

FCC CERTIFICATION RADIO MEASUREMENT TECHNICAL REPORT

On Model Name: PUR-TPMS

Model Number : PUR-07N01

Trademark : 

FCC ID : VVF49D040

IC Number : 7506A49D040

Prepared for Shanghai Vei Sheng Auto Parts Manufacturing Co., Ltd.

According to FCC Part 15 (2007), Subpart C & RSS-210 Issue 7 (2007)

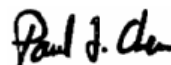
Test Report #: SHA-0711-0987SH-FCC&IC

Prepared by: Chris Huang

Reviewed by: Harry Zhao

QC Manager: Paul Chen

Test Report Released by:



Paul Chen

2007, December 20

Date

Test Location

Tests performed in a Certified ANSI Semi-Anechoic Chamber and Shielded Room performed testing.

*Test Site Location #1: Jiangsu Electronic Products
 Supervision & Inspection Institute
 No 107 Ge lane ZhongQiao
 WuXi JiangSu, China*

FCC Registration Number: 399439

*Test Site Location #2: ECMG Worldwide Certification Solutions
 (Headquarters) 684 West Maude Avenue
 Sunnyvale, CA 94085, U.S.A.*

IC Registration Number: IC4200-1 & IC4200-2

Accreditation Bodies

*The report is prepared by EMC Compliance Management Group
is a fully accredited Test Laboratory for ITE, ISM and
Telecommunications Products.*

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Opinions and Interpretations

This test report relates to the abovementioned equipment under test (EUT). Without the permission of EMC Compliance Management Group Test Lab this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark on this or similar products. The manufacturer has sole responsibility of continued compliance of the device.

Statement of Measurement Uncertainty

The data and results referenced in the document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities that can account for a nominal measurement error. Furthermore, component and process variability of devices similar to that tested may result in additional deviation.

Administrative Data

Test Sample : PUR-TPMS

Model Number : PUR-07N01

Trade Mark : 

Date Tested : 2007, December 10 & 14

*Applicant : Shanghai Vei Sheng Auto Parts Manufacturing Co., Ltd.
No.51, Jinwen Road, Airport Industrial Zone,
Zhuqiao Town, Nanhui District, Shanghai*

Telephone : 86-21-33756999

Fax : 86-21-33756100

*Manufacturer : Shanghai Vei Sheng Auto Parts Manufacturing Co., Ltd.
No.51, Jinwen Road, Airport Industrial Zone,
Zhuqiao Town, Nanhui District, Shanghai*

EUT Description

Shanghai Vei Sheng Auto Parts Manufacturing Co., Ltd. Model number PUR-07N01 (referred to as the EUT in this test report) is a transmitter part of tire pressure monitoring system. It's installed on the tire and will transmit signal if it is activated by low tire pressure.

Test Summary

The Electromagnetic Compatibility requirements on TAT-E for this test are stated below. All results listed in this report relate exclusively to this above-mentioned model as the Equipment Under Test. This report confers no approval or endorsement upon any other component, host or subsystem used in the test set-up.

EMC Test Items			
<i>Reference FCC Part 15 (2007), Subpart C & RSS-210 Issue 7 (2007)</i>			
Specification	Description	Test Results	Remark
<i>FCC Part 15.203</i>	<i>Antenna Requirement</i>	<i>Compliance</i>	<i>Attachment 1</i>
<i>FCC Part 15.205 RSS-210 Table 1</i>	<i>Restricted Band of Operation</i>	<i>Compliance</i>	<i>Attachment 2</i>
<i>FCC Part 15.207</i>	<i>Conducted Limits</i>	<i>Test is not applicable, because EUT only employ battery power for operation.</i>	
<i>FCC Part 15.209 RSS-210 Table 2</i>	<i>Radiated Emission Limits</i>	<i>Compliance</i>	<i>Refer to Attachment 4</i>
<i>FCC Part 15.231</i>	<i>Periodic Operation in the Band 40.66-40.70MHz and above 70MHz</i>	--	--
<i>(e)</i>	<i>Operation Mode</i>	<i>Compliance</i>	<i>Attachment 3</i>
<i>(e) RSS-210 Table 5</i>	<i>Field Strength of Fundamental and Spurious Emissions</i>	<i>Compliance</i>	<i>Attachment 4</i>
<i>(c) RSS-210 A1.1.3</i>	<i>Bandwidth</i>	<i>Compliance</i>	<i>Attachment 5</i>

Test Mode Justification

The test modes (Lie, Side, Stand) were done for testing.

Note: Lie mode means let EUT put flat;

Side mode means let EUT side stand;

Stand mode means let EUT stand up.

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

EUT Exercise Software


The device is not programmable and does not use software.

Equipment Modification

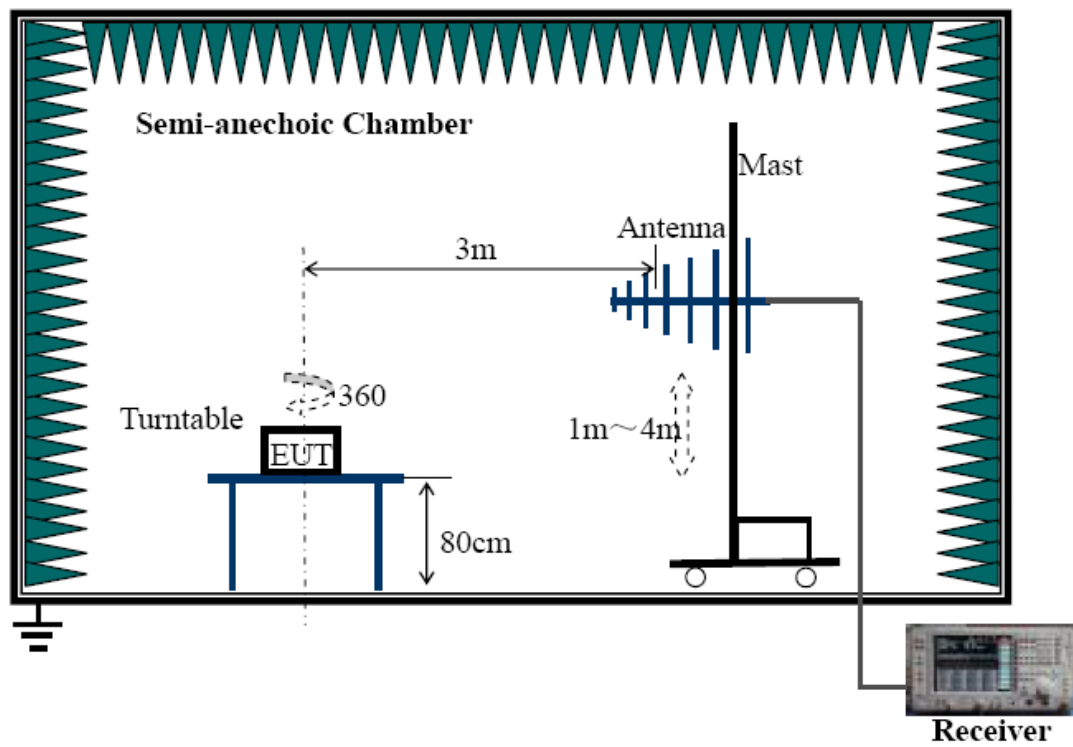
Any modifications installed previous to testing by Shanghai Vei Sheng Auto Parts Manufacturing Co., Ltd. will be incorporated in each production model sold or leased in United States.

