FCC PART 15C

TEST REPORT

For

Shenzhen Autel Intelligent Tech. Co., Ltd.

RM106-107, 109, 114, SZICC Bldg., Chaguang Road Southside, Xili Town,
Nanshan, Shenzhen, China

FCC ID: WQ83017315433

Report Type:	**Product Type:**
Original Report	TPMS Sensor

Test Engineer:	Rocky Kang
Report Number:	RSZ131213002-00
Report Date:	2014-01-02
Reviewed By:	Jimmy Xiao RF Engineer
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Shenzhen Autel Intelligent Tech. Co., Ltd.*'s product, model number: *MaxiTPMS-PAD (FCC ID: WQ83017315433)* or the "EUT" in this report was a TPMS Sensor, *named as MaxiTPMS-PAD by applicant* , which was measured approximately: 10.3 cm (L) x 10.0 cm (W) x 2.7 cm (H), rated input voltage: DC 5V from USB port.

** All measurement and test data in this report was gathered from production sample serial number: 1312066 (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2013-12-13.*

Objective

This report is prepared on behalf of *Shenzhen Autel Intelligent Tech. Co., Ltd.* in accordance with Part 2-Subpart J, and Part 15-Subparts A, B and C of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, section 15.203, 15.205, 15.207 and 15.209 rules.

Related Submittal(s)/Grant(s)

No related submittal(s)

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2009, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China.

Test site at Bay Area Compliance Laboratories Corp. (Shenzhen) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on December 06, 2010. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2009.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 382179. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

SYSTEM TEST CONFIGURATION

Justification

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

EUT Exercise Software

MaxiTPMS-Pad provided by manufacturer.

Special Accessories

The special accessories were provided by BACL.

Equipment Modifications

No modification was made to the EUT tested.

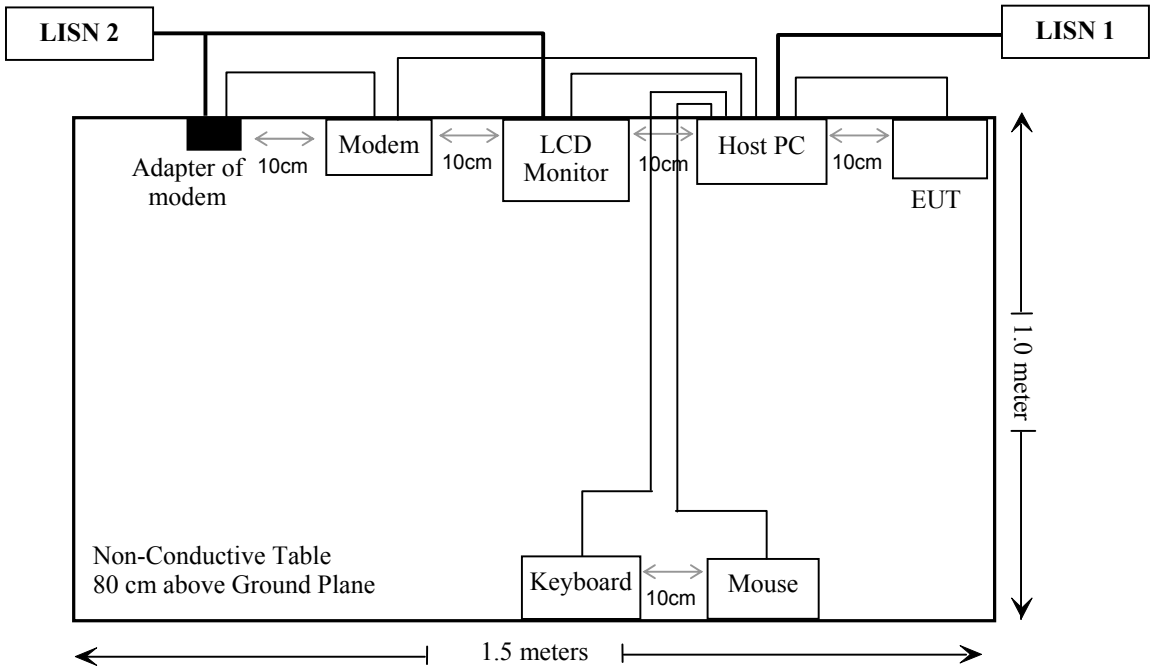
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
IBM	PC	166	L3AG6TG
DELL	LCD Monitor	ST2420Lb	CN-OXOK27-74261-2AF-090U
DELL	Keyboard	L100	CNORH656658907BL05DC
DELL	Mouse	MOC5UO	G1900NKD
SAST	Modem	AEM-2100	0293

