



## **FCC REPORT**

**Applicant:** Shenzhen Autel Intelligent Tech. Co., Ltd.

**Address of Applicant:** Rm. 2205, Overseas Chinese Scholars Venture Bldg. Hi-tech Industrial Park Shenzhen China

**Equipment Under Test (EUT)**

Product Name: TPMS diagnostic and service tool

Model No.: MaxiTPMS TS501, MaxiTPMS TS601

**FCC ID:** WQ83017501601

**Applicable standards:** FCC CFR Title 47 Part 15 Subpart C:2011

**Date of sample receipt:** 10 Dec., 2012

**Date of Test:** 10-18 Dec., 2012

**Date of report issued:** 19 Dec., 2012

**Test Result :** PASS \*

\* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

Robinson Lo  
Laboratory Manager

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the GTS product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

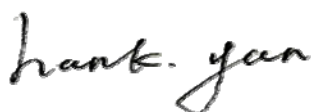
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## 2 Version

Version No.	Date	Description
00	19 Dec., 2012	Original

Prepared By:



Date:

19 Dec., 2012

Project Engineer

Check By:



Date:

19 Dec., 2012

Reviewer

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## 4 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	15.203	Pass
AC Power Line Conducted Emission	15.207	Pass
Radiated Emission	15.209	Pass
20dB Occupied Bandwidth	15.215	Pass

*Pass: The EUT complies with the essential requirements in the standard.*

*N/A: not applicable.*

## 5 General Information

### 5.1 Client Information

Applicant:	Shenzhen Autel Intelligent Tech. Co., Ltd.
Address of Applicant:	Rm. 2205, Overseas Chinese Scholars Venture Bldg. Hi-tech Industrial Park Shenzhen China
Manufacturer/ Factory:	Shenzhen Autel Intelligent Tech. Co., Ltd.
Address of Manufacturer/ Factory:	Rm. 2205, Overseas Chinese Scholars Venture Bldg. Hi-tech Industrial Park Shenzhen China

### 5.2 General Description of EUT

Product Name:	TPMS diagnostic and service tool
Model No.:	MaxiTPMS TS501, MaxiTPMS TS601
Test model no.:	MaxiTPMS TS501
Remark:	<i>MaxiTPMS TS601 and MaxiTPMS TS501 are identical in the same PCB layout, interior structure and electrical circuits. The only differences are type of the keypad and model number for commercial purpose.</i>
Operation Frequency:	125kHz
Modulation technology:	FSK
Antenna Type:	Integral
Antenna gain:	0dBi
Power supply:	Model No.:AD-050200-EU Input: AC 100-240V, 50/60Hz, 0.4A Output: DC 5.0V, 2.0A Or DC 3.7V by Li-ion Battery

## 5.3 Test mode

Transmitting mode	Keep the EUT in continuously transmitting mode.
<i>Remark: During the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.</i>	

## 5.4 Description of Support Units

N/A
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## 5.5 Test Facility

<p>The test facility is recognized, certified, or accredited by the following organizations:</p> <ul style="list-style-type: none"> <li>• <b>CNAS —Registration No.: CNAS L5775</b> CNAS has accredited Global United Technology Services Co., Ltd. To ISO/IEC 17025 General Requirements for the competence of testing and calibration laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.</li> <li>• <b>FCC —Registration No.: 600491</b> Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Registration 600491, July 20, 2010.</li> <li>• <b>Industry Canada (IC)</b> The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. Has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A-1.</li> </ul>
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## 5.6 Test Location

All tests were performed at:
<p>Global United Technology Services Co., Ltd. Address: 2nd Floor, Block No.2, Laodong Industrial Zone, Xixiang Road Baoan District, Shenzhen, China Tel: 0755-27798480 Fax: 0755-27798960</p>