There were no modifications installed by EMC Compliance Management Group (China) test personnel.

Test System Details

EUT	
Model Number:	PUR-07N01
Trademark::	
Serial Number:	Engineering Sample
Input Voltage:	DC 3V
Description:	Transmitter of tire pressure monitoring system
Manufacturer:	Shanghai Vei Sheng Auto Parts Manufacturing Co., Ltd.
Support Equipment	
None	
Cable Description	
None	

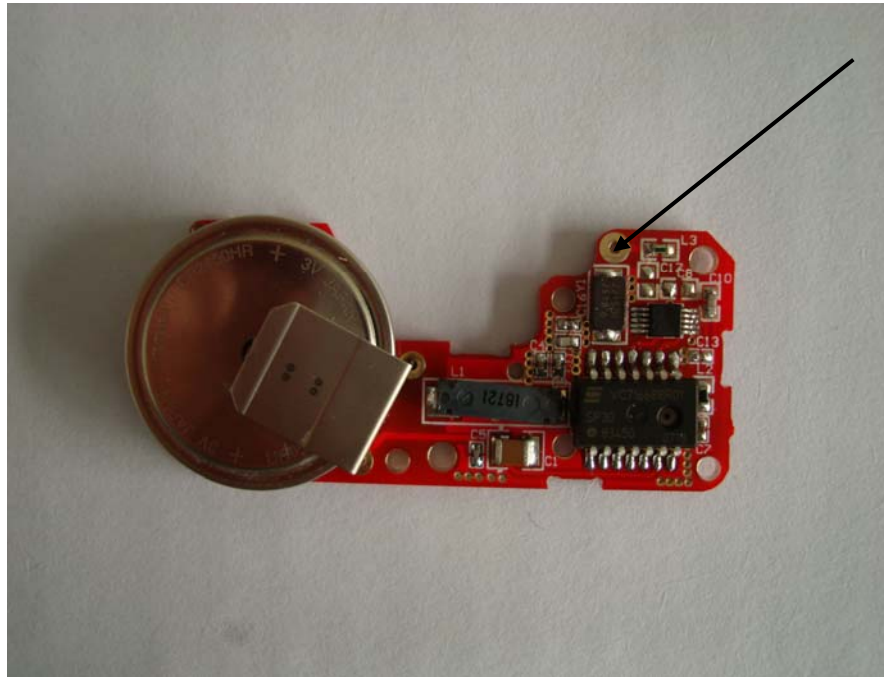
Configuration of Tested System



ATTACHMENT 1 - ANTENNA REQUIREMENT

CLIENT:	Shanghai Vei Sheng Auto Parts Manufacturing Co., Ltd.	TEST STANDARD:	FCC Part 15.203 (2007) RSS-210 (2007)
MODEL NUMBER:	PUR-07N01	PRODUCT:	PUR-TPMS
SERIAL NO.:	Engineering Sample	EUT DESIGNATION:	RF Equipment
TEMPERATURE:	21°C	HUMIDITY:	55%RH
ATM PRESSURE:	101.8 kPa	GROUNDING:	No Grounding
TESTED BY:	Shi Xiting & Cloud	DATE OF TEST:	2007, December 14
SETUP METHOD:	N/A		
ANTENNA REQUIREMENT:	An intentional radiator shall be designed to ensure that no antenna other than 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 manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.		
TEST VOLTAGE:	3V DC		
TEST STATUS:	Normal Operation As Usual		
RESULTS:	The EUT meets the Antenna requirement. The test results relate only to the equipment under test provided by client.		
CHANGES OR MODIFICATIONS:	There were no modifications installed by EMC Compliance Management Group (China) test personnel.		
M. UNCERTAINTY:	N/A		

<i>FCC Section</i>	<i>FCC Rules</i>	<i>Conclusion</i>
15.203	<p><i>Described how the EUT complies with the requirement that either its antenna is permanently attached, or that it employs a unique antenna connector, for every antenna proposed for use with the EUT.</i></p> <p><i>The exception is in those cases where EUT must be professionally installed. In order to demonstrate that professional installation is required, the following 3 points must be addressed:</i></p> <ul style="list-style-type: none"> <i>● The application (or intended use) of the EUT</i> <i>● The installation requirements of the EUT</i> <i>● The method by which the EUT will be marketed</i> 	<i>The RF Device uses an integral antenna without connector.</i>



Integral Antenna

Integral Antenna without Connector View

ATTACHMENT 2 – RESTRICTED BAND OF OPERATION

CLIENT:	Shanghai Vei Sheng Auto Parts Manufacturing Co., Ltd	TEST STANDARD:	FCC 15.205 (2007) RSS-210(2007)
MODEL NUMBER:	PUR-07N01	PRODUCT:	PUR-TPMS
SERIAL NO.:	Engineering Sample	EUT DESIGNATION:	RF Equipment
TEMPERATURE:	21°C	HUMIDITY:	55%RH
ATM PRESSURE:	101.6 kPa	GROUNDING:	No Grounding
TESTED BY:	Shi Xiting & Cloud	DATE OF TEST:	2007, December 14
SETUP METHOD:	ANSI C63.4 - 2003		
RESTRICTED BANDS OF OPERATION REQUIREMENT:	The only spurious emissions are permitted in any of the frequency bands listed below table of next page.		
TESTED RANGE:	30MHz to 4000MHz		
TEST VOLTAGE:	3V DC		
TEST STATUS:	Keep Tx in continuous transmission mode, modulated		
RESULTS:	The EUT meets the restricted bands of operation requirement. The test results relate only to the equipment under test provided by client.		
CHANGES OR MODIFICATIONS:	There were no modifications installed by EMC Compliance Management Group (China) test personnel.		
M. UNCERTAINTY:	Freq. $\pm 2 \times 10^{-7}$ x Center Freq., Amp ± 2.6 dB		

