

FCC CERTIFICATION RADIO MEASUREMENT TECHNICAL REPORT

On Model Name: Tire Pressure Sensor

Model Number : S1

Trademark : Source

FCC ID : XMLSS09S001

IC Number : 8545A-SS09S001

Prepared for Shanghai Source Electronic Technology Ltd.

According to FCC Part 15 (2008), Subpart C & RSS-210 Issue 7 (2007)

Test Report #: **SHA-0907-8301-FCC**

Prepared by: **Chris Huang**

Reviewed by: **Harry Zhao**

QC Manager: **Paul Chen**

Test Report Released by: Paul J. Chen **2009, October 14**

Paul Chen

Date

Test Location

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

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FCC Registration Number: 172634

Accreditation Bodies

The report is prepared by ECMG Worldwide Certification Solution, Inc., which 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 ECMG Worldwide Certification Solution, Inc. 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 : *Tire Pressure Sensor*

Model Number : *S1*

Trade Mark : *Source*

Date Tested : *2009, July 30th*

Applicant : *Shanghai Source Electronic Technology Ltd.
Room 601, Build 2, No.415, Xinsong Road,
Minhang District, Shanghai*

Telephone : *86-21-64928533*

Manufacturer : *Shanghai Source Electronic Technology Ltd.
Room 601, Build 2, No.415, Xinsong Road,
Minhang District, Shanghai*

EUT Description

Shanghai Source Electronic Technology Ltd. Model number S1 (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 S1 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			
Reference FCC Part 15 (2008), Subpart C & RSS-210 Issue 7 (2007)			
Specification	Description	Test Results	Remark
FCC Part 15.203	Antenna Requirement	Compliance	Attachment 1
FCC Part 15.205 RSS-210 Table 1	Restricted Band of Operation	Compliance	Attachment 2
FCC Part 15.207	Conducted Limits	Test is not applicable, because EUT only employ battery power for operation.	
FCC Part 15.209 RSS-210 Table 2	Radiated Emission Limits	Compliance	Refer to Attachment 4
FCC Part 15.231	Periodic Operation in the Band 40.66–40.70MHz and above 70MHz	--	--
(e)	Operation Mode	Compliance	Attachment 3
(e) RSS-210 Table 5	Field Strength of Fundamental and Spurious Emissions	Compliance	Attachment 4
(c) RSS-210 A1.1.3	Bandwidth	Compliance	Attachment 5

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

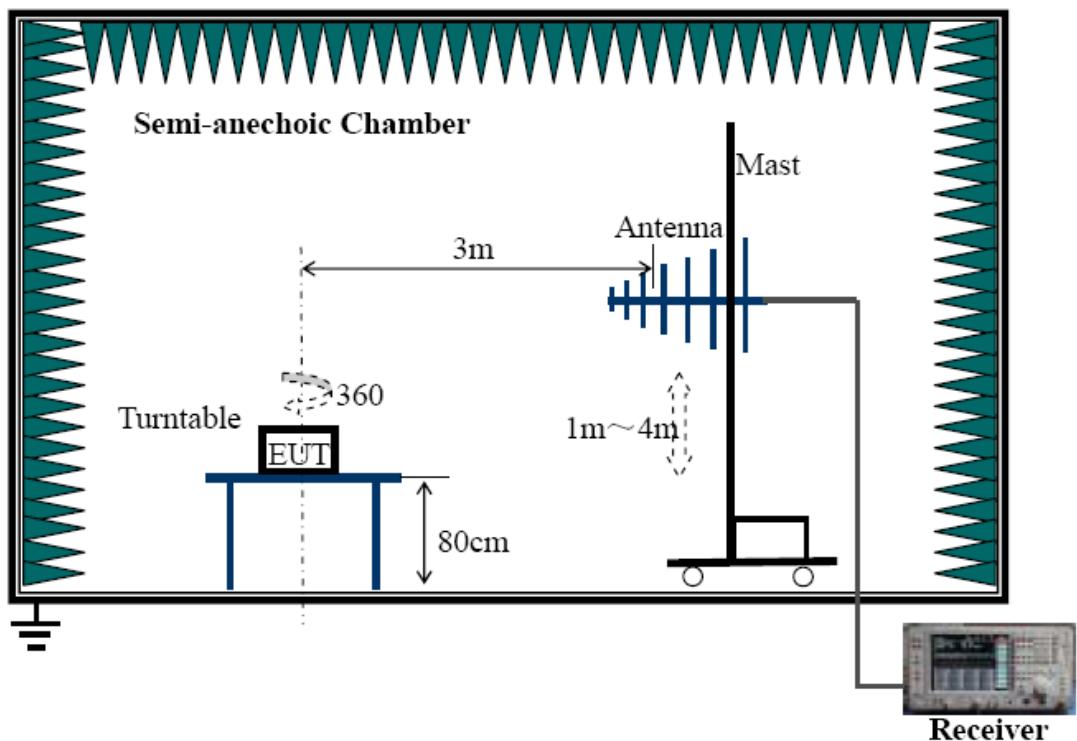
Any modifications installed previous to testing by Shanghai Source Electronic Technology Ltd. will be incorporated in each production model sold or leased in United States.

There were no modifications installed by ECMG Worldwide Certification Solution, Inc. (China) test personnel.

Test System Details

<i>EUT</i>	
<i>Model Number:</i>	<i>S1</i>
<i>Trademark::</i>	<i>Source</i>
<i>Serial Number:</i>	<i>Engineering Sample</i>
<i>Input Voltage:</i>	<i>DC 3V</i>
<i>Description:</i>	<i>Transmitter of tire pressure monitoring system</i>
<i>Manufacturer:</i>	<i>Shanghai Source Electronic Technology Ltd.</i>
<i>Support Equipment</i>	
<i>None</i>	
<i>Cable Description</i>	
<i>None</i>	

