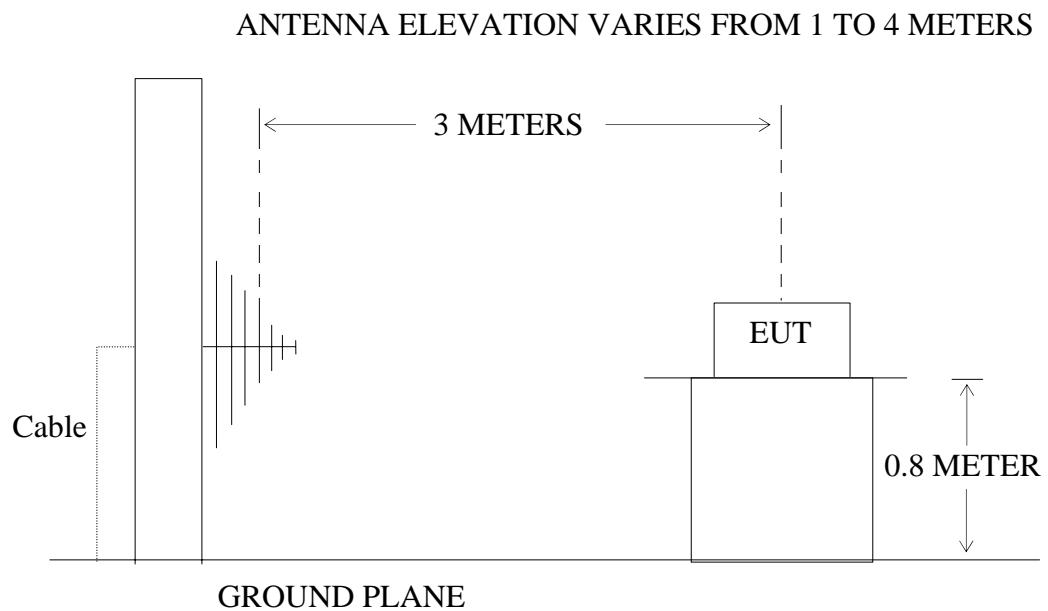
### 6.1. Block Diagram of Test Setup

#### 6.1.1. Block diagram of connection between the EUT and simulators



(EUT: Tire Pressure Monitoring System)

#### 6.1.2. Semi-anechoic Chamber Test Setup Diagram



(EUT: Tire Pressure Monitoring System)

### 6.2. Duration Time and silent period measurement according to FCC Part 15

#### Section 15.231(e)

Section 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.

### 6.3.EUT Configuration on Measurement

The following equipment are installed on duration time and silent period measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

#### 6.3.1.Tire Pressure Monitoring System (EUT)

Model Number : VT-8012  
Serial Number : N/A  
Manufacturer : Zhongshan Victon Electronic Technology Co., Ltd.

### 6.4.Operating Condition of EUT

6.4.1.Setup the EUT and simulator as shown as Section 6.1.

6.4.2.Turn on the power of all equipment.

6.4.3.Let the EUT work in measuring mode (TX) measure it.

### 6.5.Test Procedure

6.5.1.Set SPA Center Frequency = Fundamental frequency, RBW = 10kHz,  
VBW =30kHz, Span = 0Hz.

6.5.2.Set EUT as normal operation.

6.5.3.Set SPA View. Delta Mark time.

## 6.6. Measurement Result

**The EUT does meet the FCC requirement.**

Duration time = 0.472 second <1 second

Silent period = 23.94 seconds > 30 times the duration of the transmission > 10seconds

The spectral diagrams in appendix I.