FCC Restricted band

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)
13.36 - 13.41			

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

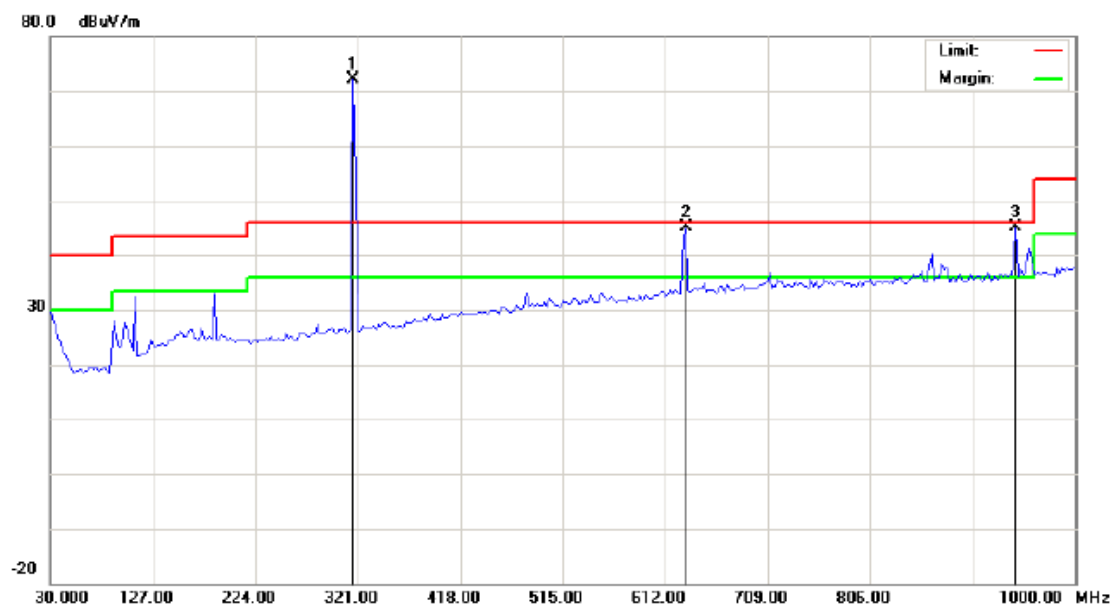
² Above 38.6

IC Restricted band

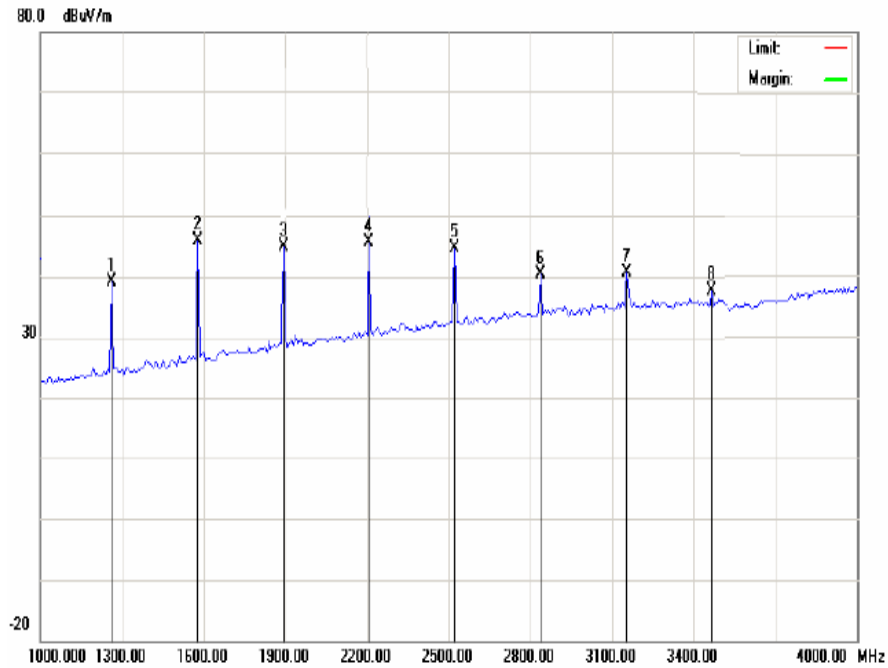
Table 1: Restricted Frequency Bands ^(Note)

MHz	MHz	MHz
0.090-0.110	73-74.6	7250-7750
2.1735-2.1905	74.8-75.2	8025-8500
3.020-3.026	108-138	
4.125-4.128	156.52475-156.52525	
4.17725-4.17775	156.7-156.9	
4.20725-4.20775	240-285	
5.677-5.683	322-335.4	
6.215-6.218	399.9-410	
6.26775-6.26825	608-614	
6.31175-6.31225	960-1427	
8.291-8.294	1435-1626.5	
8.362-8.366	1645.5-1646.5	
8.37625-8.38675	1660-1710	
8.41425-8.41475	1718.8-1722.2	
12.29-12.293	2200-2300	
12.51975-12.52025	2310-2390	
12.57675-12.57725	2655-2900	
13.36-13.41	3260-3267	
16.42-16.423	3332-3339	
16.69475-16.69525	3345.8-3358	
16.80425-16.80475	3500-4400	
25.5-25.67	4500-5150	
37.5-38.25	5350-5460	

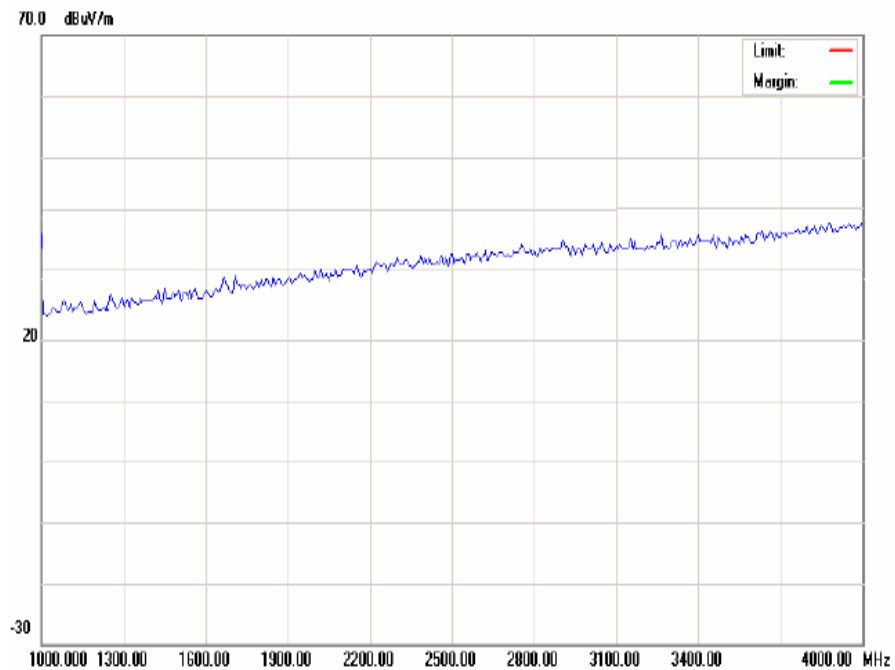
Note: Certain frequency bands listed in Table 1 and above 38.6 GHz are designated for low-power licence-exempt applications. These frequency bands and the requirements that apply to the devices are set out in this Standard as well as in RSS-310.