External I/O Cable

Cable Description	Length (m)	From/Port	To
Shielding Detachable USB Cable	1.5	Host PC	Mouse
Shielding Detachable Serial Cable	1.2	Host PC	Modem
Shielding Detachable K/B Cable	1.5	Host PC	Keyboard
Shielding Detachable VGA Cable	1.2	Host PC	LCD Monitor
Unshielding Detachable USB Cable	1.0	EUT	Host PC

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliance
§15.207(a)	Conducted Emissions	Compliance
15.205, §15.209	Radiated Emissions	Compliance

FCC§15.203 - ANTENNA REQUIREMENT

Applicable Standard

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used.

Antenna Connector Construction

The EUT has a PCB antenna arrangement, which was permanently attached; fulfill the requirement of this section. Please refer to EUT photos.

Result: Compliant

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC §15.207

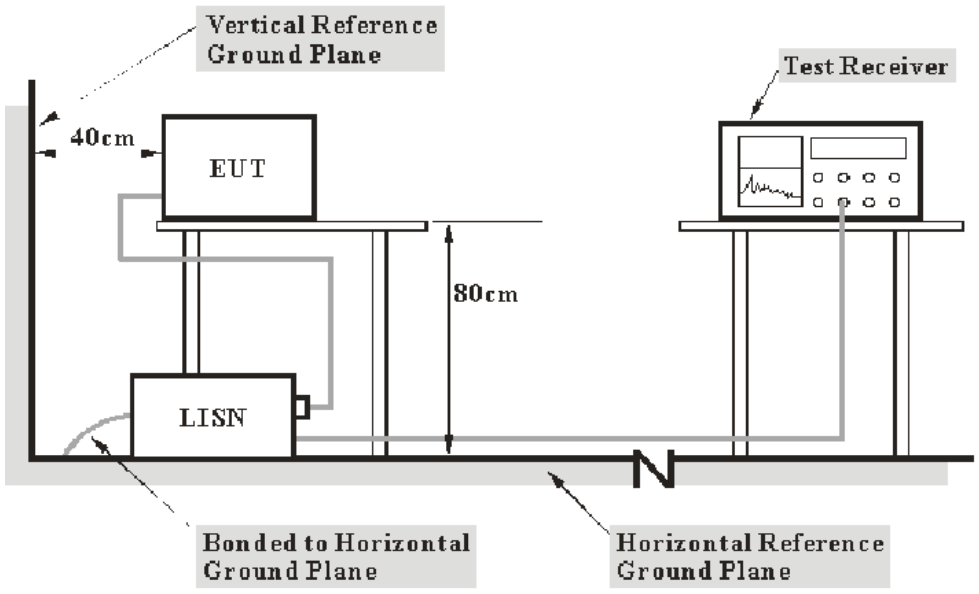
Measurement Uncertainty

Input quantities to be considered for conducted disturbance measurements maybe receiver reading, attenuation of the connection between AMN/ISN and receiver, AMN/ISN voltage division factor, AMN/ISN VDF frequency interpolation and receiver related input quantities, etc.