## 7. AVERAGE FACTOR MEASUREMENT

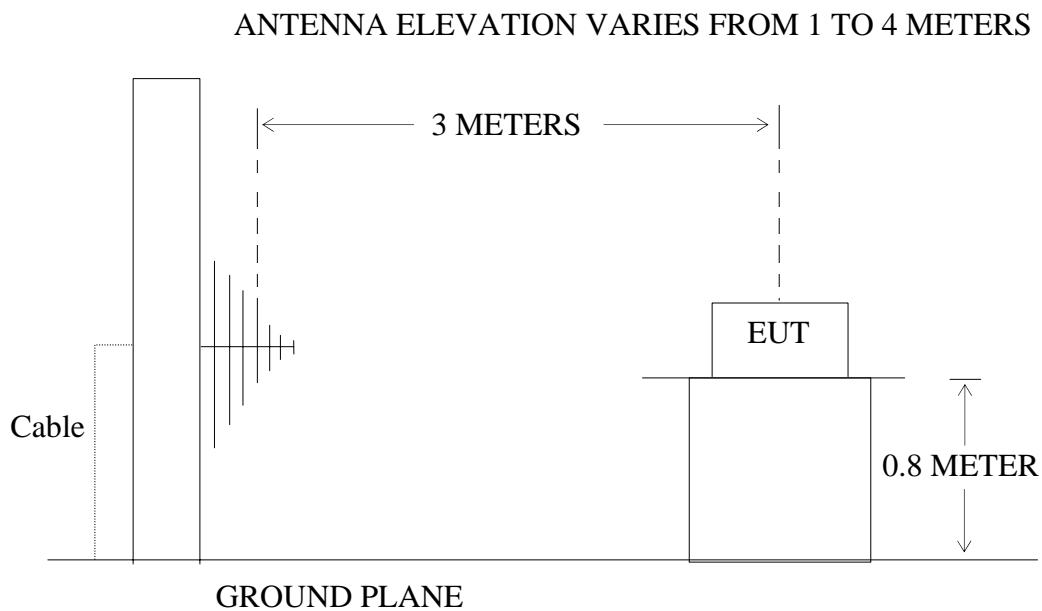
### 7.1. Block Diagram of Test Setup

#### 7.1.1. Block diagram of connection between the EUT and simulators



(EUT: Tire Pressure Monitoring System)

#### 7.1.2. Semi-anechoic Chamber Test Setup Diagram



(EUT: Tire Pressure Monitoring System)

### 7.2. Average factor Measurement according to ANSI C63.4: 2003

**ANSI C63.4: 2003 Section 13.1.4.2** Devices transmitting pulsed emissions and subject to a limit requiring an average detector function for radiated emissions shall initially be measured with an instrument that uses a peak detector. A radiated emission measured with a peak detector may then be corrected to a true average using the appropriate factor for emission duty cycle. This correction factor relates the measured peak level to the average limit and is derived by averaging absolute field strength over one complete pulse train that is 0.1 s, or less, in length. If the pulse train is longer than 0.1 s, the average shall be determined from the average absolute field strength during the 0.1 s interval in which the field strength is at a maximum. Instructions on calculating the duty cycle of a transmitter with pulsed emissions are provided in ANSI C63.4 H.4, step j.

**Average factor in dB =  $20 \log (\text{duty cycle})$**

### 7.3.EUT Configuration on Measurement

The following equipment are installed on average factor Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

#### 7.3.1. Tire Pressure Monitoring System (EUT)

Model Number : VT-8012  
 Serial Number : N/A  
 Manufacturer : Zhongshan Victon Electronic Technology Co., Ltd.

### 7.4.Operating Condition of EUT

7.4.1. Setup the EUT and simulator as shown as Section 7.1.

7.4.2. Turn on the power of all equipment.

7.4.3. Let the EUT work in measuring mode (TX) measure it.

### 7.5.Test Procedure

7.5.1. The time period over which the duty cycle is measured is 100 milliseconds, or the repetition cycle, whichever is a shorter time frame. The worst case (highest percentage on) duty cycle is used for the calculation.

7.5.2. Set SPA Center Frequency = Fundamental frequency, RBW = 10kHz,

VBW =30kHz, Span = 0Hz.

7.5.3. Set EUT as normal operation.

7.5.4. Set SPA View. Delta Mark time.

## 7.6. Measurement Result

**The duty cycle is simply the on time divided by the period:**

Effective period of one cycle = 100ms

Sum of pulse width = 31.8 + 33.0 ms = 64.8 ms

Duty Cycle = 64.8ms/100ms = 0.648

**Therefore, the average factor is found by  $20\log 0.648 = -3.8\text{dB}$**

The spectral diagrams in appendix I.

