

# TEST REPORT

**Applicant:** Autel Intelligent Tech. Corp., Ltd.

**Address of Applicant:** 6th - 10th Floor, Bldg. B1, Zhiyuan, Xueyuan Rd., Xili, Nanshan, Shenzhen 518055, China

**Manufacturer/Factory:** Autel Intelligent Tech. Corp., Ltd.

**Address of Manufacturer/Factory:** 6th - 10th Floor, Bldg. B1, Zhiyuan, Xueyuan Rd., Xili, Nanshan, Shenzhen 518055, China

**Equipment Under Test (EUT)**

Product Name: TPMS Electronic Control Uint.

Model No.: MaxiTPMS-TR201\_S, MaxiTPMS-TR201\_H

Trade Mark: AUTEL

FCC ID: WQ8TPRF201A

**Applicable standards:** FCC CFR Title 47 Part 15 Subpart B

**Date of sample receipt:** September 10, 2018

**Date of Test:** September 11-19, 2018

**Date of report issued:** September 20, 2018

**Test Result :** PASS \*

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

Authorized Signature:

**Robinson Lo**

**Laboratory Manager**

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## 2 Version

Version No.	Date	Description
00	September 20, 2018	Original

Prepared By:

*Bill. Yuan*

Date:

September 20, 2018

\_\_\_\_\_  
**Project Engineer**

Check By:

*Andy. Wu*

Date:

September 20, 2018

\_\_\_\_\_  
**Reviewer**

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## 4 Test Summary

Test Item	Test Requirement	Test Method	Class / Severity	Result
Conducted Emission	FCC Part15.107	ANSI C63.4	Class B	PASS
Radiated Emissions #	FCC Part15.109	ANSI C63.4	Class B	PASS

Remark:

1. Pass: The EUT complies with the essential requirements in the standard.
2. # Refer to FCC Part 15.33 (b)(1) conditional testing procedure :

The highest frequency generated or used in the EUT	Test frequency range of Radiated emission
<108MHz	30MHz ~ 1GHz
108MHz ~ 500MHz	30MHz ~ 2GHz
500MHz ~ 1GHz	30MHz ~ 5GHz
>1GHz	30MHz ~ 5th harmonic of the highest frequency or 40 GHz, whichever is lower.

Note: The highest frequency of the internal sources of the EUT is more than 108MHz.

## 5 General Information

### 5.1 General Description of EUT

Product Name:	TPMS Electronic Control Uint.
Model No.:	MaxiTPMS-TR201_S, MaxiTPMS-TR201_H
Test Model No:	MaxiTPMS-TR201_S
<i>Remark: All above models are identical in the same PCB layout, interior structure and electrical circuits. The differences are communication mode and model name for commercial purpose.</i>	
Serial No.:	000001
Test sample(s) ID:	GTS201809000032-1
Sample(s) Status	Normal sample
Operation Frequency:	433.92MHz & 315MHz for RX
Modulation technology:	ASK and FSK
Antenna Type:	Integral antenna
Antenna gain:	-10dBi (declare by applicant)
Power supply:	DC 12V

### 5.2 Test mode and Test voltage

<b>Test mode:</b>	
PC mode	Keep the EUT in data exchange with PC mode.
Operation mode	Keep the EUT in operation mode.
<b>Test voltage</b>	
DC 12V	

### 5.3 Description of Support Units

Manufacturer	Description	Model	Serial Number
Apple	Notebook PC	A1278	C1MN99ERDTY3
AUTEL	ECU	J2534	N/A
AUTEL	433MHz transmitter	N/A	N/A
Customer to provide	Adapter	BI24-120150-E2	N/A

### 5.4 Deviation from Standards

None.
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### 5.5 Abnormalities from Standard Conditions