Based on CISPR 16-4-2:2011, the expended combined standard uncertainty of conducted disturbance test at Bay Area Compliance Laboratories Corp. (Shenzhen) is shown as below. And the uncertainty will not be taken into consideration for the test data recorded in the report

Port	Measurement uncertainty
AC Mains	3.26 dB (k=2, 95% level of confidence)
CAT 3	3.70 dB (k=2, 95% level of confidence)
CAT 5	3.86 dB (k=2, 95% level of confidence)
CAT 6	4.64 dB (k=2, 95% level of confidence)

EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.4-2009 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The host PC was connected to a 120 VAC/60 Hz power source.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

During the conducted emission test, the host PC was connected to the outlet of the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS30	100176	2013-06-17	2014-06-17
Rohde & Schwarz	LISN	ENV216	3560.6650.12-101613-Yb	2013-05-07	2014-05-07
Rohde & Schwarz	Transient Limiter	ESH3Z2	DE25985	2013-10-15	2014-10-15
Rohde & Schwarz	CE Test software	EMC 32	V8.53	-	-

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

Test Results Summary

According to the recorded data in following table, with the worst margin reading of:

11.2 dB at **13.166000 MHz** in the **Neutral** conducted mode

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level is in compliance with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cispr}$$

in BACL, $U_{(Lm)}$ is less than U_{cispr}, if L_m is less than L_{lim}, it implies that the EUT complies with the limit.

Test Data

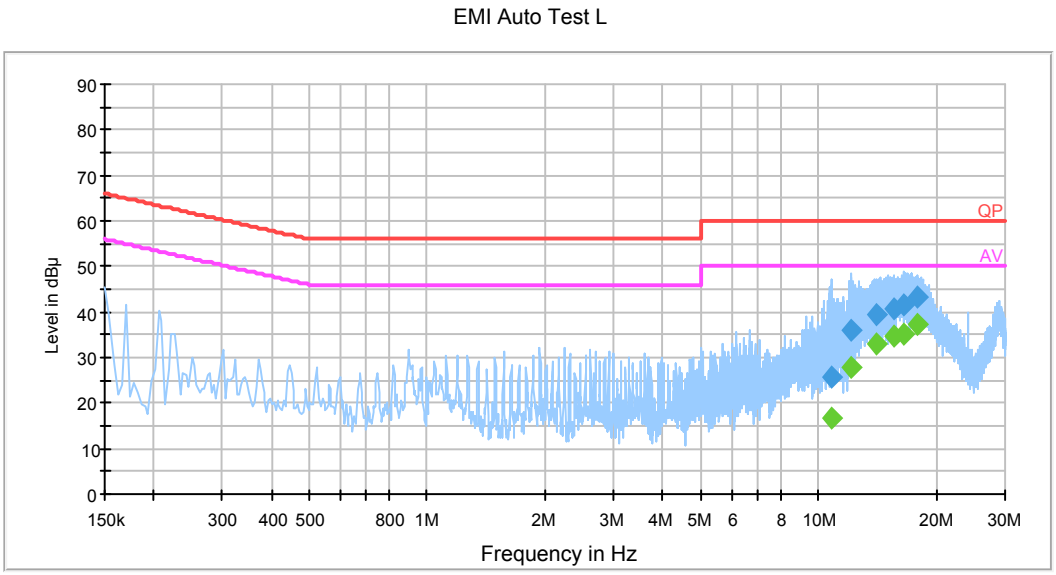
Environmental Conditions

Temperature:	20 ℃
Relative Humidity:	50 %
ATM Pressure:	100.1 kPa

The testing was performed by Rocky Kang on 2013-12-30.