## APPENDIX I (Test Curves)

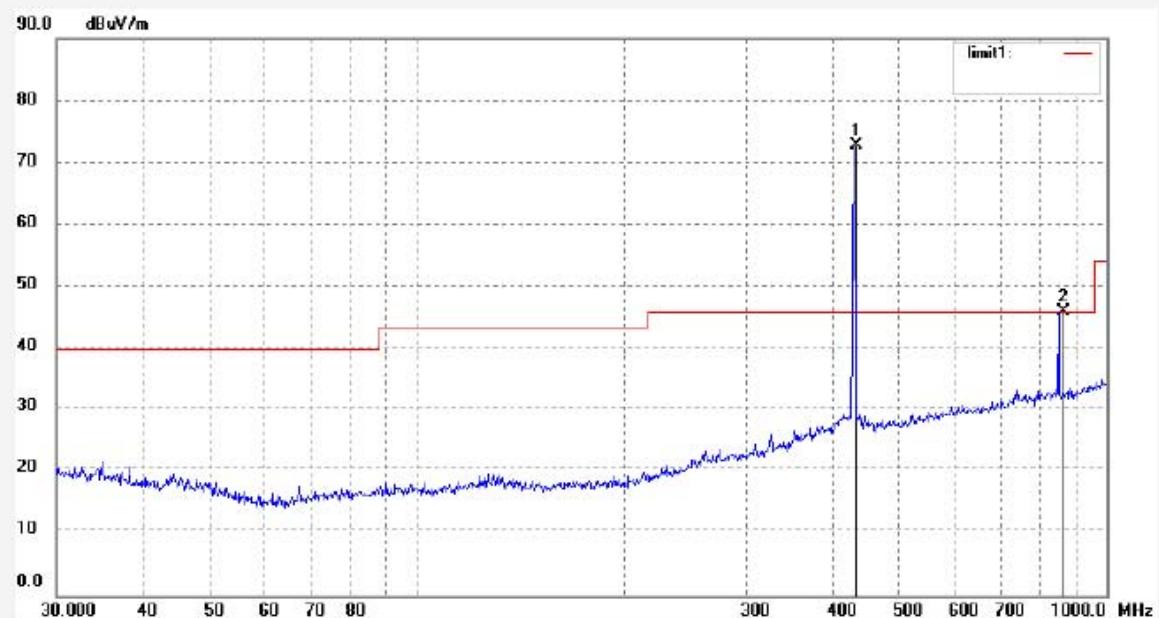

**ACCURATE TECHNOLOGY CO., LTD.**

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 Science & Industry Park,Nanshan Shenzhen,P.R.China

 Site: 966 chamber  
 Tel:+86-0755-26503290  
 Fax:+86-0755-26503396

Job No.: RTTE #900	Polarization: Horizontal
Standard: FCC Class B 3M Radiated	Power Source: DC 3V
Test item: Radiation Test	Date: 08/12/17/
Temp.( C)/Hum.(%) 25 C / 49 %	Time: 9/34/56
EUT: Tire Pressure Monitoring System	Engineer Signature: Joe
Mode: TX	Distance: 3m
Model: VT-8012	
Manufacturer: Victon	

Note: Sample No.:084364 Report No.:ATE20082353



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	433.9319	49.84	22.95	72.79	92.8	-20.01	peak	
2	867.8645	17.33	28.64	45.97	72.8	-26.83	peak	

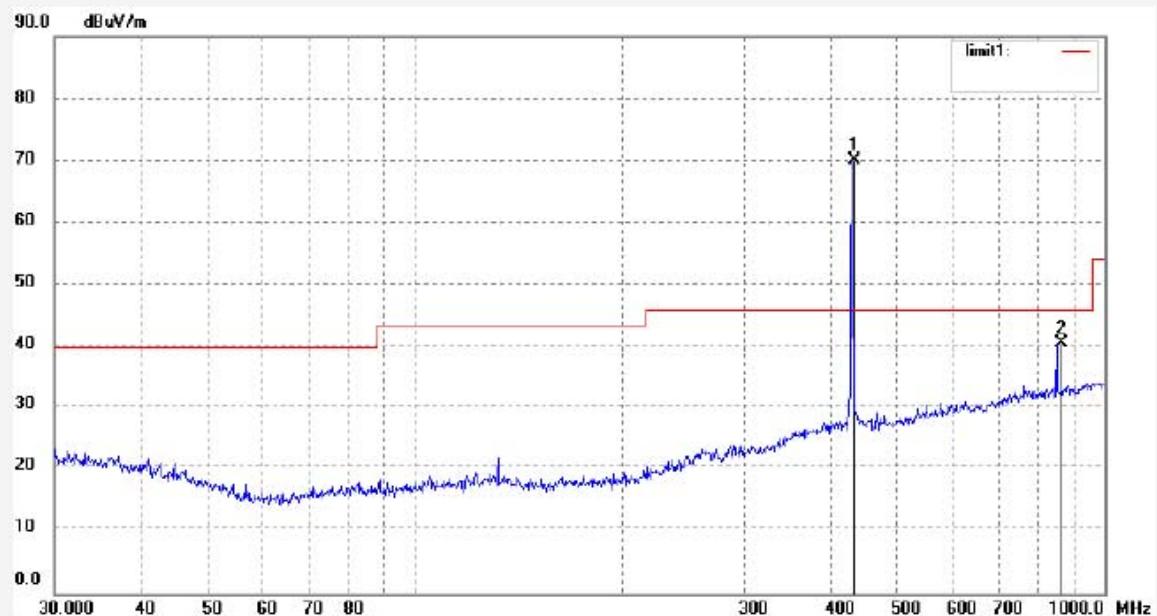

**ACCURATE TECHNOLOGY CO., LTD.**

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 Science & Industry Park,Nanshan Shenzhen,P.R.China