None.
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### 5.6 Test Facility

<p>The test facility is recognized, certified, or accredited by the following organizations:</p> <ul style="list-style-type: none"> <li>• <b>FCC —Registration No.: 381383</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 381383, January 08, 2018.</li> <li>• <b>Industry Canada (IC) —Registration No.: 9079A-2</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-2, August 15, 2016</li> </ul>
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### 5.7 Test Location

The test was performed at:
<p>Global United Technology Services Co., Ltd. Address: No. 301-309, 3/F., Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China 518102 Tel: 0755-27798480 Fax: 0755-27798960</p>

## 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	July. 03 2015	July. 02 2020
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	June. 27 2018	June. 26 2019
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June. 27 2018	June. 26 2019
5	Double –ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	9120D-829	GTS208	June. 27 2018	June. 26 2019
6	Horn Antenna	ETS-LINDGREN	3160	GTS217	June. 27 2018	June. 26 2019
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	GTS	N/A	GTS213	June. 27 2018	June. 26 2019
9	Coaxial Cable	GTS	N/A	GTS211	June. 27 2018	June. 26 2019
10	Coaxial cable	GTS	N/A	GTS210	June. 27 2018	June. 26 2019
11	Coaxial Cable	GTS	N/A	GTS212	June. 27 2018	June. 26 2019
12	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June. 27 2018	June. 26 2019
13	Amplifier(2GHz-20GHz)	HP	8349B	GTS206	June. 27 2018	June. 26 2019
14	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June. 27 2018	June. 26 2019
15	Band filter	Amindeon	82346	GTS219	June. 27 2018	June. 26 2019
16	Power Meter	Anritsu	ML2495A	GTS540	June. 27 2018	June. 26 2019
17	Power Sensor	Anritsu	MA2411B	GTS541	June. 27 2018	June. 26 2019
18	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS588	June. 27 2018	June. 26 2019
19	Splitter	Agilent	11636B	GTS237	June. 27 2018	June. 26 2019
20	Loop Antenna	ZHINAN	ZN30900A	GTS534	June. 27 2018	June. 26 2019

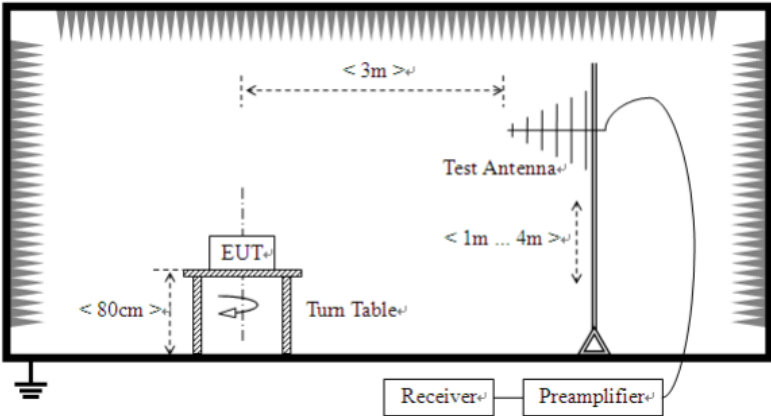
<b>Conducted Emission</b>						
<b>Item</b>	<b>Test Equipment</b>	<b>Manufacturer</b>	<b>Model No.</b>	<b>Inventory No.</b>	<b>Cal.Date (mm-dd-yy)</b>	<b>Cal.Due date (mm-dd-yy)</b>
1	Shielding Room	ZhongYu Electron	7.3(L)x3.1(W)x2.9(H)	GTS252	May.16 2014	May.15 2019
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 27 2018	June. 26 2019
3	Coaxial Switch	ANRITSU CORP	MP59B	GTS225	June. 27 2018	June. 26 2019
4	Artificial Mains Network	SCHWARZBECK MESS	NSLK8127	GTS226	June. 27 2018	June. 26 2019
5	Coaxial Cable	GTS	N/A	GTS227	N/A	N/A
6	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
7	Thermo meter	KTJ	TA328	GTS233	June. 27 2018	June. 26 2019
8	Absorbing clamp	Elektronik-Feinmechanik	MDS21	GTS229	June. 27 2018	June. 26 2019