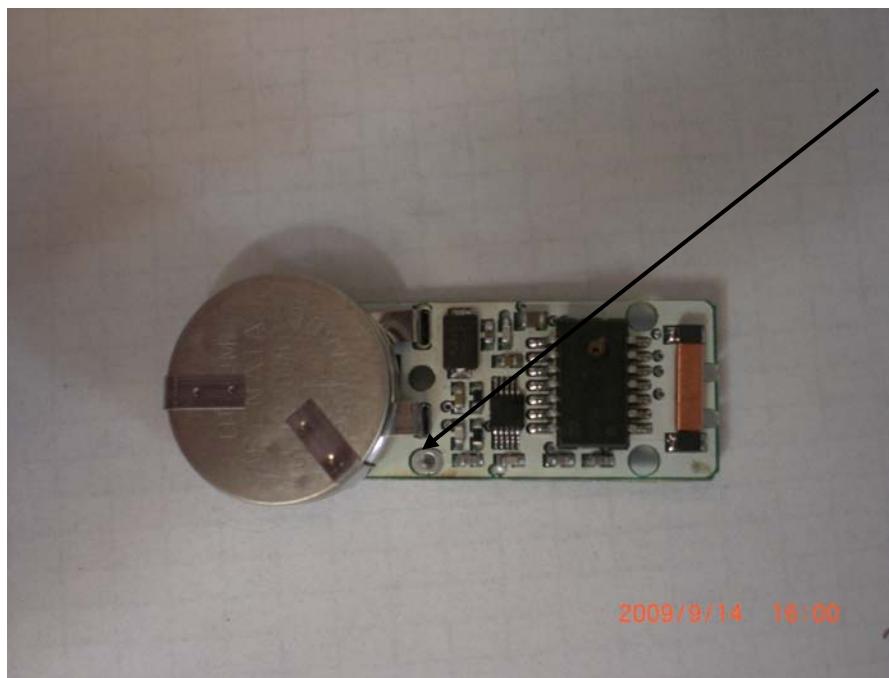
Configuration of Tested System



ATTACHMENT 1 - ANTENNA REQUIREMENT

CLIENT:	Shanghai Source Electronic Technology Ltd.	TEST STANDARD:	FCC Part 15.203 (2008) RSS-210 (2007)
MODEL NUMBER:	S1	PRODUCT:	Tire Pressure Sensor
SERIAL NO.:	Engineering Sample	EUT DESIGNATION:	RF Equipment
TEMPERATURE:	21°C	HUMIDITY:	55%RH
ATM PRESSURE:	101.8 kPa	GROUNDING:	No Grounding
TESTED BY:	Cloud Feng	DATE OF TEST:	2009, July 30
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 ECMG Worldwide Certification Solution, Inc.(China) test personnel.		
M. UNCERTAINTY:	N/A		

FCC Section	FCC Rules	Conclusion
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> 	<p><i>The RF Device uses an integral antenna without connector.</i></p>



Integral Antenna without Connector View

ATTACHMENT 2 – RESTRICTED BAND OF OPERATION

CLIENT:	Shanghai Source Electronic Technology Ltd.	TEST STANDARD:	FCC 15.205 (2008) RSS-210(2007)
MODEL NUMBER:	S1	PRODUCT:	Tire Pressure Sensor
SERIAL NO.:	Engineering Sample	EUT DESIGNATION:	RF Equipment
TEMPERATURE:	21°C	HUMIDITY:	55%RH
ATM PRESSURE:	101.6 kPa	GROUNDING:	No Grounding
TESTED BY:	Cloud Feng	DATE OF TEST:	2009, July 30
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 ECMG Worldwide Certification Solution, Inc.(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.