 Site: 966 chamber  
 Tel:+86-0755-26503290  
 Fax:+86-0755-26503396

Job No.: RTTE #901	Polarization: Vertical
Standard: FCC Class B 3M Radiated	Power Source: DC 3V
Test item: Radiation Test	Date: 08/12/17/
Temp.( C)/Hum.(%) 25 C / 49 %	Time: 9/38/26
EUT: Tire Pressure Monitoring System	Engineer Signature: Joe
Mode: TX	Distance: 3m
Model: VT-8012	
Manufacturer: Victon	

Note: Sample No.:084364 Report No.:ATE20082353



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	433.9319	47.13	22.95	70.08	92.8	-22.72	peak	
2	867.8645	11.87	28.64	40.51	72.8	-32.29	peak	


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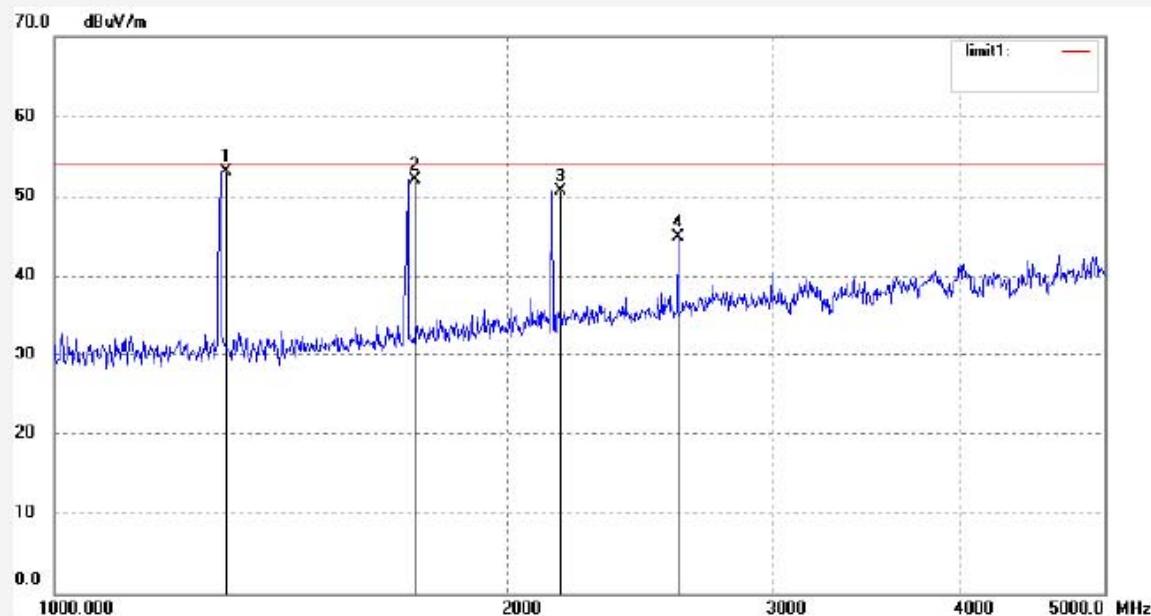
Site: 966 chamber

Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: RTTE #902	Polarization: Horizontal
Standard: FCC Class B 3M Radiated	Power Source: DC 3V
Test item: Radiation Test	Date: 08/12/17/
Temp.( C)/Hum.(%) 25 C / 49 %	Time: 9/57/54
EUT: Tire Pressure Monitoring System	Engineer Signature: Joe
Mode: TX	Distance: 3m
Model: VT-8012	
Manufacturer: Victon	

Note: Sample No.:084364 Report No.:ATE20082353



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	1301.792	65.28	-12.20	53.08	74.0	-20.92	peak	
2	1735.718	62.48	-10.39	52.09	72.8	-20.71	peak	
3	2169.643	59.08	-8.38	50.70	72.8	-22.10	peak	
4	2603.567	51.66	-6.72	44.94	72.8	-27.86	peak	