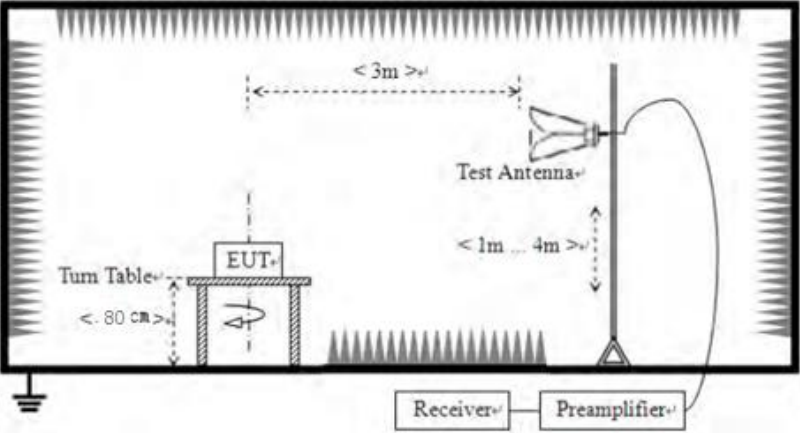
<b>General used equipment:</b>						
<b>Item</b>	<b>Test Equipment</b>	<b>Manufacturer</b>	<b>Model No.</b>	<b>Inventory No.</b>	<b>Cal.Date (mm-dd-yy)</b>	<b>Cal.Due date (mm-dd-yy)</b>
1	Humidity/ Temperature Indicator	Shanghai	ZJ1-2B	GTS243	June. 27 2018	June. 26 2019
2	Barometer	ChangChun	DYM3	GTS255	June. 27 2018	June. 26 2019