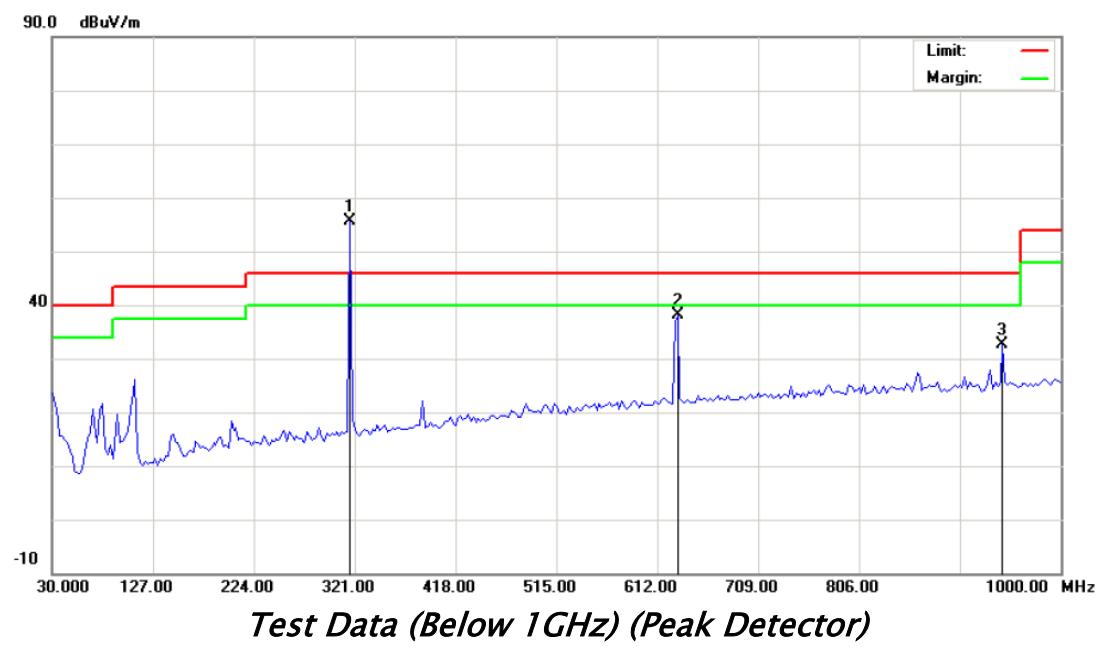
² Above 38.6

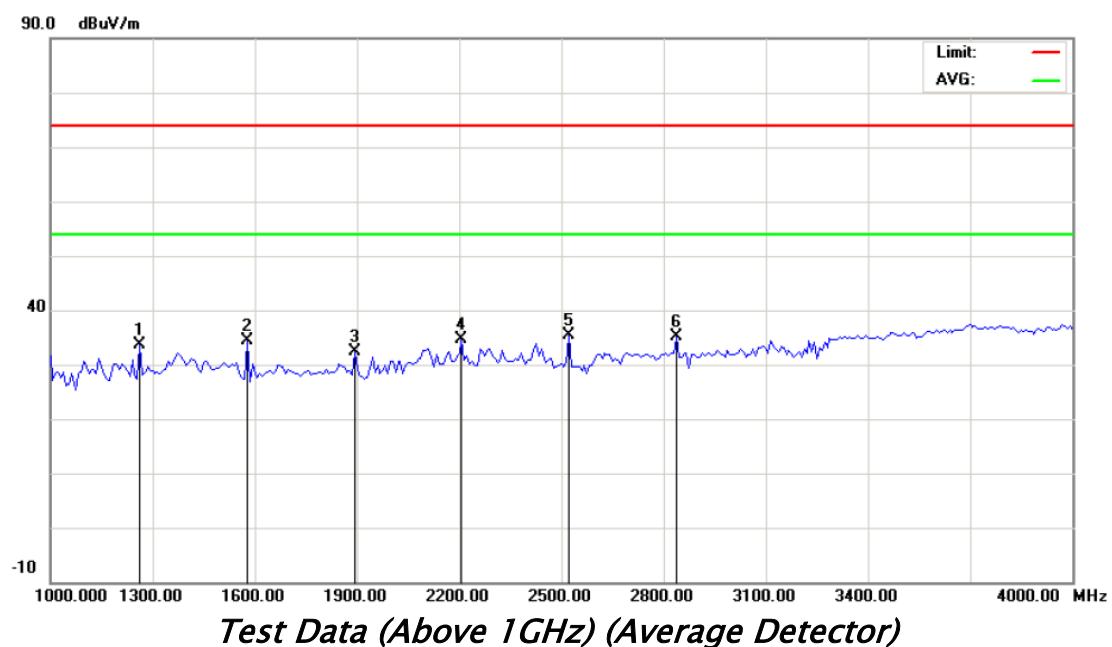
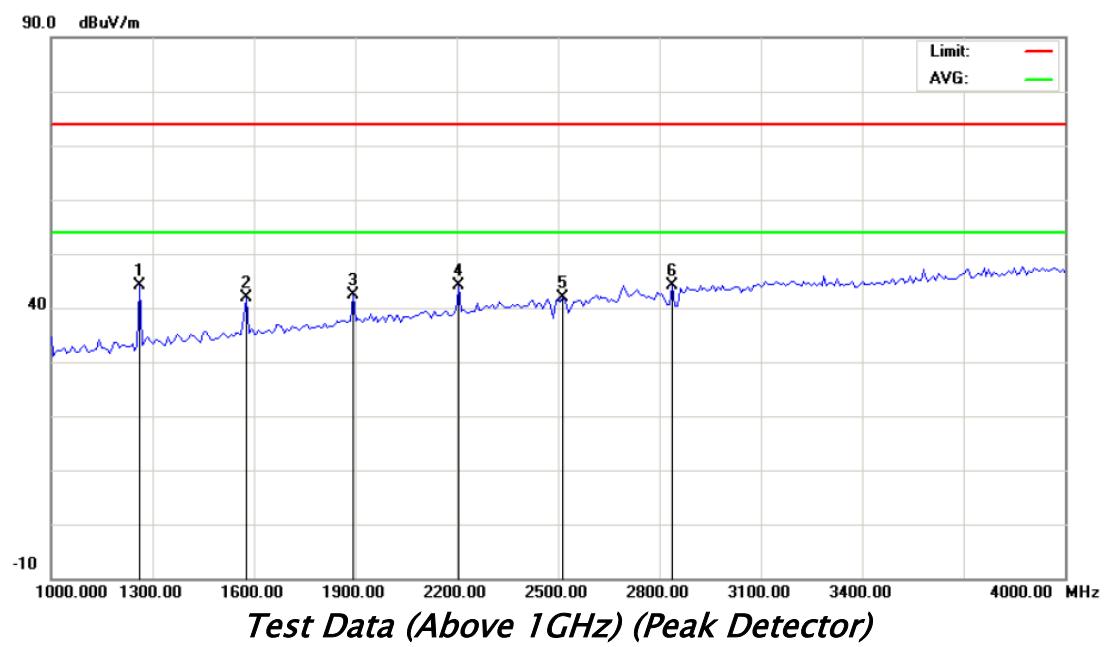
IC Restricted band

Table 1: Restricted Frequency Bands ^(Note)

MHz	MHz	MHz	GHz
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.





Fundamental Frequency

Polarization	Frequency Type	Frequency (MHz)	Field Strength dB(µV/m)	Limit dB(µV/m)	Over Limit dB(µV/m)	Read Level dB(µV)	Antenna factor (dB)	Cable factor (dB)	Pre-Amp (dB)	Duty cycle Correction Factor (dB)
Horizontal	Fundamental	315.00	62.11	67.48	-5.37	73.36	13.00	1.33	20.06	5.52
Vertical	Fundamental	315.00	55.62	67.48	-11.86	66.87	13.00	1.33	20.06	5.52

Average Values

Polarization	Frequency Type	Frequency (MHz)	Read Level dB(µV)	Antenna factor (dB)	Cable factor (dB)	Pre-Amp (dB)	Field Strength dB(µV/m)	Limit dB(µV/m)	Over Limit dB(µV/m)
Horizontal	Fundamental	315.00	73.36	13.00	1.33	20.06	67.63	87.48	-19.85
Vertical	Fundamental	315.00	66.87	13.00	1.33	20.06	61.14	87.48	-26.34

Peak Values

Spurious Frequency

Polarization	Frequency Type	Frequency (MHz)	Field Strength dB(µV/m)	Limit dB(µV/m)	Over Limit dB(µV/m)	Read Level dB(µV)	Antenna factor (dB)	Cable factor (dB)	Pre-Amp (dB)	Duty cycle Correction Factor (dB)
Horizontal	Spurious	630.00	43.85	47.48	-3.63	56.77	18.51	1.55	27.46	5.52
	Spurious	945.00	38.65	47.48	-8.83	45.26	20.99	2.06	24.14	5.52
	Spurious	1260.00	42.43	47.48	-5.05	45.08	24.37	2.11	23.61	5.52
	Spurious	1575.00	41.10	47.48	-6.38	45.89	23.30	2.44	25.01	5.52
	Spurious	1890.00	35.89	47.48	-11.59	40.52	24.00	2.76	25.87	5.52
	Spurious	2205.00	35.20	47.48	-12.28	42.48	27.40	2.81	28.45	5.52
	Spurious	2520.00	35.12	47.48	-12.36	43.92	27.60	2.97	33.85	5.52
	Spurious	2835.00	31.00	47.48	-16.48	42.13	27.90	3.10	36.58	5.52
	Spurious	3150.00	30.68	47.48	-16.80	40.95	28.38	3.17	36.30	5.52
Vertical	Spurious	630.00	38.13	47.48	-9.35	51.05	18.51	1.55	27.46	5.52
	Spurious	945.00	32.54	47.48	-14.94	39.15	20.99	2.06	24.14	5.52
	Spurious	1260.00	42.75	47.48	-4.73	45.40	24.37	2.11	23.61	5.52
	Spurious	1575.00	38.82	47.48	-8.66	43.61	23.30	2.44	25.01	5.52
	Spurious	1890.00	35.32	47.48	-12.16	39.95	24.00	2.76	25.87	5.52
	Spurious	2205.00	35.06	47.48	-12.42	42.34	27.40	2.81	28.45	5.52
	Spurious	2520.00	34.87	47.48	-12.61	43.67	27.60	2.97	33.85	5.52
	Spurious	2835.00	30.74	47.48	-16.74	41.84	27.90	3.10	36.58	5.52
	Spurious	3150.00	30.48	47.48	-17.00	40.75	28.38	3.17	36.30	5.52

Note: The value of the field strength from 1890MHz to 3150MHz is the worst case.