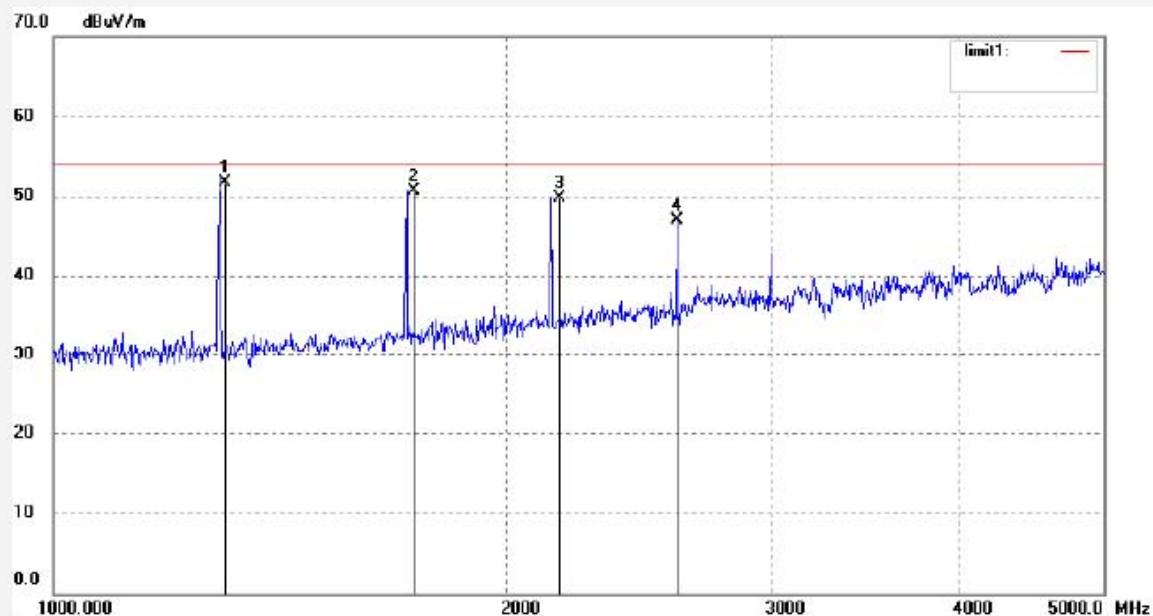

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 Science & Industry Park,Nanshan Shenzhen,P.R.China

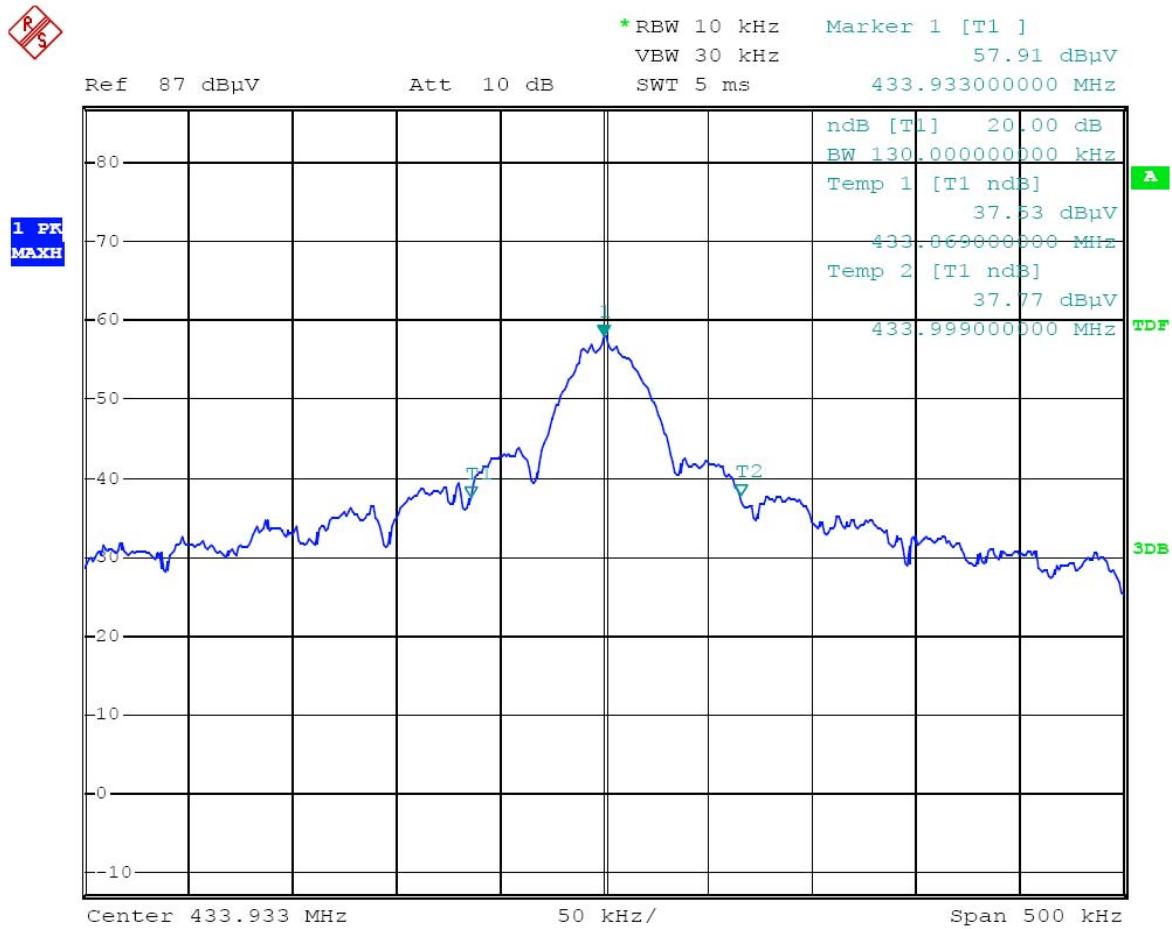
 Site: 966 chamber  
 Tel:+86-0755-26503290  
 Fax:+86-0755-26503396