## 5.7 Other Information Requested by the Customer

None.
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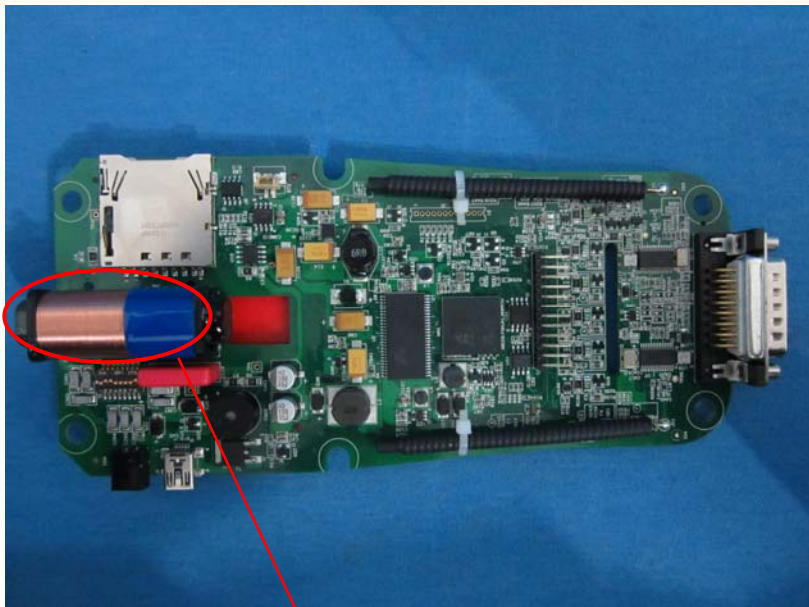
## 6 Test Instruments list

Radiated Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	Mar. 30 2011	Mar. 29 2013
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	Spectrum Analyzer	Agilent	E4440A	GTS533	Dec. 06 2012	Dec. 05 2013
4	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	Jul. 03 2012	Jul. 02 2013
5	Loop Antenna	ZHINAN	ZN30900A	GTS534	Nov. 08 2012	Nov. 07 2013
6	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	Feb. 25 2012	Feb. 24 2013
7	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	9120D-829	GTS208	June 29 2012	June 28 2013
8	Horn Antenna	ETS-LINDGREN	3160	GTS217	Mar. 30 2011	Mar. 29 2013
9	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
10	Coaxial Cable	GTS	N/A	GTS213	Mar. 31 2012	Mar. 30 2013
11	Coaxial Cable	GTS	N/A	GTS211	Mar. 31 2012	Mar. 30 2013
12	Coaxial cable	GTS	N/A	GTS210	Mar. 31 2012	Mar. 30 2013
13	Coaxial Cable	GTS	N/A	GTS212	Mar. 31 2012	Mar. 30 2013
14	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	Jul. 03 2012	Jul. 02 2013
15	Amplifier(2GHz-20GHz)	HP	8349B	GTS206	Jul. 03 2012	Jul. 02 2013
16	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June 29 2012	June 28 2013
17	Band filter	Amindeon	82346	GTS219	Mar. 31 2012	Mar. 30 2013

Conducted Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Shielding Room	ZhongYu Electron	7.0(L)x3.0(W)x3.0(H)	GTS264	Sep. 08 2011	Sep. 07 2013
2	EMI Test Receiver	Rohde & Schwarz	ESCS30	GTS223	Jul. 03 2012	Jul. 02 2013
3	10dB Pulse Limita	Rohde & Schwarz	N/A	GTS224	Jul. 03 2012	Jul. 02 2013
4	Coaxial Switch	ANRITSU CORP	MP59B	GTS225	Jul. 03 2012	Jul. 02 2013
5	LISN	SCHWARZBECK MESS-ELEKTRONIK	NSLK 8127	GTS226	Jul. 03 2012	Jul. 02 2013
6	Coaxial Cable	GTS	N/A	GTS227	Jul. 03 2012	Jul. 02 2013
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A