Test Data (Below 1GHz) (Peak Detector)



Test Data (Above 1GHz) (Peak Detector)



Test Data (Above 1GHz) (Average Detector)

Frequency Type	Frequency (MHz)	Field Strength dB(μV/m)	Limit dB(μV/m)	Over Limit dB(μV/m)	Read Level dB(μV)	Factor (dB)	Duty cycle Correction Factor (dB)
Fundamental	315.00	58.55	67.48	-8.93	72.06	-5.73	7.78
Spurious	630.00	41.60	47.48	-5.88	56.78	-7.40	7.78
Spurious	945.00	38.79	47.48	-8.69	47.66	-1.09	7.78
Frequency Type	Frequency (MHz)	Field Strength dB(μV/m)	Limit dB(μV/m)	Over Limit dB(μV/m)	Read Level dB(μV)	Factor (dB)	Duty cycle Correction Factor (dB)
Spurious	1260.00	40.11	47.48	-7.37	74.44	-26.55	7.78
Spurious	1575.00	45.57	47.48	-1.91	77.48	-24.13	7.78
Spurious	1890.00	44.87	47.48	-2.61	78.97	-26.32	7.78
Spurious	2205.00	45.11	47.48	-2.37	77.00	-24.11	7.78
Spurious	2520.00	44.38	47.48	-3.10	75.70	-23.54	7.78
Spurious	2835.00	40.87	47.48	-6.61	71.82	-23.17	7.78
Spurious	3150.00	43.79	47.48	-3.69	74.44	-22.87	7.78

Average Values

Frequency Type	Frequency (MHz)	Field Strength dB(μV/m)	Limit dB(μV/m)	Over Limit dB(μV/m)	Read Level dB(μV)	Factor (dB)
Fundamental	315.00	66.33	87.48	-21.15	72.06	-5.73
Spurious	630.00	49.38	67.48	-18.10	56.78	-7.40
Spurious	945.00	46.57	67.48	-20.91	47.66	-1.09
Frequency Type	Frequency (MHz)	Field Strength dB(μV/m)	Limit dB(μV/m)	Over Limit dB(μV/m)	Read Level dB(μV)	Factor (dB)
Spurious	1260.00	47.89	67.48	-19.59	74.44	-26.55
Spurious	1575.00	53.35	67.48	-14.13	77.48	-24.13
Spurious	1890.00	52.65	67.48	-14.83	78.97	-26.32
Spurious	2205.00	52.89	67.48	-14.59	77.00	-24.11
Spurious	2520.00	52.16	67.48	-15.32	75.70	-23.54
Spurious	2835.00	48.65	67.48	-18.83	71.82	-23.17
Spurious	3150.00	51.57	67.48	-15.91	74.44	-22.87

Peak Values

Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due Date
Broadband Antenna	Sunol	JB5	A110503	11/29/07	11/28/08
Preamplifier	HP	8449B	2944A06849	11/29/07	11/28/08
EMI Receiver	HP	85462A	3650A00363	11/29/07	11/28/08
Note: All testing were performed using internationally recognized standards. All test instruments were calibrated.					

SIGNED BY: Shi-Xiting & Cloud Feng
ENGINEER

REVIEWED BY: Hongzhan
SENIOR ENGINEER

ATTACHMENT 3 – OPERATION MODE

CLIENT:	Shanghai Vei Sheng Auto Parts manufacturing CO., Ltd.	TEST STANDARD:	FCC Part 15.231 (e) (2007) RSS-210 (2007)
MODEL NUMBER:	PUR-07N01	PRODUCT:	PUR-TPMS
SERIAL NO.:	Engineering Sample	EUT DESIGNATION:	RF Equipment
TEMPERATURE:	21°C	HUMIDITY:	55%RH
ATM PRESSURE:	101.8 kPa	GROUNDING:	No Grounding
TESTED BY:	Shi Xiting & Cloud	DATE OF TEST:	2007, December 14
SETUP METHOD:	N/A		
OPERATION MODE REQUIREMENT:	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.		
TEST VOLTAGE:	3V DC		
TEST STATUS:	Keep Tx in normal transmission mode, modulated, to measure the Silent period; Keep Tx in continuous transmission mode, modulated, to measure the transmit period.		
RESULTS:	The EUT meets the operation mode requirement. The test results relate only to the equipment under test provided by client.		
CHANGES OR MODIFICATIONS:	There were no modifications installed by EMC Compliance Management Group (China) test personnel.		
M. UNCERTAINTY:	N/A		

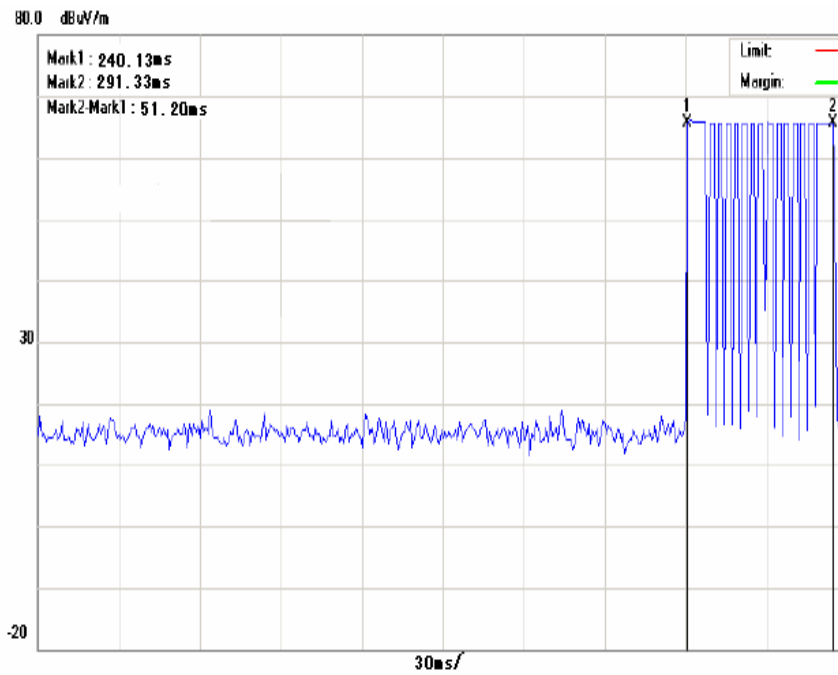
Transmission period:

<i>Frequency (Fundamental)</i>	<i>Transmission period(continuous transmission)</i>	<i>Limits</i>	<i>Result</i>
315MHz	51.20ms	1s	Pass

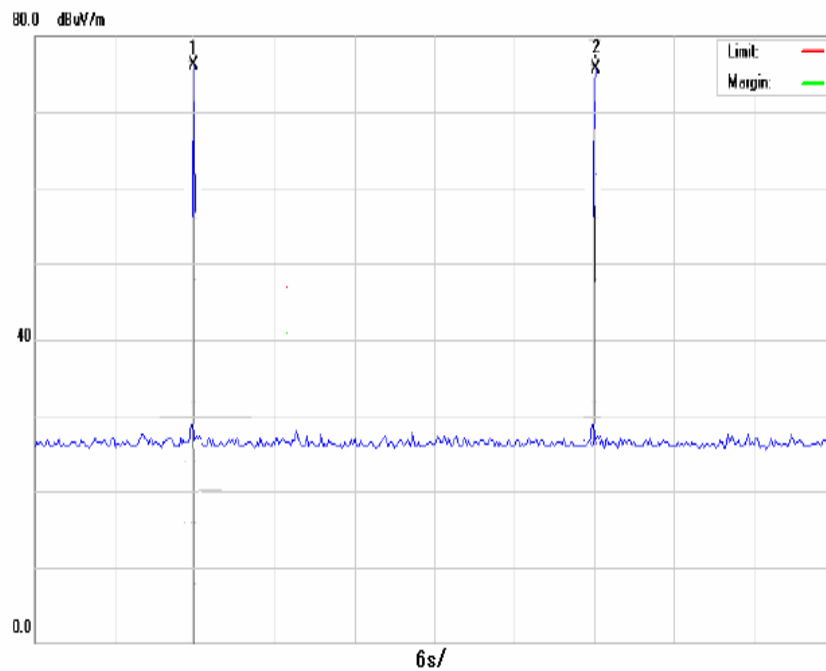
Silent period:

<i>Frequency (Fundamental)</i>	<i>Silent period(normal transmission)</i>	<i>Limits 1 about transmission period</i>	<i>Limits 2</i>	<i>Result</i>
315MHz	30.3s	$30 \times 51.20\text{ms} = 1.536\text{s}$	10s	Pass

<i>FCC Section</i>	<i>FCC Rules</i>	<i>Conclusion</i>
15.231 (e)	<i>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.</i>	<i>The transmitter is activated by the pressure of the tire. As it is activated, it will transmit signal (duration time 51.2ms) at a predetermined interval of 30.3s.</i>



Transmitting Period (Sweep 300ms)



Silent Period (Sweep 60s)

Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due Date
Broadband Antenna	Sunol	JB5	A110503	11/29/07	11/28/08
EMI Receiver	HP	85462A	3650A00363	11/29/07	11/28/08
Note: All testing were performed using internationally recognized standards. All test instruments were calibrated.					

SIGNED BY: Shi-xiting & Cloud Feng
ENGINEER

REVIEWED BY: Hany Zhou
SENIOR ENGINEER

ATTACHMENT 4 –FIELD STRENGTH OF FUNDAMENTAL AND SPURIOUS EMISSIONS

CLIENT:	Shanghai Vei Sheng Auto Parts Manufacturing Co., Ltd.	TEST STANDARD:	FCC Part 15.231(e) FCC Part 15.209 RSS-210																								
MODEL NUMBER:	PUR-07N01	PRODUCT:	PUR-TPMS																								
SERIAL NO.:	Engineering Sample	EUT DESIGNATION:	RF Equipment																								
TEMPERATURE:	21°C	HUMIDITY:	53%RH																								
ATM PRESSURE:	101.6 kPa	GROUNDING:	No Grounding																								
TESTED BY:	Shi Xiting & Cloud	DATE OF TEST:	2007, December 14																								
SETUP METHOD:	ANSI C63.4 : 2003, FCC Part 15.35																										
FCC REQUIREMENT:	<p>Intentional radiators may operate at a periodic rate exceeding that specified in paragraph (a) and may be employed for any type of operation, including operation prohibited in paragraph (a), provided the intentional radiator complies with the provisions of paragraph (b) through (d) of this Section, except the field strength table in paragraph (b) is replaced by the following:</p> <table border="1" style="width: 100%; border-collapse: collapse; margin: 10px 0;"> <thead> <tr> <th style="width: 33%;">Fundamental Frequency (MHz)</th> <th style="width: 33%;">Field Strength of Fundamental (microvolts/meter)</th> <th style="width: 33%;">Field Strength of Spurious Emission (microvolts/meter)</th> </tr> </thead> <tbody> <tr> <td>40.66-40.70</td> <td>1,000</td> <td>100</td> </tr> <tr> <td>70-130</td> <td>500</td> <td>50</td> </tr> <tr> <td>130-174</td> <td>500 to 1,500 **</td> <td>50 to 150 **</td> </tr> <tr> <td>174-260</td> <td>1,500</td> <td>150</td> </tr> <tr> <td>260-470</td> <td>1,500 to 5,00 **</td> <td>150 to 500 **</td> </tr> <tr> <td>Above 470</td> <td>5,000</td> <td>500</td> </tr> <tr> <td colspan="3">** linear interpolations</td> </tr> </tbody> </table> <p>[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, $\mu\text{V/m at 3 meters} = 22.72727(F) - 2454.545$; for the band 260-470MHz, $\mu\text{V/m at 3 meters} = 16.6667(F) - 2833.3333$. The maximum permitted unwanted emission level is 20dB below the maximum permitted fundamental level.]</p>			Fundamental Frequency (MHz)	Field Strength of Fundamental (microvolts/meter)	Field Strength of Spurious Emission (microvolts/meter)	40.66-40.70	1,000	100	70-130	500	50	130-174	500 to 1,500 **	50 to 150 **	174-260	1,500	150	260-470	1,500 to 5,00 **	150 to 500 **	Above 470	5,000	500	** linear interpolations		
Fundamental Frequency (MHz)	Field Strength of Fundamental (microvolts/meter)	Field Strength of Spurious Emission (microvolts/meter)																									
40.66-40.70	1,000	100																									
70-130	500	50																									
130-174	500 to 1,500 **	50 to 150 **																									
174-260	1,500	150																									
260-470	1,500 to 5,00 **	150 to 500 **																									
Above 470	5,000	500																									
** linear interpolations																											

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TEST PROCEDURE:	<p>a. The EUT was placed on a rotatable table with 0.8 meters above ground.</p> <p>b. The EUT was set 3 meters from the interference-receiving antenna, which was mounted on the top of a variable height antenna tower.</p> <p>c. The antenna was varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna were set to make measurement.</p> <p>d. For each suspected emission the EUT was arranged to its worst case and then change the antenna tower height (from 1m to 4m) and turn table (from 0 degree to 360 degree) to find the maximum reading.</p> <p>e. If the emission level of the EUT in peak mode was 20 dB lower than the specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be tested using the quasi-peak method in about six maximal points and the results will be reported.</p> <p>f. Broadband antenna (Calibrated antenna) was used as receiving antenna below 1000MHz. Horn antenna were used as receiving antenna above 1000MHz.</p> <p>g. The bandwidth is 120 kHz below 1000 MHz, and 1 MHz above 1000 MHz</p> <p>Explanation of the Correction Factor are given as follows:</p> $FS = RA + AF + CF - AG - DC$ <p>Where: FS = Field Strength</p> <p>RA = Receiver Amplitude</p> <p>AF = Antenna Factor</p> <p>CF = Cable Attenuation Factor</p> <p>AG = Amplifier Gain</p> <p>DC = Duty Cycle Correction Factor</p>
TESTED RANGE:	30MHz to 4000MHz
TEST VOLTAGE:	3V DC
TEST STATUS:	Keep Tx in continuous transmission mode, modulated
RESULTS:	The EUT meets the requirements of field strength test. The test results relate only equipment under test provided by client.
CHANGES OR MODIFICATIONS:	There were no modifications installed by EMC Compliance Management Group (China) test personnel.
M. UNCERTAINTY:	Freq. $\pm 2 \times 10^{-7}$ x Center Freq., Amp ± 2.6 dB

Average value of the measured emissions:

Direction	Polarization	Frequency Type	Frequency (MHz)	Field Strength dB(μV/m)	Limit dB(μV/m)	Over Limit dB(μV/m)	Read Level dB(μV)	Factor (dB)	Duty cycle Correction Factor (dB)
Lie	Horizontal	Fundamental	315.00	58.55	67.48	-8.93	72.06	-5.73	7.78
		Spurious	630.00	41.6	47.48	-5.88	56.78	-7.40	7.78
		Spurious	945.00	38.79	47.48	-8.69	47.66	-1.09	7.78
		Spurious	1260.00	45.54	47.48	-1.94	50.45	2.87	7.78
		Spurious	1575.00	43.06	47.48	-4.42	50.11	0.73	7.78
		Spurious	1890.00	39.86	47.48	-7.62	46.75	0.89	7.78
	Vertical	Fundamental	315.00	60.62	67.48	-6.86	74.13	-5.73	7.78
		Spurious	630.00	38.62	47.48	-8.86	53.80	-7.40	7.78
		Spurious	945.00	39.19	47.48	-8.29	48.06	-1.09	7.78
		Spurious	1260.00	46.10	47.48	-1.38	51.01	2.87	7.78
		Spurious	1575.00	39.18	47.48	-8.30	46.23	0.73	7.78
		Spurious	1890.00	36.20	47.48	-11.28	43.09	0.89	7.78
Side	Horizontal	Fundamental	315.00	58.47	67.48	-9.01	71.98	-5.73	7.78
		Spurious	630.00	38.11	47.48	-9.37	53.29	-7.40	7.78
		Spurious	945.00	40.35	47.48	-7.13	49.22	-1.09	7.78
		Spurious	1260.00	45.83	47.48	-1.65	50.74	2.87	7.78
		Spurious	1575.00	36.93	47.48	-10.55	43.98	0.73	7.78
		Spurious	1890.00	37.24	47.48	-10.24	44.13	0.89	7.78
	Vertical	Fundamental	315.00	59.69	67.48	-7.79	73.20	-5.73	7.78
		Spurious	630.00	34.93	47.48	-12.55	50.11	-7.40	7.78
		Spurious	945.00	41.36	47.48	-6.12	50.23	-1.09	7.78
		Spurious	1260.00	43.07	47.48	-4.41	47.98	2.87	7.78
		Spurious	1575.00	37.04	47.48	-10.44	44.09	0.73	7.78
		Spurious	1890.00	36.20	47.48	-11.28	43.09	0.89	7.78
Stand	Horizontal	Fundamental	315.00	59.69	67.48	-7.79	73.20	-5.73	7.78
		Spurious	630.00	40.93	47.48	-6.55	56.11	-7.40	7.78
		Spurious	945.00	40.22	47.48	-7.26	49.09	-1.09	7.78
		Spurious	1260.00	41.52	47.48	-5.96	46.43	2.87	7.78
		Spurious	1575.00	38.16	47.48	-9.32	45.21	0.73	7.78
		Spurious	1890.00	37.13	47.48	-10.35	44.02	0.89	7.78
	Vertical	Fundamental	315.00	56.53	67.48	-10.95	70.04	-5.73	7.78
		Spurious	630.00	36.91	47.48	-10.57	52.09	-7.40	7.78
		Spurious	945.00	39.66	47.48	-7.82	48.53	-1.09	7.78
		Spurious	1260.00	43.21	47.48	-4.27	48.12	2.87	7.78
		Spurious	1575.00	37.67	47.48	-9.81	44.72	0.73	7.78
		Spurious	1890.00	35.46	47.48	-12.02	42.35	0.89	7.78

Peak value of the measured emissions:

Direction	Polarization	Frequency Type	Frequency (MHz)	Read Level dB(μV)	Factor (dB)	Field Strength dB(μV/m)	Limit dB(μV/m)	Over Limit dB(μV/m)
Lie	Horizontal	Fundamental	315.00	72.06	-5.73	66.33	87.48	-21.15
		Spurious	630.00	56.78	-7.40	49.38	67.48	-18.10
		Spurious	945.00	47.66	-1.09	46.57	67.48	-20.91
		Spurious	1260.00	50.45	2.87	53.32	67.48	-14.16
		Spurious	1575.00	50.11	0.73	50.84	67.48	-16.64
		Spurious	1890.00	46.75	0.89	47.64	67.48	-19.84
	Vertical	Fundamental	315.00	74.13	-5.73	68.40	87.48	-19.08
		Spurious	630.00	53.80	-7.40	46.40	67.48	-21.08
		Spurious	945.00	48.06	-1.09	46.97	67.48	-20.51
		Spurious	1260.00	51.01	2.87	53.88	67.48	-13.60
		Spurious	1575.00	46.23	0.73	46.96	67.48	-20.52
		Spurious	1890.00	43.09	0.89	43.98	67.48	-23.5
Side	Horizontal	Fundamental	315.00	71.98	-5.73	66.25	87.48	-21.23
		Spurious	630.00	53.29	-7.40	45.89	67.48	-21.59
		Spurious	945.00	49.22	-1.09	48.13	67.48	-19.35
		Spurious	1260.00	50.74	2.87	53.61	67.48	-13.87
		Spurious	1575.00	43.98	0.73	44.71	67.48	-22.77
		Spurious	1890.00	44.13	0.89	45.02	67.48	-22.46
	Vertical	Fundamental	315.00	73.20	-5.73	67.47	87.48	-20.01
		Spurious	630.00	50.11	-7.40	42.71	67.48	-24.77
		Spurious	945.00	50.23	-1.09	49.14	67.48	-18.34
		Spurious	1260.00	47.98	2.87	50.85	67.48	-16.63
		Spurious	1575.00	44.09	0.73	44.82	67.48	-22.66
		Spurious	1890.00	43.09	0.89	43.98	67.48	-23.50
Stand	Horizontal	Fundamental	315.00	73.20	-5.73	67.47	87.48	-20.01
		Spurious	630.00	56.11	-7.40	48.71	67.48	-18.77
		Spurious	945.00	49.09	-1.09	48.00	67.48	-19.48
		Spurious	1260.00	46.43	2.87	49.3	67.48	-18.18
		Spurious	1575.00	45.21	0.73	45.94	67.48	-21.54
		Spurious	1890.00	44.02	0.89	44.91	67.48	-22.57
	Vertical	Fundamental	315.00	70.04	-5.73	64.31	87.48	-23.17
		Spurious	630.00	52.09	-7.40	44.69	67.48	-22.79
		Spurious	945.00	48.53	-1.09	47.44	67.48	-20.04
		Spurious	1260.00	48.12	2.87	50.99	67.48	-16.49
		Spurious	1575.00	44.72	0.73	45.45	67.48	-22.03
		Spurious	1890.00	42.35	0.89	43.24	67.48	-24.24

Note:

1. Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follow:

For fundamental frequency ($F=315.00\text{MHz}$)

Average field Strength of Fundamental (dBuV/m)

$$\begin{aligned} &= 20\log(16.6667 \times F - 2883.3333) \\ &= 20\log(16.6667 \times 315.00 - 2883.3333) \\ &= 67.48 \text{ dBuV/m} \end{aligned}$$

Average field Strength of Spurious (dBuV/m) = $67.48 - 20 = 47.48 \text{ dBuV/m}$

According to FCC 15.35(b), maximum permitted peak field strength is 20dB above the maximum permitted average emission limit.