Job No.: RTTE #903	Polarization: Vertical
Standard: FCC Class B 3M Radiated	Power Source: DC 3V
Test item: Radiation Test	Date: 08/12/17/
Temp.( C)/Hum.(%) 25 C / 49 %	Time: 10/06/44
EUT: Tire Pressure Monitoring System	Engineer Signature: Joe
Mode: TX	Distance: 3m
Model: VT-8012	
Manufacturer: Victon	

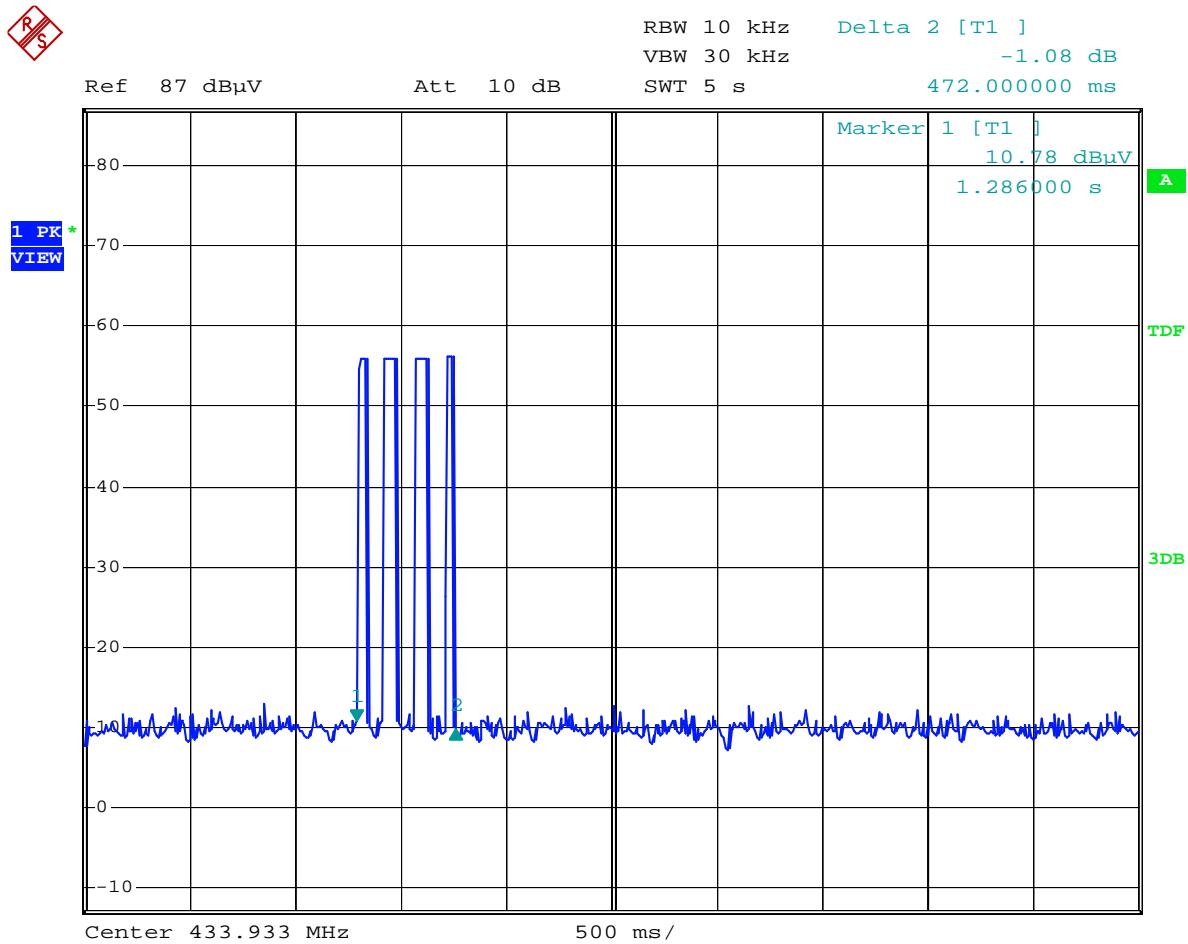
Note: Sample No.:084364 Report No.:ATE20082353