Average Values

Polarization	Frequency Type	Frequency (MHz)	Read Level dB(µV)	Antenna factor (dB)	Cable factor (dB)	Pre-Amp (dB)	Field Strength dB(µV/m))	Limit dB(µV/m)	Over Limit dB(µV/m)
Horizontal	Spurious	630.00	56.77	18.51	1.55	27.46	49.37	67.48	-18.11
	Spurious	945.00	45.26	20.99	2.06	24.14	44.17	67.48	-23.31
	Spurious	1260.00	45.08	24.37	2.11	23.61	47.95	67.48	-19.53
	Spurious	1575.00	45.89	23.30	2.44	25.01	46.62	67.48	-20.86
	Spurious	1890.00	40.52	24.00	2.76	25.87	41.41	67.48	-26.07
	Spurious	2205.00	43.78	27.40	2.81	28.45	42.02	67.48	-25.46
	Spurious	2520.00	44.09	27.60	2.97	33.85	41.00	67.48	-26.48
	Spurious	2835.00	42.00	27.90	3.10	36.58	36.42	67.48	-31.06
	Spurious	3150.00	40.80	28.38	3.17	36.30	36.05	67.48	-31.43
Vertical	Spurious	630.00	51.05	18.51	1.55	27.46	43.65	67.48	-23.83
	Spurious	945.00	39.15	20.99	2.06	24.14	38.06	67.48	-29.42
	Spurious	1260.00	45.40	24.37	2.11	23.61	48.27	67.48	-19.21
	Spurious	1575.00	43.61	23.30	2.44	25.01	44.34	67.48	-23.14
	Spurious	1890.00	39.95	24.00	2.76	25.87	40.84	67.48	-26.64
	Spurious	2205.00	42.34	27.40	2.81	28.45	40.58	67.48	-26.90
	Spurious	2520.00	43.67	27.60	2.97	33.85	40.39	67.48	-27.09
	Spurious	2835.00	41.84	27.90	3.10	36.58	36.26	67.48	-31.22
	Spurious	3150.00	40.75	28.38	3.17	36.30	36.00	67.48	-31.48

Note: The value of the field strength from 1890MHz to 3150MHz is the worst case.

Peak Values

Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due Date
Broadband Antenna	Sunol	JB5	A110503	11/29/08	11/28/09
Horn Antenna	R&S	HF906	4044.4507.02	05/13/09	05/12/10
EMI Receiver	HP	85462A	3650A00363	11/29/08	11/28/09
Note: All testing were performed using internationally recognized standards. All test instruments were calibrated.					

SIGNED BY:

Cloud Feng

ENGINEER

REVIEWED BY:

Hang Zhou

SENIOR ENGINEER

ATTACHMENT 3 - OPERATION MODE

CLIENT:	Shanghai Source Electronic Technology Ltd.	TEST STANDARD:	FCC Part 15.231 (e) (2008) RSS-210 (2007)
MODEL NUMBER:	S1	PRODUCT:	Tire Pressure Sensor
SERIAL NO.:	Engineering Sample	EUT DESIGNATION:	RF Equipment
TEMPERATURE:	21°C	HUMIDITY:	55%RH
ATM PRESSURE:	101.8 kPa	GROUNDING:	No Grounding
TESTED BY:	Cloud Feng	DATE OF TEST:	2009, July 30
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 and the transmitting 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 ECMG Worldwide Certification Solution, Inc.(China) test personnel.		
M. UNCERTAINTY:	N/A		

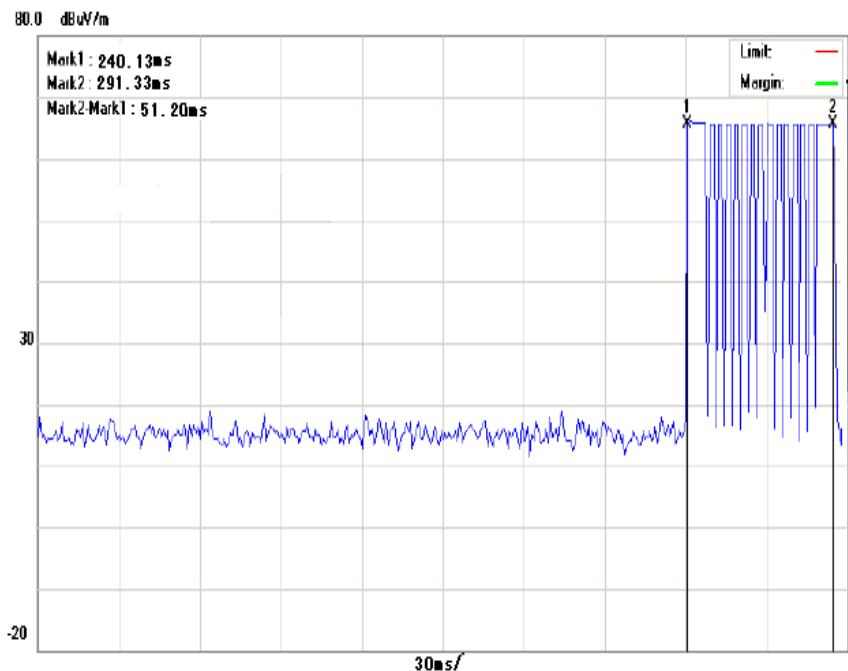
Transmission period:

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

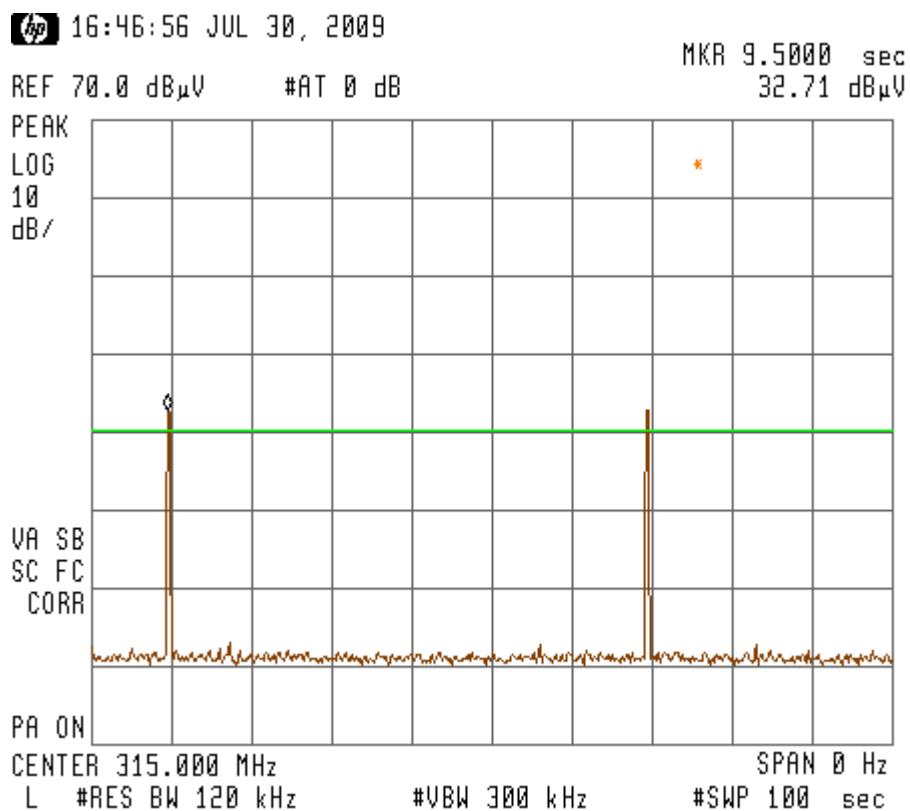
Silent period:

<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	60s	$30*51.20ms=1.536s$	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.</i> <i>As it is activated, it will transmit signal (duration time 51.2ms) at a predetermined interval of 60s.</i>



Transmitting Period (Sweep 300ms)



Silent Period (Sweep 100s)

Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due Date
Broadband Antenna	Sunol	JB5	A110503	11/29/08	11/28/09
EMI Receiver	HP	85462A	3650A00363	11/29/08	11/28/09
Note: All testing were performed using internationally recognized standards. All test instruments were calibrated.					