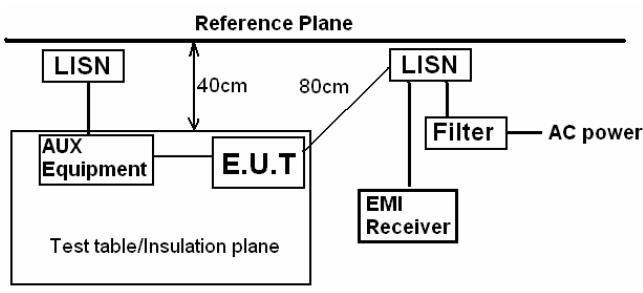
## 7 Test results and Measurement Data

### 7.1 Antenna requirement:

<b>Standard requirement:</b>	FCC Part15 C Section 15.203 /247(c)
<b>15.203 requirement:</b> An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, 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.	
<b>E.U.T Antenna:</b> <i>The antenna is Integral antenna, the best case gain of the antenna is 0dBi</i>	
 <p style="color: red; text-align: center;"><b>RF Antenna</b></p>	

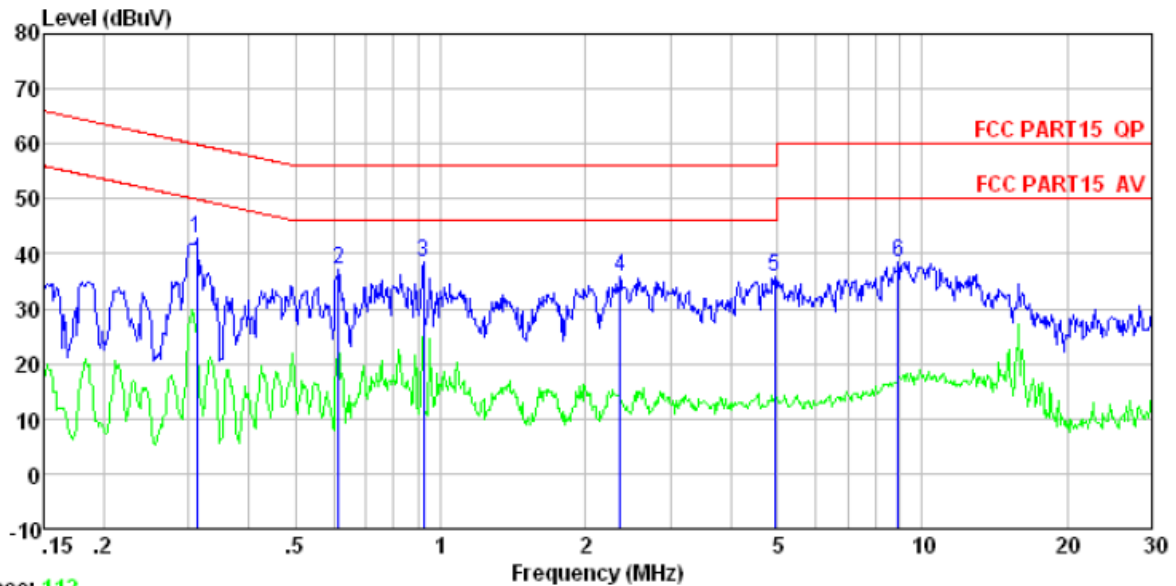


## 7.2 Conducted Emissions

Test Requirement:	FCC Part15 C Section 15.207		
Test Method:	ANSI C63.4:2003		
Test Frequency Range:	150KHz to 30MHz		
Class / Severity:	Class B		
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto		
Limit:	Frequency range (MHz)	Limit (dBuV)	
		Quasi-peak	Average
	0.15-0.5	66 to 56*	56 to 46*
	0.5-5	56	46
	5-30	60	50
* Decreases with the logarithm of the frequency.			
Test setup:	 <p>Remark: E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m</p>		
Test procedure:	<ol style="list-style-type: none"> <li>1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment.</li> <li>2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).</li> <li>3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2003 on conducted measurement.</li> </ol>		
Test Instruments:	Refer to section 6.0 for details		
Test mode:	Refer to section 5.3 for details		
Test results:	Pass		

### Measurement data:

Line:

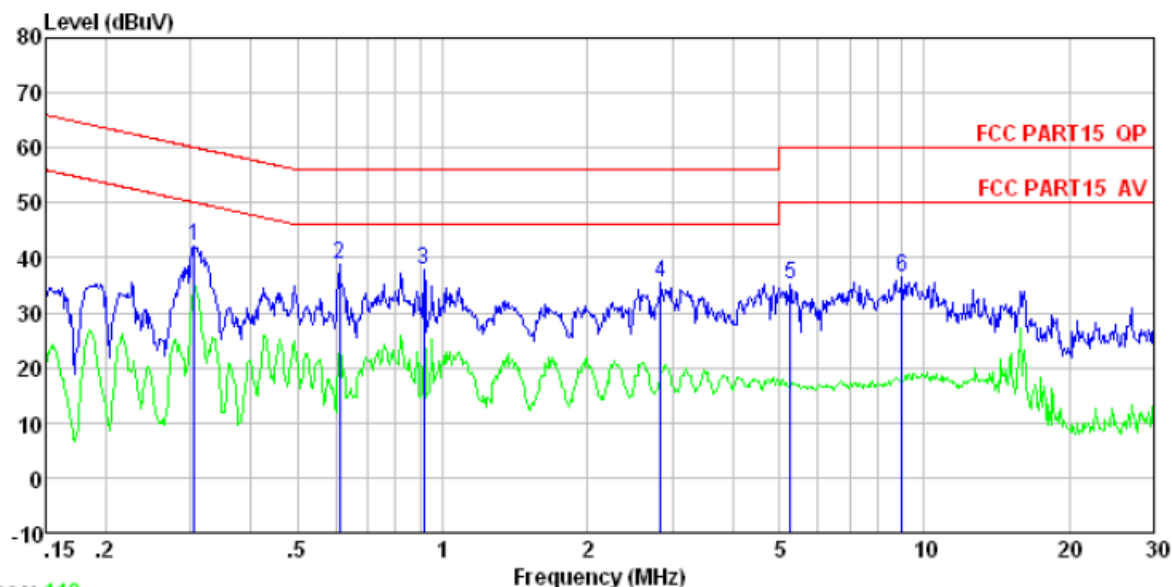


Trace: 112

Condition : FCC PART15 QP LISN-2012 LINE  
 Job No. : 1477RF  
 Test Mode : Transmitting mode  
 Test Engineer: Jim

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.312	42.89	-0.22	0.10	42.77	59.93	-17.16	QP
2	0.614	37.39	-0.20	0.10	37.29	56.00	-18.71	QP
3	0.923	38.53	-0.21	0.10	38.42	56.00	-17.58	QP
4	2.358	36.11	-0.24	0.10	35.97	56.00	-20.03	QP
5	4.952	36.16	-0.30	0.10	35.96	56.00	-20.04	QP
6	8.916	38.85	-0.40	0.19	38.64	60.00	-21.36	QP