## 7 Test Results and Measurement Data

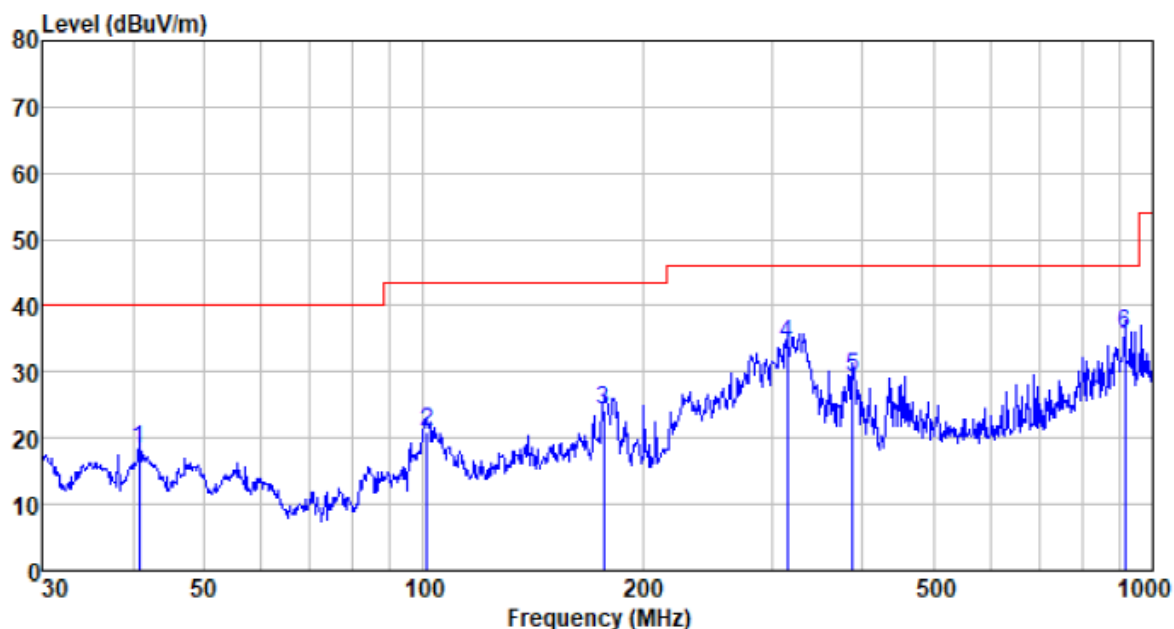
### 7.1 Radiated Emission

Test Requirement:	FCC Part15 B Section 15.109				
Test Method:	ANSI C63.4:2014				
Test Frequency Range:	30MHz to 6000MHz				
Test site:	Measurement Distance: 3m (Semi-Anechoic Chamber)				
Receiver setup:	Frequency	Detector	RBW	VBW	Remark
	30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
Peak		1MHz	10Hz	Average Value	
Limit:	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 setup:	<p>For radiated emissions from 30MHz to1GHz</p>  <p>For radiated emissions above 1GHz</p>				

	
<p>Test Procedure:</p>	<ol style="list-style-type: none"> <li>1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.</li> <li>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.</li> <li>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.</li> <li>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 rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.</li> <li>5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</li> <li>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.</li> </ol>
<p>Test environment:</p>	<p>Temp.: 25 °C Humid.: 52% Press.: 1 012mbar</p>
<p>Measurement Record:</p>	<p>Uncertainty: ± 4.50dB</p>
<p>Test Instruments:</p>	<p>Refer to section 6 for details</p>
<p>Test mode:</p>	<p>Refer to section 5.2 for details. Only show the worst case.</p>
<p>Test results:</p>	<p>Pass</p>