2. Field Strength = Read Level + Factor – Duty Cycle Correction Factor

Factor = Antenna Factor + Cable Loss - Preamp Factor

Duty Cycle Correction Factor is calculated by averaging the sum of the pulse train.

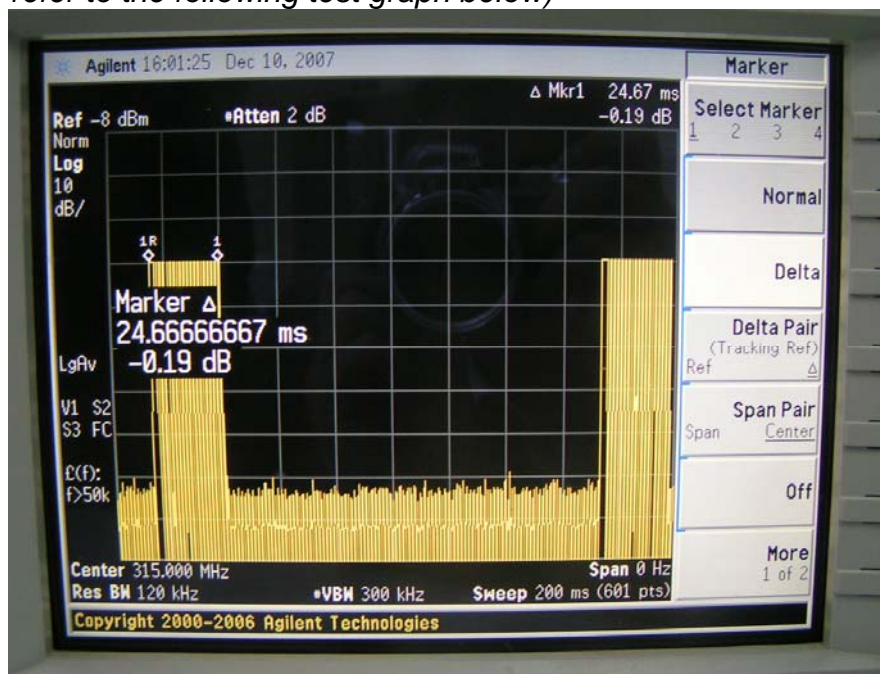
Correction factor is measured as follows:

Keep the EUT in continuous transmission mode (modulated), and set the spectrum to the fundamental frequency and set the span width to 0 Hz. Then connect a storage oscilloscope to the video output of the spectrum that is used to detect the pulse train. Adjust the oscilloscope settings to observe the pulse train and determine the number and width of the pulses, as well as the period of the train.

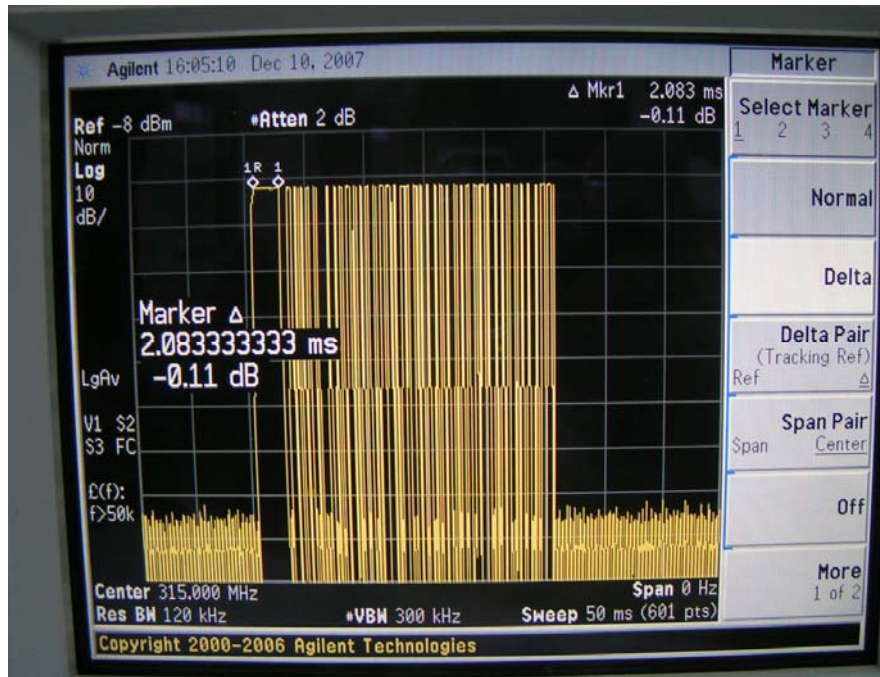
Duty Cycle Correction Factor at its maximum value

$$\begin{aligned} \text{Duty Cycle} &= 20\log(1 \times \text{Pulse 1} + 10 \times \text{Pulse 2} + 31 \times \text{Pulse 3}) / \text{Period} \\ &= 20\log(1 \times 2.08333 + 10 \times 0.33333 + 31 \times 0.15000) / 24.66667 \\ &= 20\log 0.4081 = 7.78 \text{ dB} \end{aligned}$$

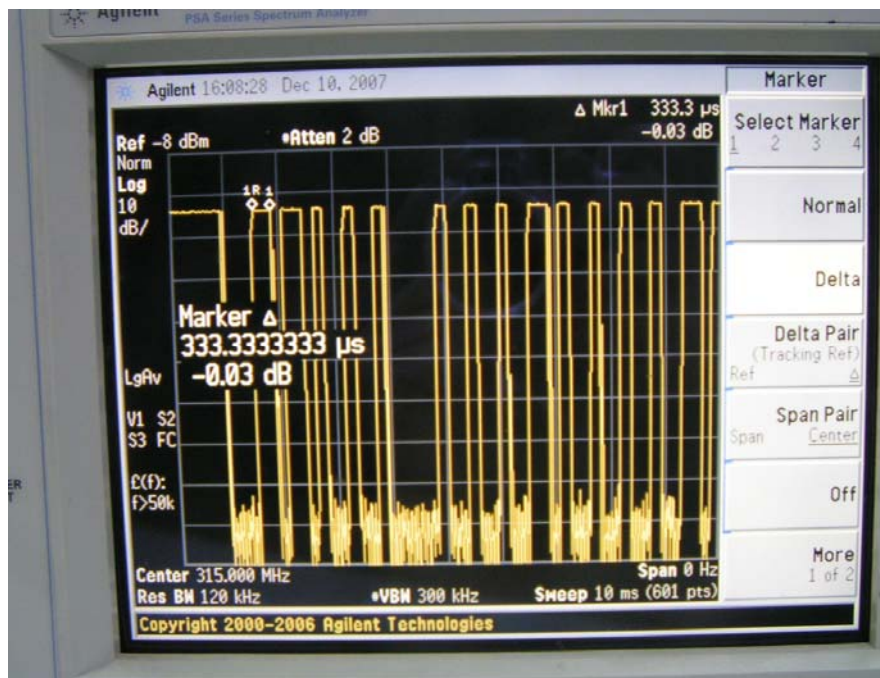
(please refer to the following test graph below)