## Neutral:



Trace: 110

Condition : FCC PART15 QP LISN-2012 NEUTRAL

Job No. : 1477RF

Test Mode : Transmitting mode

Test Engineer: Jim

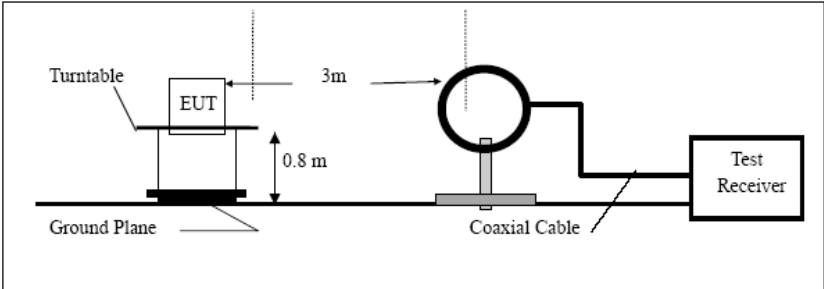
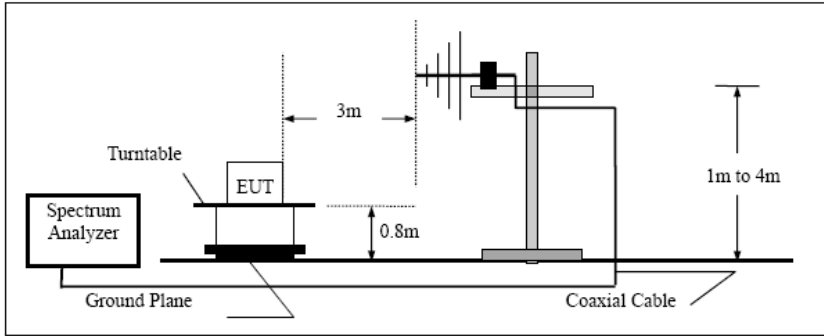
	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.305	41.98	-0.09	0.10	41.99	60.10	-18.11	QP
2	0.611	38.70	-0.08	0.10	38.72	56.00	-17.28	QP
3	0.914	37.84	-0.09	0.10	37.85	56.00	-18.15	QP
4	2.839	35.41	-0.12	0.10	35.39	56.00	-20.61	QP
5	5.277	35.19	-0.16	0.10	35.13	60.00	-24.87	QP
6	9.011	36.59	-0.27	0.19	36.51	60.00	-23.49	QP

## Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level = Receiver Read level + LISN Factor + Cable Loss

## 7.3 Radiated Emissions

Test Requirement:	FCC Part15 C Section 15.209				
Test Method:	ANSI C63.4:2003				
Test Frequency Range:	9kHz to 1GHz				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Remark
	9kHz - 30MHz	AV	10kHz	30kHz	Average Value
	30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
		AV	1MHz	10Hz	Average Value
Limit: (Spurious Emissions)	<b>Limits for frequency below 30MHz</b>				
	Frequency	Limit (uV/m)	Measurement Distance(m)	Remark	
	0.009-0.490	2400/F(kHz)	300	Average Value	
	0.490-1.705	24000/F(kHz)	30	Average Value	
	1.705-30	30	30	Average Value	
	<b>Limits for frequency Above 30MHz</b>				
	Frequency	Limit (dBuV/m @3m)	Remark		
	30MHz-88MHz	40.00	Quasi-peak Value		
	88MHz-216MHz	43.50	Quasi-peak Value		
	216MHz-960MHz	46.00	Quasi-peak Value		
	960MHz-1GHz	54.00	Quasi-peak Value		
	Above 1GHz	54.00	Average Value		
74.00		Peak Value			
Test Procedure:	<div>1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.</div> <div>2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</div> <div>3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</div> <div>4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.</div> <div>5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</div> <div>6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</div> <div>7. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.</div>				

Test setup:	<p>Below 30MHz</p>  <p>30MHz ~ 1000MHz</p> 
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

## Measurement data:

Note: Limit dBuV/m @3m = Limit dBuV/m @300m+ 80

Limit dBuV/m @3m = Limit dBuV/m @30m + 40

### Below 30MHz

Frequency (kHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit @3m (dBuV/m)	Over Limit (dB)	ANT. Polarization
125.00	60.78	21.27	0.18	0.00	82.23	105.67	-23.44	Vertical
250.00	*					99.65		Vertical
375.00	*					96.12		Vertical
125.00	53.24	21.27	0.18	0.00	74.69	105.67	-30.98	Horizontal
250.00	*					99.65		Horizontal
375.00	*					96.12		Horizontal