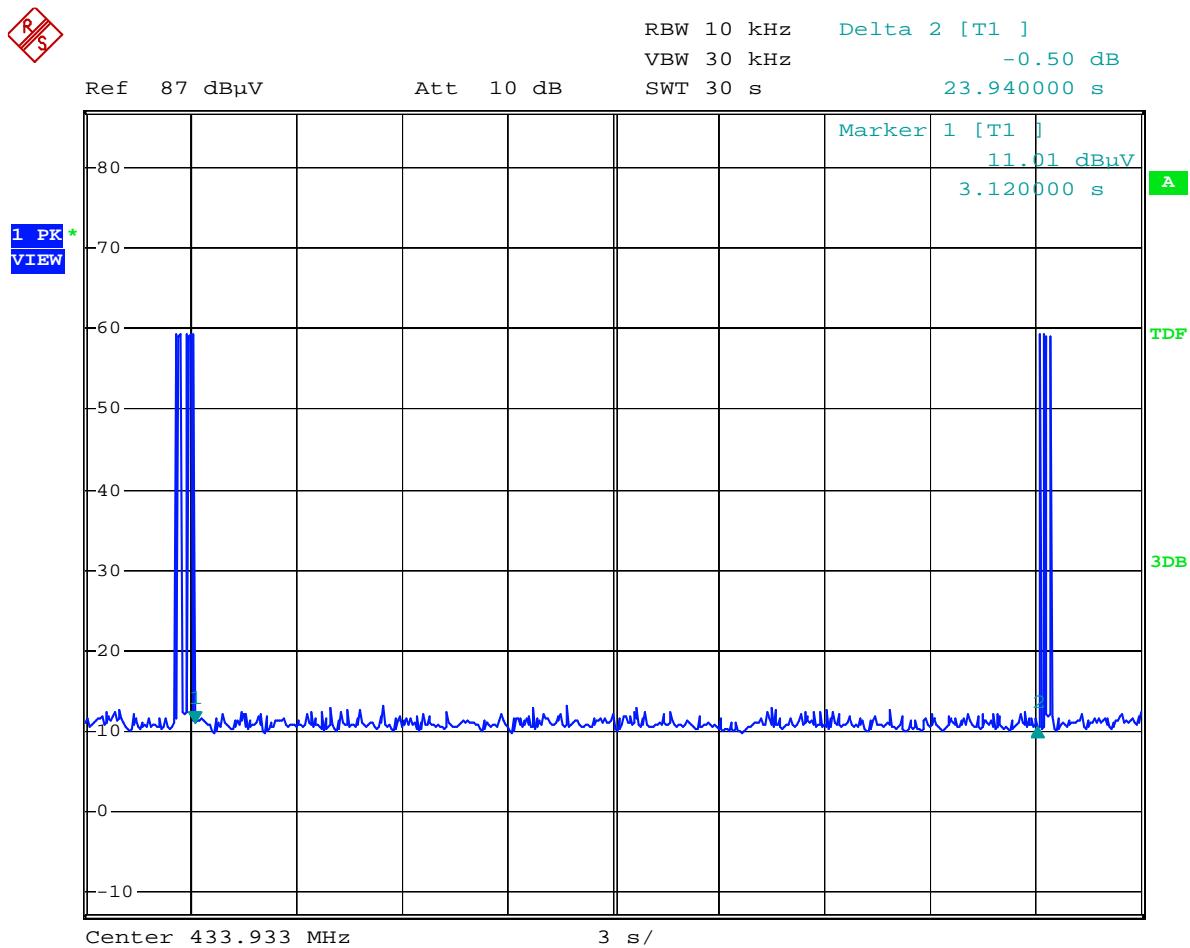
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	1301.792	63.92	-12.20	51.72	74.0	-22.28	peak	
2	1735.718	60.97	-10.39	50.58	72.8	-22.22	peak	
3	2169.643	58.14	-8.38	49.76	72.8	-23.04	peak	
4	2603.567	53.74	-6.72	47.02	72.8	-25.78	peak	