SIGNED BY:

Cloud Feng

ENGINEER

REVIEWED BY:

Hang Zhou

SENIOR ENGINEER

ATTACHMENT 4 -FIELD STRENGTH OF FUNDAMENTAL AND SPURIOUS EMISSIONS

CLIENT:	Shanghai Source Electronic Technology Ltd.		TEST STANDARD:	FCC Part 15.231(e) FCC Part 15.209 RSS-210																					
MODEL NUMBER:	S1		PRODUCT:	Tire Pressure Sensor																					
SERIAL NO.:	Engineering Sample		EUT DESIGNATION:	RF Equipment																					
TEMPERATURE:	21°C		HUMIDITY:	53%RH																					
ATM PRESSURE:	101.6 kPa		GROUNDING:	No Grounding																					
TESTED BY:	Cloud Feng		DATE OF TEST:	2009, July 30																					
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;"> <thead> <tr> <th style="text-align: center;">Fundamental Frequency (MHz)</th> <th style="text-align: center;">Field Strength of Fundamental (microvolts/meter)</th> <th style="text-align: center;">Field Strength of Spurious Emission (microvolts/meter)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">40.66-40.70</td> <td style="text-align: center;">1,000</td> <td style="text-align: center;">100</td> </tr> <tr> <td style="text-align: center;">70-130</td> <td style="text-align: center;">500</td> <td style="text-align: center;">50</td> </tr> <tr> <td style="text-align: center;">130-174</td> <td style="text-align: center;">500 to 1,500 **</td> <td style="text-align: center;">50 to 150 **</td> </tr> <tr> <td style="text-align: center;">174-260</td> <td style="text-align: center;">1,500</td> <td style="text-align: center;">150</td> </tr> <tr> <td style="text-align: center;">260-470</td> <td style="text-align: center;">1,500 to 5,00 **</td> <td style="text-align: center;">150 to 500 **</td> </tr> <tr> <td style="text-align: center;">Above 470</td> <td style="text-align: center;">5,000</td> <td style="text-align: center;">500</td> </tr> </tbody> </table> <p style="text-align: center;">** linear interpolations</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
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																							
<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, uV/m at 3 meters =$22.72727(F)-2454.545$; for the band 260-470MHz, uV/m at 3 meters =$16.6667(F)-2833.3333$. The maximum permitted unwanted emission level is 20dB below the maximum permitted fundamental level.]</p>																									

CONTINUE ON THE NEXT PAGE...

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> <p>FS= RA + AF + CF - AG - DC</p> <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 ECMG Worldwide Certification Solution, Inc.(China) test personnel.
M. UNCERTAINTY:	Freq. $\pm 2 \times 10^{-7} \times$ 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)	Antenna factor (dB)	Cable factor (dB)	Pre-Amp (dB)	Duty cycle Correction Factor (dB)
Lie	Horizontal	Fundamental	315.00	62.11	67.48	-5.37	73.36	13.00	1.33	20.06	5.52
	Vertical	Fundamental	315.00	55.62	67.48	-11.86	66.87	13.00	1.33	20.06	5.52
Side	Horizontal	Fundamental	315.00	55.76	67.48	-11.72	67.01	13.00	1.33	20.06	5.52
	Vertical	Fundamental	315.00	54.85	67.48	-12.63	66.10	13.00	1.33	20.06	5.52
Stand	Horizontal	Fundamental	315.00	58.76	67.48	-8.72	70.01	13.00	1.33	20.06	5.52
	Vertical	Fundamental	315.00	58.41	67.48	-9.07	69.66	13.00	1.33	20.06	5.52

Direction	Polarization	Frequency Type	Frequency (MHz)	Field Strength dB(µV/m)	Limit dB(µV/m)	Over Limit dB(µV/m)	Read Level dB(µV)	Antenna factor (dB)	Cable factor (dB)	Pre-Amp (dB)	Duty cycle Correction Factor (dB)
Lie	Horizontal	Spurious	630.00	43.85	47.48	-3.63	56.77	18.51	1.55	27.46	5.52
		Spurious	945.00	38.65	47.48	-8.83	45.26	20.99	2.06	24.14	5.52
		Spurious	1260.00	42.43	47.48	-5.05	45.08	24.37	2.11	23.61	5.52
		Spurious	1575.00	41.10	47.48	-6.38	45.89	23.30	2.44	25.01	5.52
		Spurious	1890.00	35.89	47.48	-11.59	40.52	24.00	2.76	25.87	5.52
	Vertical	Spurious	630.00	38.13	47.48	-9.35	51.05	18.51	1.55	27.46	5.52
		Spurious	945.00	32.54	47.48	-14.94	39.15	20.99	2.06	24.14	5.52
		Spurious	1260.00	42.75	47.48	-4.73	45.40	24.37	2.11	23.61	5.52
		Spurious	1575.00	38.82	47.48	-8.66	43.61	23.30	2.44	25.01	5.52
		Spurious	1890.00	35.32	47.48	-12.16	39.95	24.00	2.76	25.87	5.52
Side	Horizontal	Spurious	630.00	40.36	47.48	-7.12	53.28	18.51	1.55	27.46	5.52
		Spurious	945.00	41.03	47.48	-6.45	47.64	20.99	2.06	24.14	5.52
		Spurious	1260.00	43.76	47.48	-3.72	46.41	24.37	2.11	23.61	5.52
		Spurious	1575.00	32.75	47.48	-14.73	37.54	23.30	2.44	25.01	5.52
		Spurious	1890.00	34.14	47.48	-13.34	38.77	24.00	2.76	25.87	5.52
	Vertical	Spurious	630.00	37.84	47.48	-9.64	50.76	18.51	1.55	27.46	5.52
		Spurious	945.00	40.43	47.48	-7.05	47.04	20.99	2.06	24.14	5.52
		Spurious	1260.00	42.07	47.48	-5.41	44.72	24.37	2.11	23.61	5.52
		Spurious	1575.00	36.84	47.48	-10.64	41.63	23.30	2.44	25.01	5.52
		Spurious	1890.00	37.13	47.48	-10.35	41.76	24.00	2.76	25.87	5.52
Stand	Horizontal	Spurious	630.00	41.10	47.48	-6.38	54.02	18.51	1.55	27.46	5.52
		Spurious	945.00	41.03	47.48	-6.45	47.64	20.99	2.06	24.14	5.52
		Spurious	1260.00	40.34	47.48	-7.14	42.99	24.37	2.11	23.61	5.52
		Spurious	1575.00	39.85	47.48	-7.63	44.64	23.30	2.44	25.01	5.52
		Spurious	1890.00	39.54	47.48	-7.94	44.17	24.00	2.76	25.87	5.52
	Vertical	Spurious	630.00	39.54	47.48	-7.94	52.46	18.51	1.55	27.46	5.52
		Spurious	945.00	40.51	47.48	-6.97	47.12	20.99	2.06	24.14	5.52
		Spurious	1260.00	42.83	47.48	-4.65	45.48	24.37	2.11	23.61	5.52
		Spurious	1575.00	38.10	47.48	-9.38	42.89	23.30	2.44	25.01	5.52
		Spurious	1890.00	37.43	47.48	-10.05	42.06	24.00	2.76	25.87	5.52

Note: The field strength at the frequency above 1890MHz is as small as the background noise.