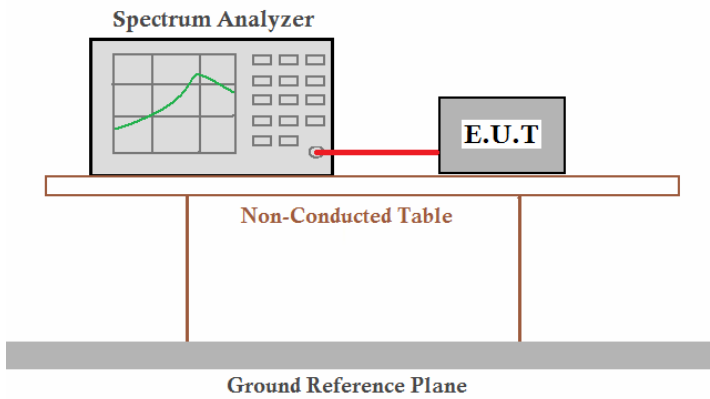
Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.
3. “\*”, means this data is the too weak instrument of signal is unable to test.

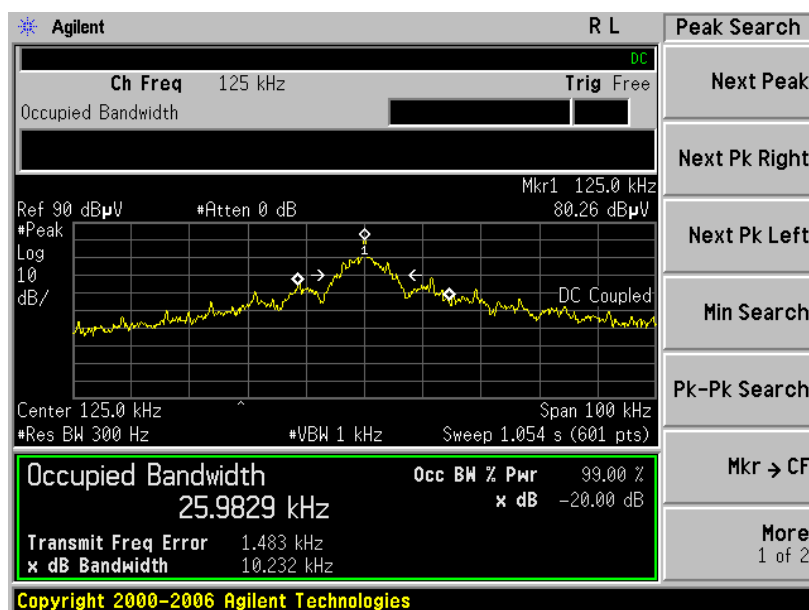
### 30MHz ~ 1000MHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
39.44	42.91	16.58	0.65	32.06	28.08	40.00	-11.92	Vertical
100.93	42.10	16.06	1.20	31.76	27.60	43.50	-15.90	Vertical
156.46	50.56	11.58	1.61	32.00	31.75	43.50	-11.75	Vertical
197.20	51.91	13.57	1.82	32.13	35.17	43.50	-8.33	Vertical
227.69	49.08	14.57	2.01	32.15	33.51	46.00	-12.49	Vertical
912.86	37.62	24.04	4.90	31.19	35.37	46.00	-10.63	Vertical
39.99	38.62	16.58	0.66	32.06	23.80	40.00	-16.20	Horizontal
56.99	39.69	15.99	0.84	31.95	24.57	40.00	-15.43	Horizontal
97.80	43.84	16.10	1.17	31.75	29.36	43.50	-14.14	Horizontal
226.89	52.63	14.57	2.00	32.15	37.05	46.00	-8.95	Horizontal
701.76	40.16	21.81	4.09	31.19	34.87	46.00	-11.13	Horizontal
900.15	37.54	24.09	4.85	31.18	35.30	46.00	-10.70	Horizontal