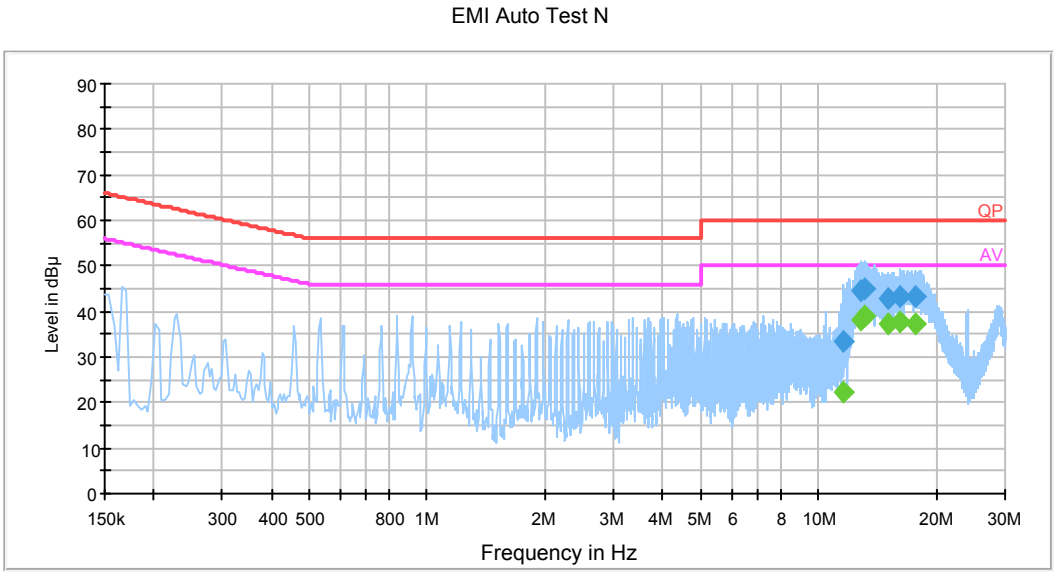
Test mode: Transmitting

AC 120V/60 Hz, Line



Frequency (MHz)	Corrected Amplitude (dBµV)	Corrected Factor (dB)	Limit (dBµV)	Margin (dB)	Remark (PK/QP/Ave)
10.822000	25.6	19.7	60.0	34.4	QP
10.822000	16.6	19.7	50.0	33.4	Ave.
12.122000	35.9	19.7	60.0	24.1	QP
12.122000	28.0	19.7	50.0	22.0	Ave.
14.094000	39.2	19.8	60.0	20.8	QP
14.094000	32.8	19.8	50.0	17.2	Ave.
15.614000	40.6	19.8	60.0	19.4	QP
15.614000	34.6	19.8	50.0	15.4	Ave.
16.578000	41.4	19.8	60.0	18.6	QP
16.578000	35.3	19.8	50.0	14.7	Ave.
17.818000	43.4	19.9	60.0	16.6	QP
17.818000	37.3	19.9	50.0	12.7	Ave.

AC 120V/60 Hz, Neutral



Frequency (MHz)	Corrected Amplitude (dBµV)	Corrected Factor (dB)	Limit (dBµV)	Margin (dB)	Remark (PK/QP/Ave)
11.522000	33.3	19.8	60.0	26.7	QP
11.522000	22.5	19.8	50.0	27.5	Ave.
12.826000	44.4	19.8	60.0	15.6	QP
12.826000	38.0	19.8	50.0	12.0	Ave.
13.166000	45.1	19.8	60.0	14.9	QP
13.166000	38.8	19.8	50.0	11.2	Ave.
15.090000	42.9	19.9	60.0	17.1	QP
15.090000	37.4	19.9	50.0	12.6	Ave.
16.186000	43.3	19.9	60.0	16.7	QP
16.186000	37.9	19.9	50.0	12.1	Ave.
17.662000	43.2	20.0	60.0	16.8	QP
17.662000	37.5	20.0	50.0	12.5	Ave.

Note:
1) Correction Factor =LISN VDF (Voltage Division Factor) + Cable Loss + Transient Limiter Attenuation
The corrected factor has been input into the transducer of the test software.
2) Corrected Amplitude = Reading + Correction Factor + Transient Limiter
3) Margin = Limit – Corrected Amplitude

FCC§15.205 & §15.209 - FIELD STRENGTH AND RADIATED EMISSIONS

Applicable Standard

FCC§15.205, §15.209

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on CISPR 16-4-2:2011, the expended combined standard uncertainty of radiation emissions at Bay Area Compliance Laboratories Corp. (Shenzhen) is 5.91 dB for 30MHz-1GHz.