Peak value of the measured emissions:

Direction	Polarization	Frequency Type	Frequency (MHz)	Read Level dB(µV)	Antenna factor (dB)	Cable factor (dB)	Pre-Amp (dB)	Field Strength dB(µV/m)	Limit dB(µV/m)	Over Limit dB(µV/m)
Lie	Horizontal	Fundamental	315.00	73.36	13.00	1.33	20.06	67.63	87.48	-19.85
	Vertical	Fundamental	315.00	66.87	13.00	1.33	20.06	61.14	87.48	-26.34
Side	Horizontal	Fundamental	315.00	67.01	13.00	1.33	20.06	61.28	87.48	-26.20
	Vertical	Fundamental	315.00	66.10	13.00	1.33	20.06	60.37	87.48	-27.11
Stand	Horizontal	Fundamental	315.00	70.01	13.00	1.33	20.06	64.28	87.48	-23.20
	Vertical	Fundamental	315.00	69.66	13.00	1.33	20.06	63.93	87.48	-23.55

Direction	Polarization	Frequency Type	Frequency (MHz)	Read Level dB(µV)	Antenna factor (dB)	Cable factor (dB)	Pre-Amp (dB)	Field Strength dB(µV/m)	Limit dB(µV/m)	Over Limit dB(µV/m)
Lie	Horizontal	Spurious	630.00	56.77	18.51	1.55	27.46	49.37	67.48	-18.11
		Spurious	945.00	45.26	20.99	2.06	24.14	44.17	67.48	-23.31
		Spurious	1260.00	45.08	24.37	2.11	23.61	47.95	67.48	-19.53
		Spurious	1575.00	45.89	23.30	2.44	25.01	46.62	67.48	-20.86
		Spurious	1890.00	40.52	24.00	2.76	25.87	41.41	67.48	-26.07
	Vertical	Spurious	630.00	51.05	18.51	1.55	27.46	43.65	67.48	-23.83
		Spurious	945.00	39.15	20.99	2.06	24.14	38.06	67.48	-29.42
		Spurious	1260.00	45.40	24.37	2.11	23.61	48.27	67.48	-19.21
		Spurious	1575.00	43.61	23.30	2.44	25.01	44.34	67.48	-23.14
		Spurious	1890.00	39.95	24.00	2.76	25.87	40.84	67.48	-26.64
Side	Horizontal	Spurious	630.00	53.28	18.51	1.55	27.46	45.88	67.48	-21.60
		Spurious	945.00	47.64	20.99	2.06	24.14	46.55	67.48	-20.93
		Spurious	1260.00	46.41	24.37	2.11	23.61	49.28	67.48	-18.20
		Spurious	1575.00	37.54	23.30	2.44	25.01	38.27	67.48	-29.21
		Spurious	1890.00	38.77	24.00	2.76	25.87	39.66	67.48	-27.82
	Vertical	Spurious	630.00	50.76	18.51	1.55	27.46	43.36	67.48	-24.12
		Spurious	945.00	47.04	20.99	2.06	24.14	45.95	67.48	-21.53
		Spurious	1260.00	44.72	24.37	2.11	23.61	47.59	67.48	-19.89
		Spurious	1575.00	41.63	23.30	2.44	25.01	42.36	67.48	-25.12
		Spurious	1890.00	41.76	24.00	2.76	25.87	42.65	67.48	-24.83
Stand	Horizontal	Spurious	630.00	54.02	18.51	1.55	27.46	46.62	67.48	-20.86
		Spurious	945.00	47.64	20.99	2.06	24.14	46.55	67.48	-20.93
		Spurious	1260.00	42.99	24.37	2.11	23.61	45.86	67.48	-21.62
		Spurious	1575.00	44.64	23.30	2.44	25.01	45.37	67.48	-22.11
		Spurious	1890.00	44.17	24.00	2.76	25.87	45.06	67.48	-22.42
	Vertical	Spurious	630.00	52.46	18.51	1.55	27.46	45.06	67.48	-22.42
		Spurious	945.00	47.12	20.99	2.06	24.14	46.03	67.48	-21.45
		Spurious	1260.00	45.48	24.37	2.11	23.61	48.35	67.48	-19.13
		Spurious	1575.00	42.89	23.30	2.44	25.01	43.62	67.48	-23.86
		Spurious	1890.00	42.06	24.00	2.76	25.87	42.95	67.48	-24.53

Note: The field strength at the frequency above 1890MHz is as small as the background noise.

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

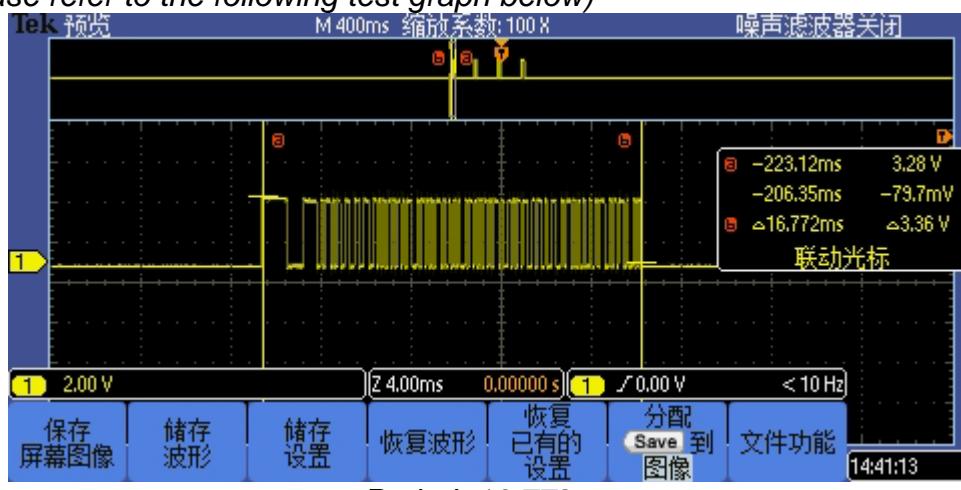
Duty Cycle Correction Factor is calculated by averaging the sum of the pulse train. Correction factor is measured as follows:

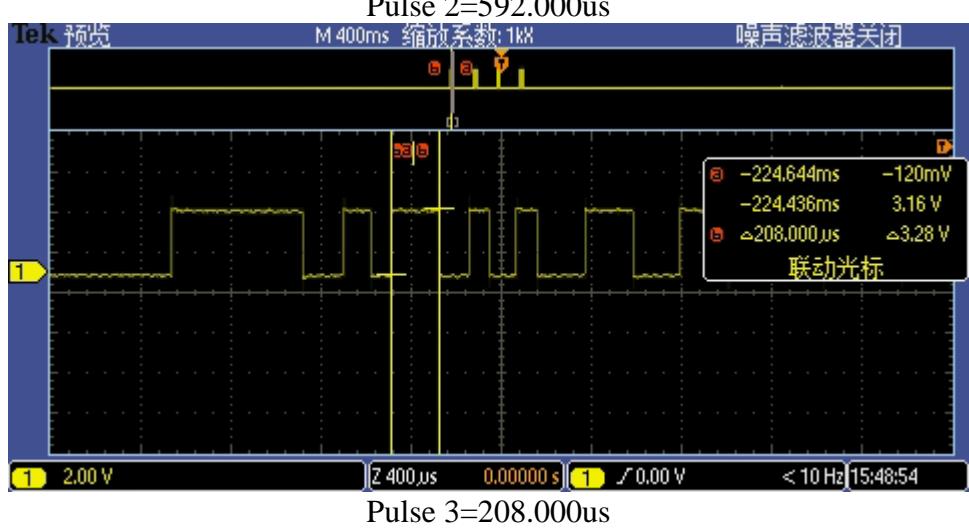
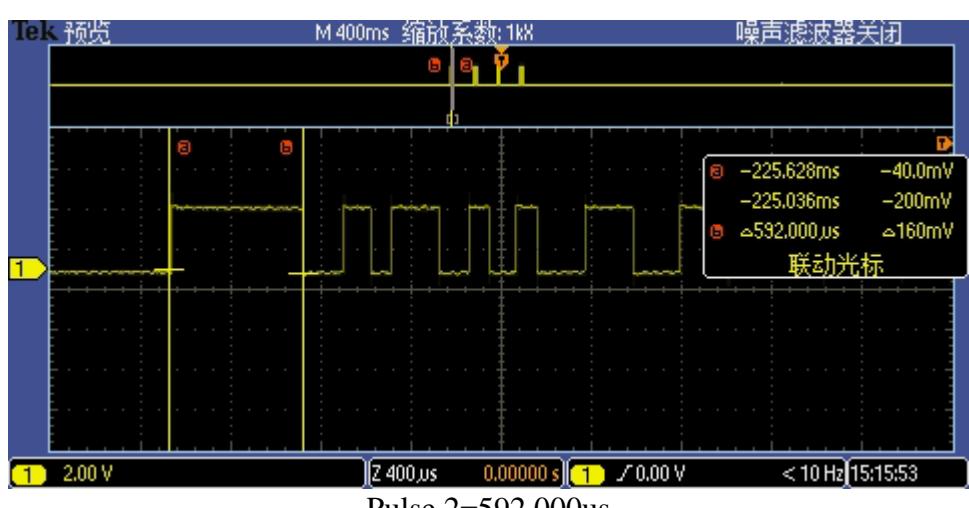
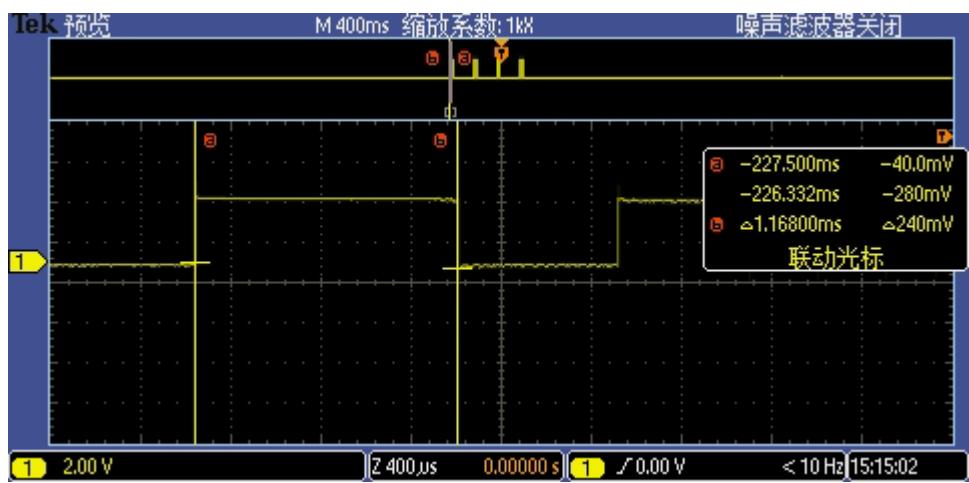
Keep the EUT in continuous transmission mode (modulated), and set the spectrum to the fundamental frequency and set the span width to 0 Hz. Then connect a storage oscilloscope to the video output of the spectrum that is used to detect the pulse train. Adjust the oscilloscope settings to observe the pulse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

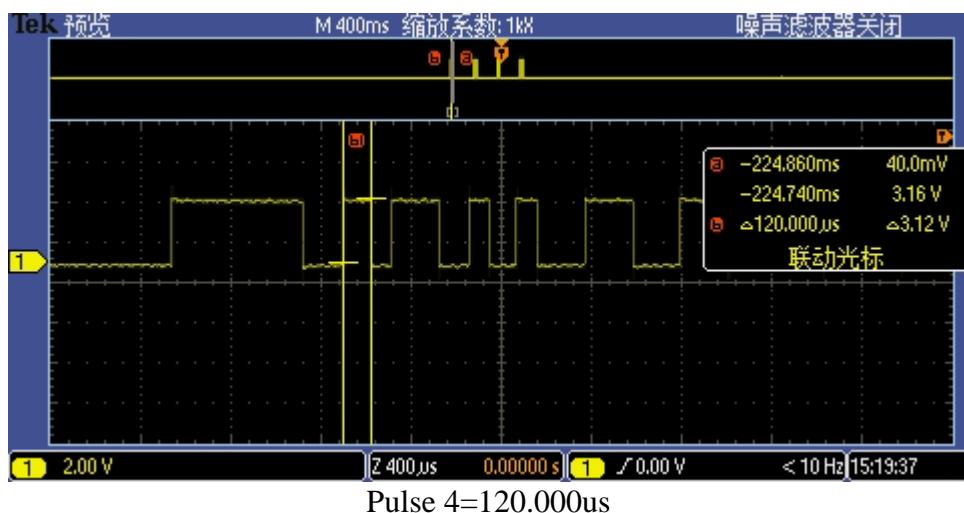
Duty Cycle Correction Factor at its maximum value

$$\begin{aligned}\text{Duty Cycle} &= 20\log(1^*\text{Pulse 1} + 1^*\text{Pulse 2} + 31^*\text{Pulse 3})/\text{Period} \\&= 20\log(1^*1.16800 + 1^*0.592 + 21^*0.208 + 23^*0.120)/16.772 \\&= 20\log 0.5299 = 5.52 \text{ dB}\end{aligned}$$

(please refer to the following test graph below)







Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due Date
Broadband Antenna	Sunol	JB5	A110503	11/29/08	11/28/09
Horn Antenna	R&S	HF906	4044.4507.0 2	05/13/09	05/12/10
EMI Receiver	HP	85462A	3650A00363	11/29/08	11/28/09
Oscilloscope	Tektronix	DPO	2024	11/29/08	11/28/09
Note: All testing were performed using internationally recognized standards. All test instruments were calibrated.					