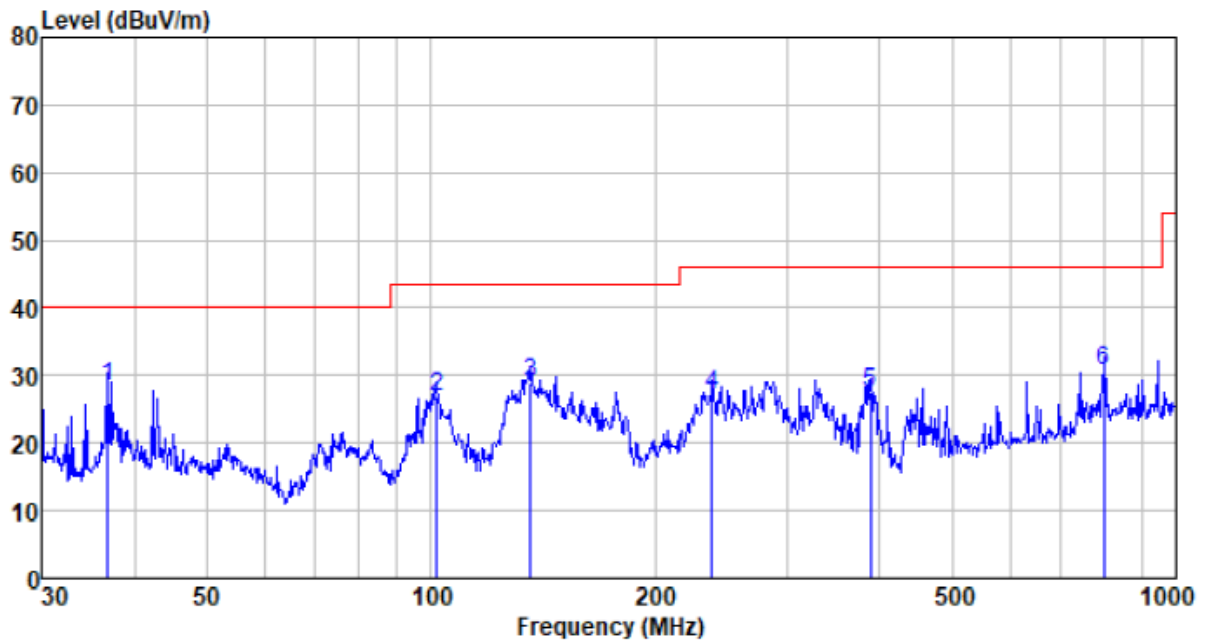
**Measurement Data  
Below 1GHz**

Test mode:	PC mode	Antenna Polarity:	Horizontal
Temp.:	35°C	Humidity:	54%



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark
40.702	41.03	12.21	0.67	35.70	18.21	40.00	-21.79	QP
101.289	44.48	12.04	1.20	36.73	20.99	43.50	-22.51	QP
176.888	50.89	8.77	1.72	37.22	24.16	43.50	-19.34	QP
315.481	55.24	13.90	2.44	37.44	34.14	46.00	-11.86	QP
387.992	48.94	15.14	2.79	37.51	29.36	46.00	-16.64	QP
916.069	46.05	22.35	4.91	37.58	35.73	46.00	-10.27	QP

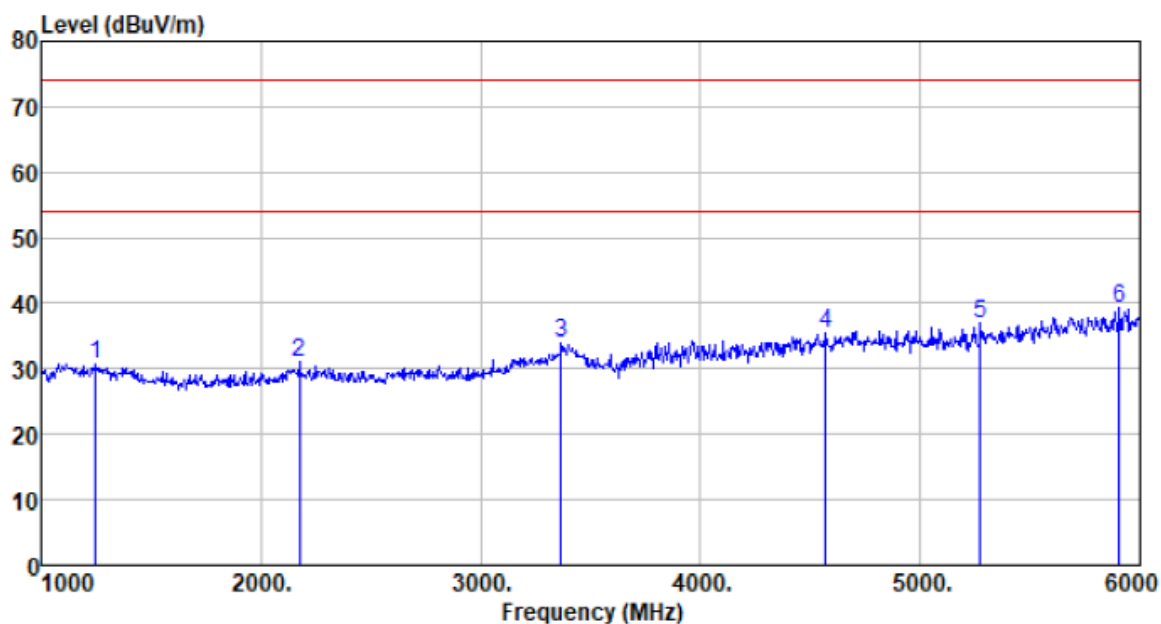
Test mode:	PC mode	Antenna Polarity:	Vertical
Temp.:	35°C	Humidity:	54%



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark
36.766	51.64	11.64	0.63	35.47	28.44	40.00	-11.56	QP
101.644	50.36	11.99	1.21	36.73	26.83	43.50	-16.67	QP
135.982	56.68	7.73	1.48	36.99	28.90	43.50	-14.60	QP
238.310	50.72	11.78	2.06	37.37	27.19	46.00	-18.81	QP
389.355	47.08	15.16	2.80	37.51	27.53	46.00	-18.47	QP
798.980	42.53	21.40	4.45	37.62	30.76	46.00	-15.24	QP