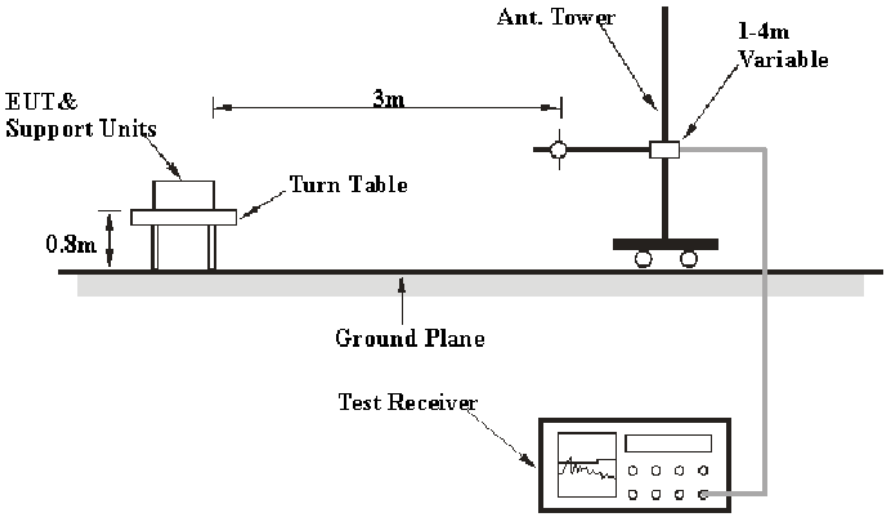
Test Equipment Setup

The spectrum analyzer or receiver is set as:

Frequency Range	RBW	Video B/W	IF B/W	Detector
9 kHz – 30 MHz	10 kHz	30 kHz	9 kHz	QP
30 MHz – 1000 MHz	100 kHz	300 kHz	120kHz	QP

Note: The frequency bands 9-90 kHz and 110-490 kHz, the testing are use an average detector.

EUT Setup



The radiated emission and out of band emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.4-2009 The specification used was the FCC 15.209 and 15.205 limits.

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

The EUT is set 3 meter away from the testing antenna, which is varied from 1-4 mete, and the EUT is placed on a turntable, which is 0.8 meter above ground plane, the table shall be rotated for 360 degrees to find out the highest emission. The receiving antenna should be changed the polarization both of horizontal and vertical.

Corrected Amplitude & Margin Calculation

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

Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin = Limit – Corrected Amplitude

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	8447E	1937A01046	2013-09-30	2014-09-30
Rohde & Schwarz	EMI Test Receiver	ESCI	101122	2013-09-17	2014-09-17
Sunol Sciences	Broadband Antenna	JB1	A040904-2	2011-11-28	2014-11-27
ETS	Passive Loop Antenna	6512	00029604	2011-11-30	2014-11-29
Rohde & Schwarz	CE Test software	EMC 32	V9.10	-	-

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	20 ℃
Relative Humidity:	50 %
ATM Pressure:	100.1 kPa

The testing was performed by Rocky Kang on 2013-12-31.

EUT operation mode: Transmitting

1) Field Strength of Radiated Emissions, up to 30MHz

Frequency (kHz)	Reading Amplitude (dBuV)	Detector (PK/QP/Ave.)	Direction (Degree)	Height (m)	Antenna Factor (dB/m)	Cable Loss (dB)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
125.0	36.85	Ave.	180	1.5	59.8	0.1	96.75	105.67	8.92
369.6	28.51	Ave.	180	1.5	56.8	0.1	85.41	96.25	10.84

2) Spurious Emission, up to 1000MHz:

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna height (m)	Antenna Polarity	Turntable position (degree)	Correction Factor (dB)	Limit (dBµV/m)	Margin (dB)
40.67	34.54	1.3	H	196	-13.8	40	5.46
67.79	32.73	1.2	H	178	-19.4	40	7.27
216.97	34.24	1.0	V	163	-14.3	46	11.76
665.96	33.32	1.1	H	89	-7.6	46	12.68

******* END OF REPORT *******