SIGNED BY:

Cloud Feng

ENGINEER

REVIEWED BY:

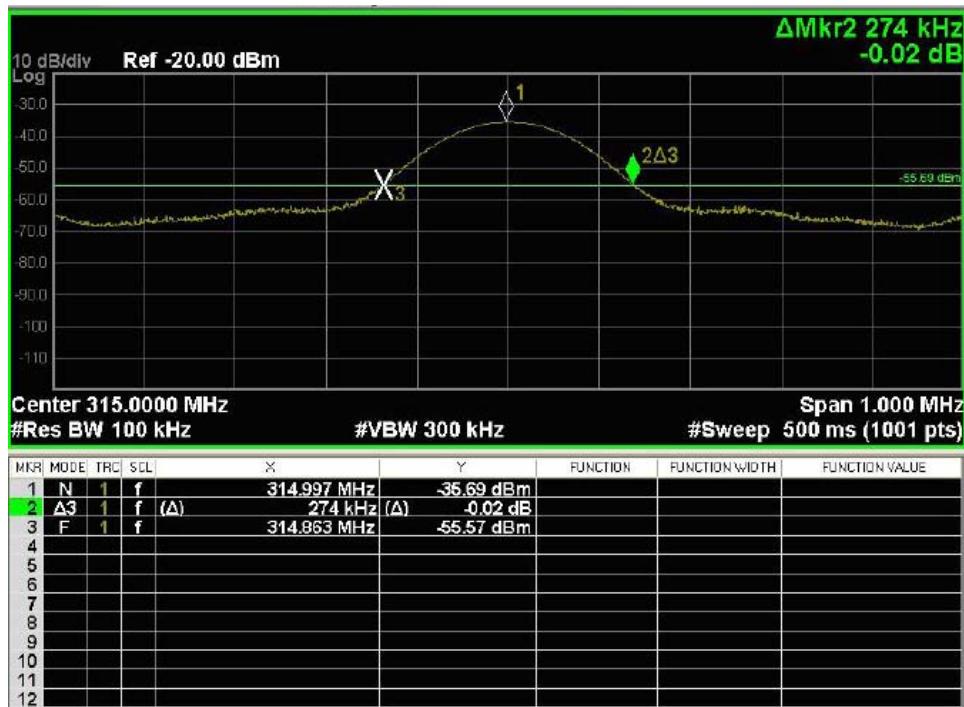
Hang Zhou

SENIOR ENGINEER

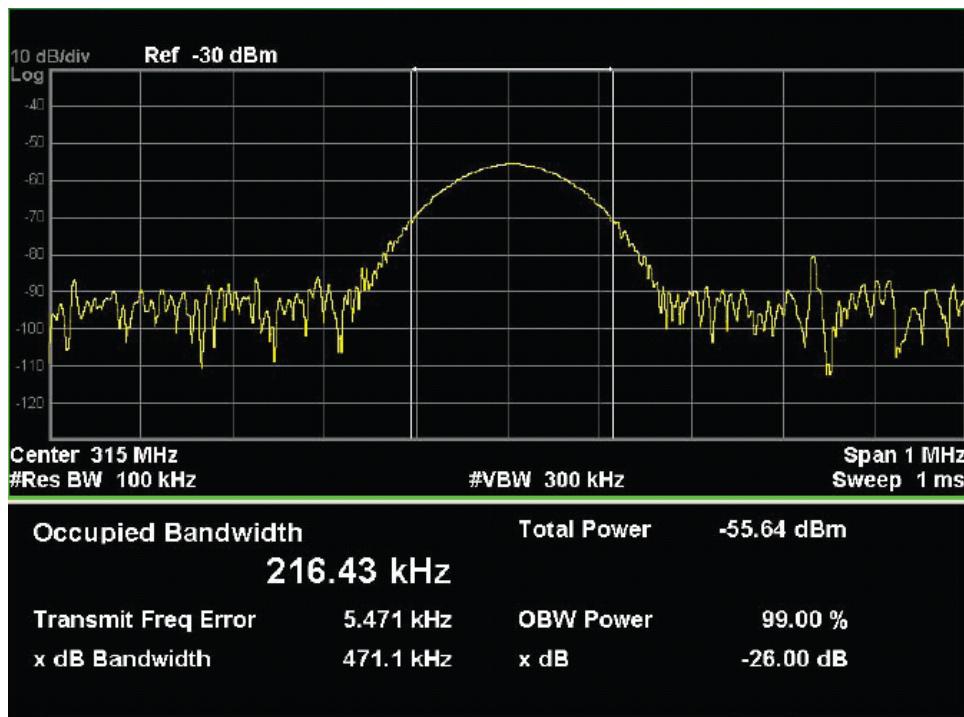
ATTACHMENT 5 – BANDWIDTH TEST

CLIENT:	Shanghai Source Electronic Technology Ltd.	TEST STANDARD:	FCC Part 15.231 (C) RSS 210 (2007)
MODEL TESTED:	S1	PRODUCT:	TIRE PRESSURE SENSOR
SERIAL NO.:	Engineering Sample	EUT DESIGNATION:	RF Equipment
TEMPERATURE:	21°C	HUMIDITY:	53%RH
ATM PRESSURE:	101.6 kPa	GROUNDING:	No Grounding
TESTED BY:	Cloud Feng	DATE OF TEST:	2009, July 30
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 ECMG Worldwide Certification Solution, Inc.(China) test personnel.		
M. UNCERTAINTY:	Freq. $\pm 2 \times 10^{-7} \times$ Center Freq., Amp ± 2.6 dB		

Test Data (Fundamental Frequency)



20dB bandwidth



99% Bandwidth Plot

FCC part 15.231 (c)

<i>20 dB Bandwidth (MHz)</i>	<i>Bandwidth Limit (MHz) (F_{center} x 0.25%)</i>	<i>Conclusion</i>
0.2740	0.7875	<i>Compliance</i>

IC: RSS210 A1.1.3

<i>99% Bandwidth (MHz)</i>	<i>Bandwidth Limit (MHz) (F_{center} x 0.25%)</i>	<i>Conclusion</i>
0.2164	0.7875	<i>Compliance</i>

Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4408B	MY45102743	08/12/09	08/11/10
Note: All testing were performed using internationally recognized standards. All test instruments were calibrated.					

SIGNED BY:

Cloud Feng

ENGINEER

REVIEWED BY:

Hang Zhou

SENIOR ENGINEER