## 7.4 20dB Occupied Bandwidth

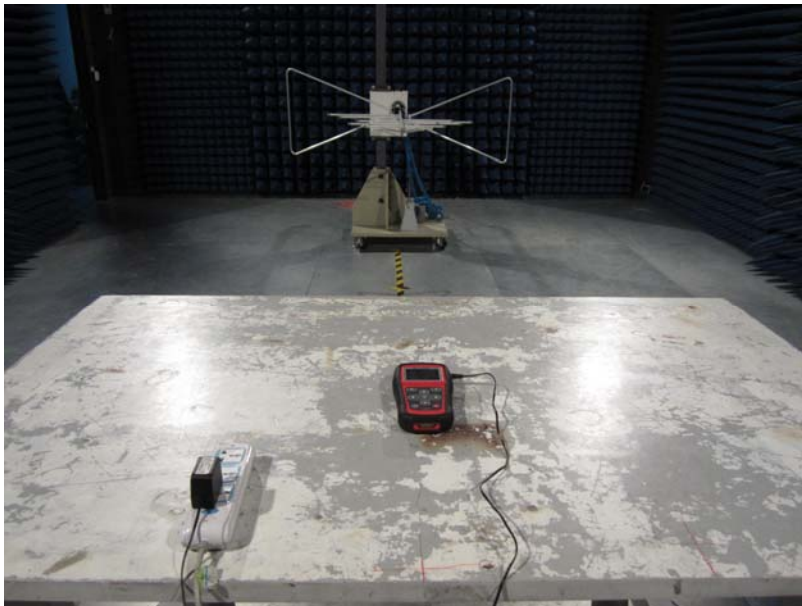
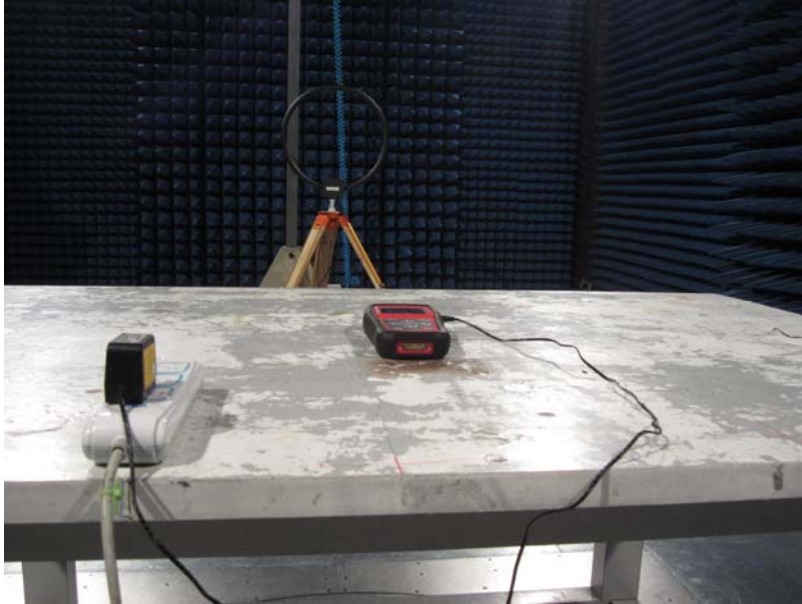
Test Requirement:	FCC Part15 C Section 15.215
Test Method:	ANSI C63.4:2003
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