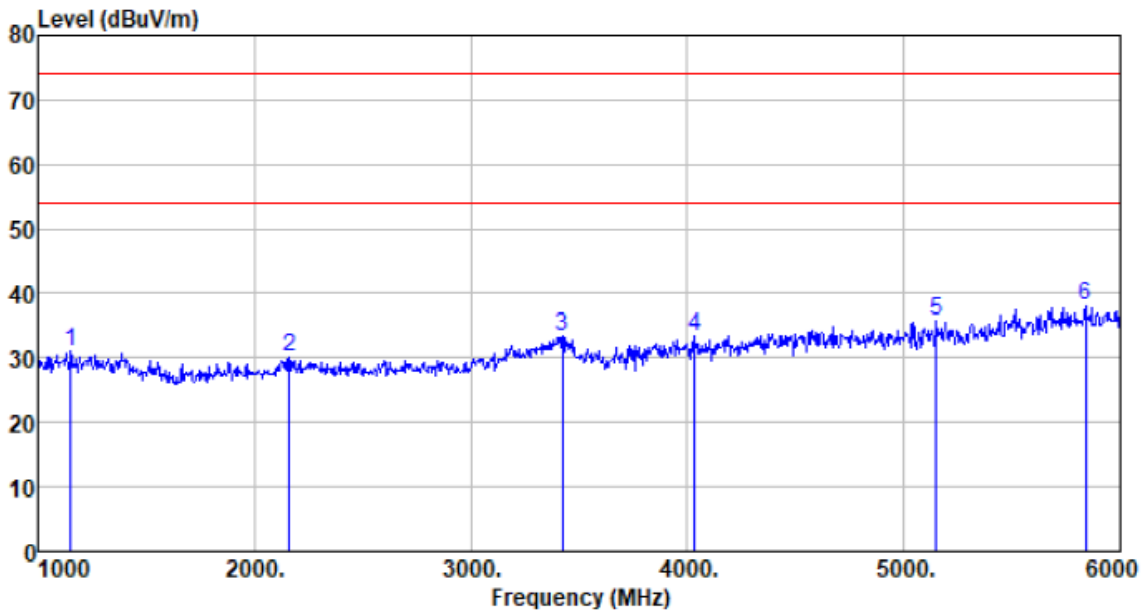
## Above 1GHz

Test mode:	PC mode	Antenna Polarity:	Horizontal
Temp.:	35°C	Humidity:	54%



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark
1250.000	36.76	25.52	4.50	35.96	30.82	74.00	-43.18	Peak
2175.000	34.76	27.74	5.16	36.67	30.99	74.00	-43.01	Peak
3365.000	36.03	28.51	6.70	37.34	33.90	74.00	-40.10	Peak
4570.000	33.16	31.47	8.40	37.64	35.39	74.00	-38.61	Peak
5275.000	33.37	31.76	9.17	37.40	36.90	74.00	-37.10	Peak
5905.000	32.92	32.78	10.06	36.53	39.23	74.00	-34.77	Peak

Test mode:	PC mode	Antenna Polarity:	Vertical
Temp.:	35°C	Humidity:	54%



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark
1150.000	37.48	25.01	4.42	35.86	31.05	74.00	-42.95	Peak
2160.000	34.01	27.62	5.14	36.65	30.12	74.00	-43.88	Peak
3425.000	35.04	28.72	6.82	37.35	33.23	74.00	-40.77	Peak
4035.000	33.15	29.75	7.90	37.42	33.38	74.00	-40.62	Peak
5150.000	32.30	32.07	8.99	37.58	35.78	74.00	-38.22	Peak
5840.000	32.10	32.70	9.99	36.60	38.19	74.00	-35.81	Peak