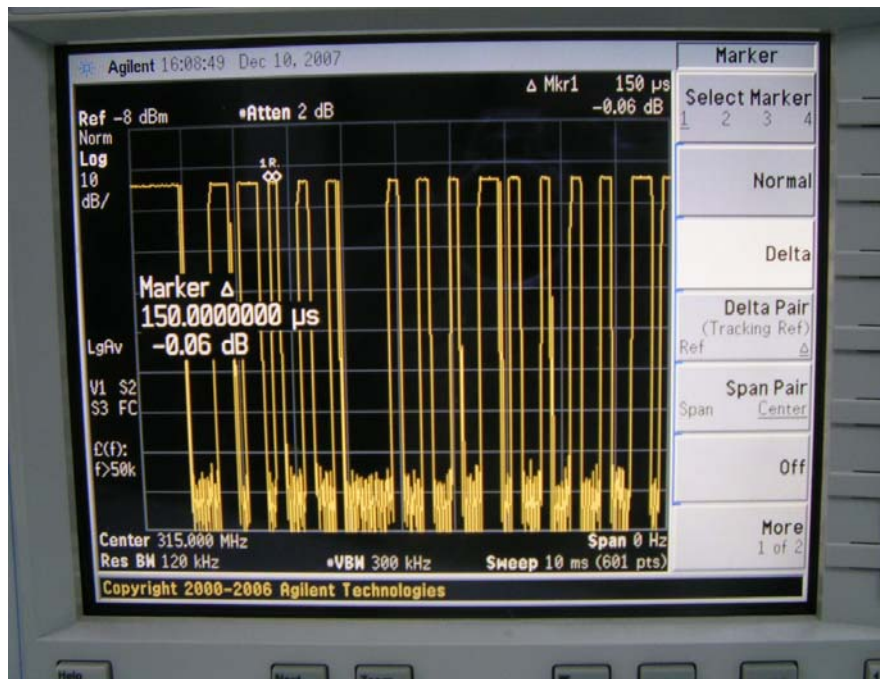
Period=24.66667ms



Pulse 1=2.08333ms



Pulse 2=333.3333us



Pulse3=150.000us

Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due Date
Broadband Antenna	Sunol	JB5	A110503	11/29/07	11/28/08
EMI Receiver	HP	85462A	3650A00363	11/29/07	11/28/08
Spectrum Analyzer	Agilent	E4440A	US45303119	03/20/07	03/19/08
Note: All testing were performed using internationally recognized standards. All test instruments were calibrated.					

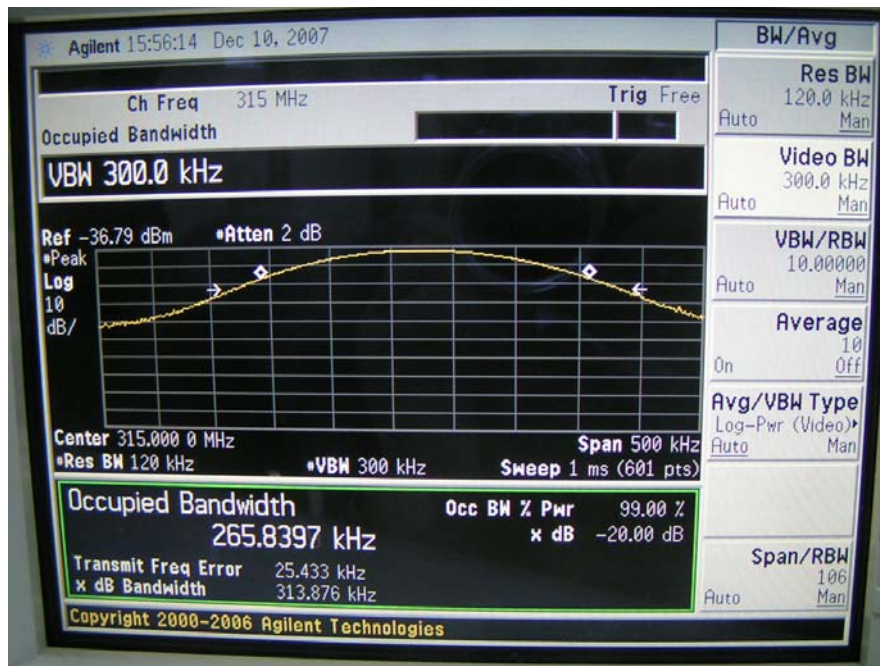
SIGNED BY: Shi-xiting & Cloud Feng
ENGINEER

REVIEWED BY: Hongzhu
SENIOR ENGINEER

ATTACHMENT 5 – BANDWIDTH TEST

CLIENT:	Shanghai Vei Sheng Auto Parts Manufacturing Co., Ltd.	TEST STANDARD:	FCC Part 15.231 (C) RSS 210 (2007)
MODEL TESTED:	PUR-07N01	PRODUCT:	PUR-TPMS
SERIAL NO.:	Engineering Sample	EUT DESIGNATION:	RF Equipment
TEMPERATURE:	21°C	HUMIDITY:	53%RH
ATM PRESSURE:	101.6 kPa	GROUNDING:	No Grounding
TESTED BY:	Shi Xiting & Cloud	DATE OF TEST:	2007, December 10
SETUP METHOD:	ANSI C63.4 - 2003		
FCC BANDWIDTH REQUIREMENT:	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. For devices operating above 900 MHz, The emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.		
IC BANDWIDTH REQUIREMENT:	For the purpose of Section A1.1, the 99% bandwidth shall be no wider than 0.25% of the centre frequency for devices operating between 70-900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the centre frequency.		
TEST VOLTAGE:	3V DC		
TEST STATUS:	Keep Tx in continuous transmission mode, modulated		
RESULTS:	The EUT meets the bandwidth requirement. The test results relate only to the equipment under test provided by client.		
CHANGES OR MODIFICATIONS:	There were no modifications installed by EMC Compliance Management Group (China) test personnel.		
M. UNCERTAINTY:	Freq. $\pm 2 \times 10^{-7}$ x Center Freq., Amp ± 2.6 dB		

Test Data (Fundamental Frequency)



FCC part 15.231 (c)

20 dB Bandwidth (MHz)	Bandwidth Limit (MHz) ($F_{center} \times 0.25\%$)	Conclusion
0.313876	0.7875	Compliance

IC: RSS210 A1.1.3

99% Bandwidth (MHz)	Bandwidth Limit (MHz) ($F_{center} \times 0.25\%$)	Conclusion
0.2658397	0.7875	Compliance

Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4440A	US45303119	03/20/07	03/19/08
Note: All testing were performed using internationally recognized standards. All test instruments were calibrated.					

SIGNED BY: Shi-xiting & Cloud Feng
ENGINEER

REVIEWED BY: Hany Zhao
SENIOR ENGINEER