### Measurement Data



## 8 Test Setup Photo

Radiated Emission





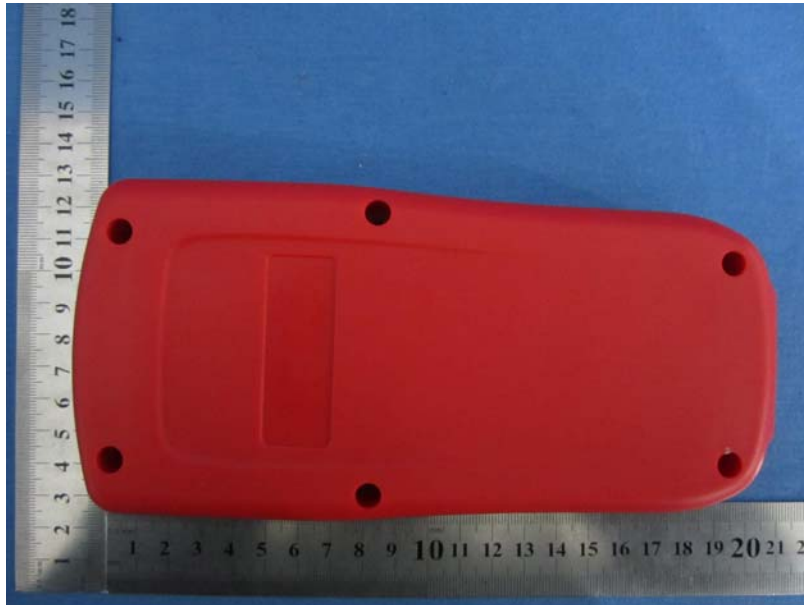
## Conducted Emission



## 9 EUT Constructional Details



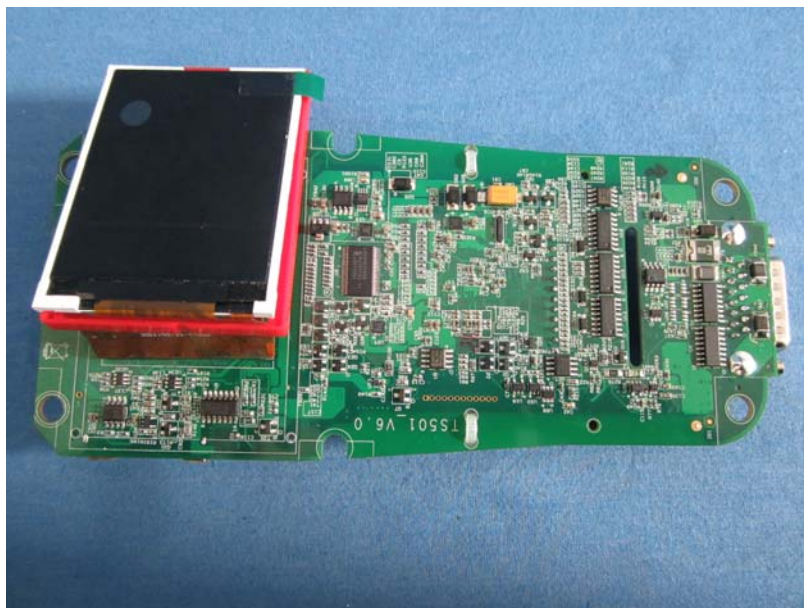
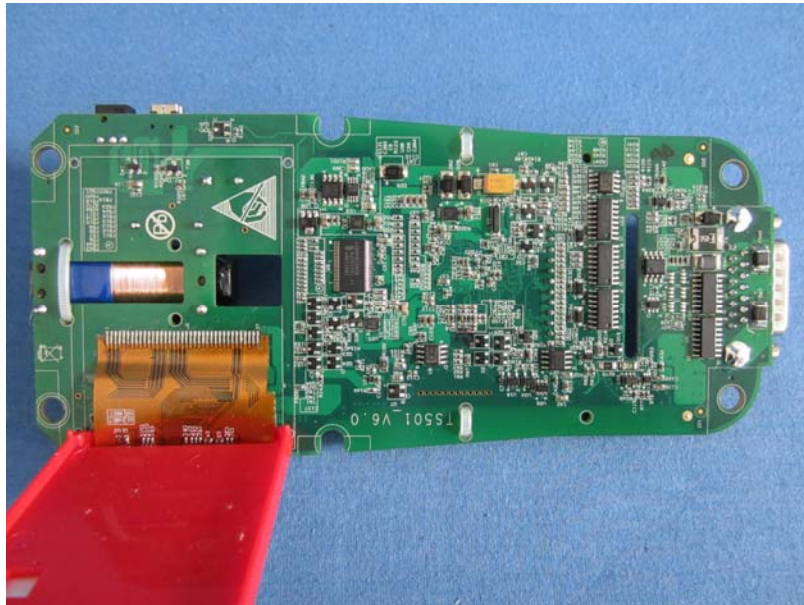














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