**Note:**

The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

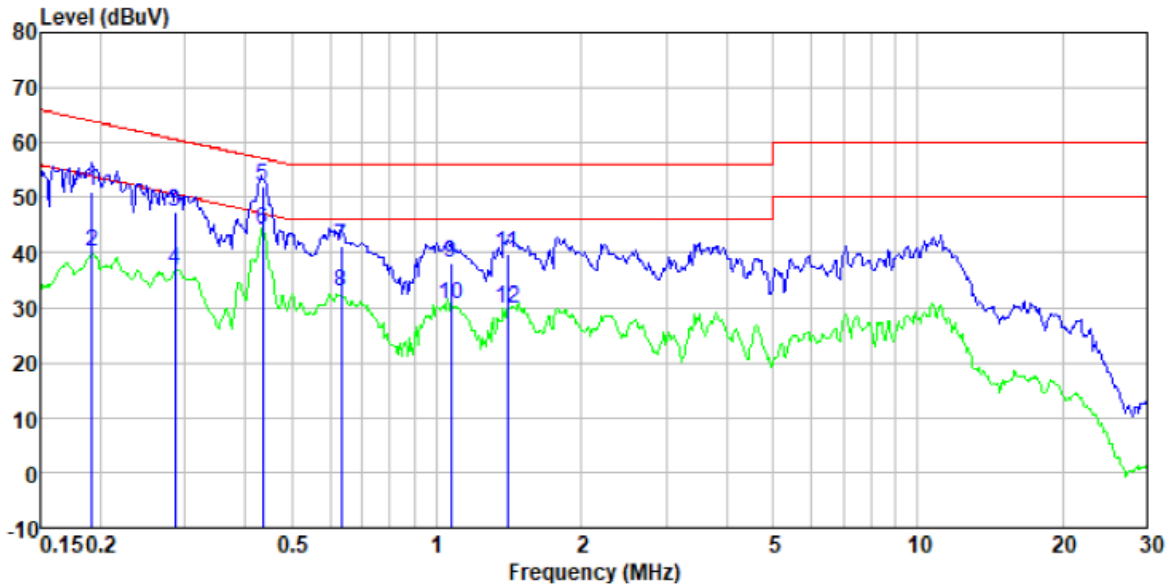
$$\text{Final Test Level} = \text{Receiver Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Preamplifier Factor}$$

## 7.2 Conducted Emissions

Test Requirement:	FCC Part15 B Section 15.107														
Test Method:	ANSI C63.4:2014														
Test Frequency Range:	150kHz to 30MHz														
Class / Severity:	Class B														
Receiver setup:	RBW=9kHz, VBW=30kHz														
Limit:	<table border="1"> <thead> <tr> <th rowspan="2">Frequency range (MHz)</th> <th colspan="2">Limit (dB<math>\mu</math>V)</th> </tr> <tr> <th>Quasi-peak</th> <th>Average</th> </tr> </thead> <tbody> <tr> <td>0.15-0.5</td> <td>66 to 56*</td> <td>56 to 46*</td> </tr> <tr> <td>0.5-5</td> <td>56</td> <td>46</td> </tr> <tr> <td>0.5-30</td> <td>60</td> <td>50</td> </tr> </tbody> </table>	Frequency range (MHz)	Limit (dB $\mu$ V)		Quasi-peak	Average	0.15-0.5	66 to 56*	56 to 46*	0.5-5	56	46	0.5-30	60	50
Frequency range (MHz)	Limit (dB $\mu$ V)														
	Quasi-peak	Average													
0.15-0.5	66 to 56*	56 to 46*													
0.5-5	56	46													
0.5-30	60	50													
Test setup:	<p><i>Remark</i>  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.). The provide 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 refers 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: 2014 on conducted measurement.</li> </ol>														
Test environment:	Temp.: 25 °C Humid.: 52% Press.: 1 012mbar														
Test Instruments:	Refer to section 6 for details														
Test mode:	Refer to section 5.2 for details. Only show the worst case.														
Test results:	Pass														