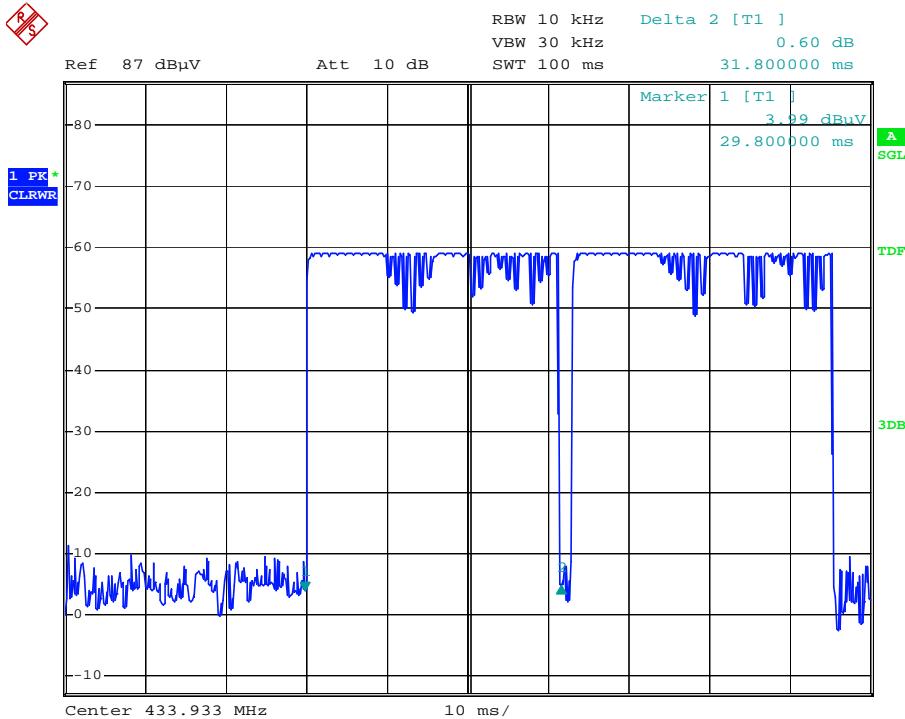
Date: 22.DEC.2008 09:00:05



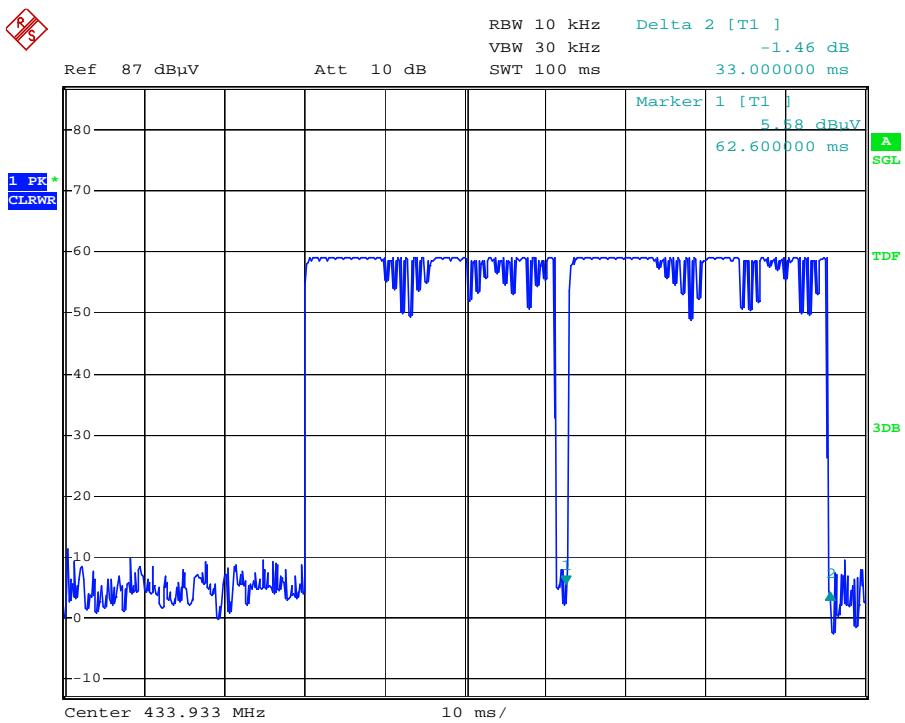
Date: 22.DEC.2008 16:03:01



Date: 22.DEC.2008 15:57:08



Date: 22.DEC.2008 09:18:03



Date: 22.DEC.2008 09:18:42

Both of graphs show the duration of 'on' signal, duration is  $31.8+33.0 = 64.8$ ms at 100ms.