## Measurement Data

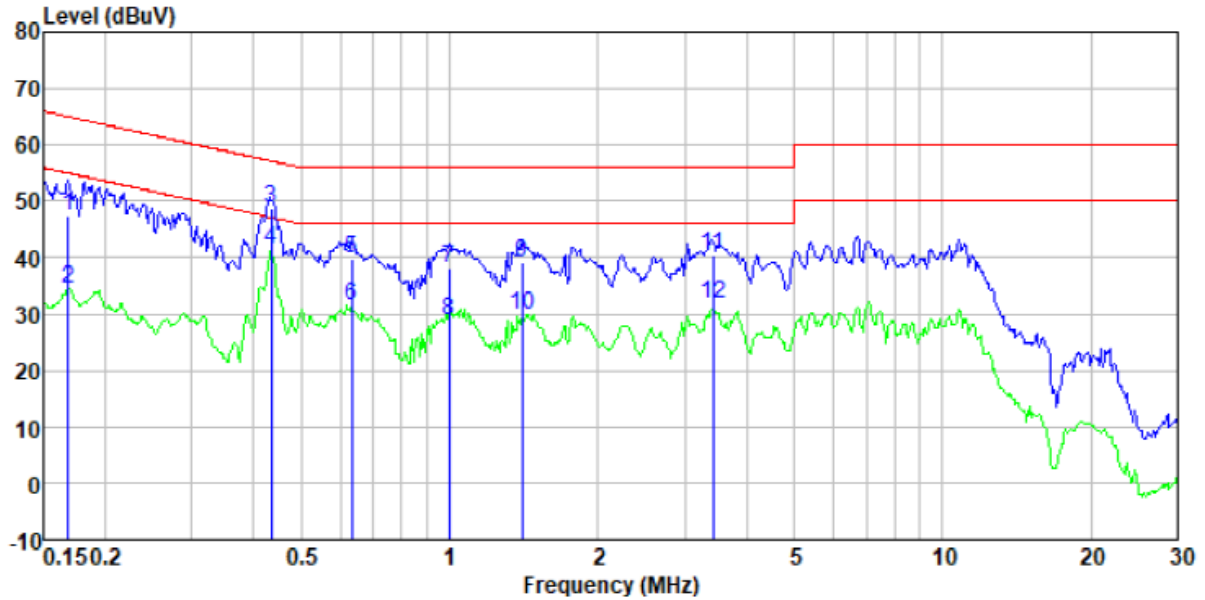
Test mode:	PC mode	Phase Polarity:	Line
Temp.:	35°C	Humidity:	55%



Freq MHz	Reading level dBuV	LISN/ISN factor dB/m	Cable loss dB	Level dBuV	Limit level dBuV	Over limit dB	Remark
0.19	50.65	0.40	0.11	51.16	63.93	-12.77	QP
0.19	39.53	0.40	0.11	40.04	53.93	-13.89	Average
0.29	46.82	0.40	0.10	47.32	60.63	-13.31	QP
0.29	36.29	0.40	0.10	36.79	50.63	-13.84	Average
0.44	51.76	0.34	0.11	52.21	57.15	-4.94	QP
0.44	43.57	0.34	0.11	44.02	47.15	-3.13	Average
0.63	40.77	0.28	0.12	41.17	56.00	-14.83	QP
0.63	32.30	0.28	0.12	32.70	46.00	-13.30	Average
1.07	37.69	0.20	0.15	38.04	56.00	-17.96	QP
1.07	30.19	0.20	0.15	30.54	46.00	-15.46	Average
1.40	39.37	0.20	0.16	39.73	56.00	-16.27	QP
1.40	29.59	0.20	0.16	29.95	46.00	-16.05	Average



Test mode:	PC mode	Phase Polarity:	Neutral
Temp.:	35°C	Humidity:	55%



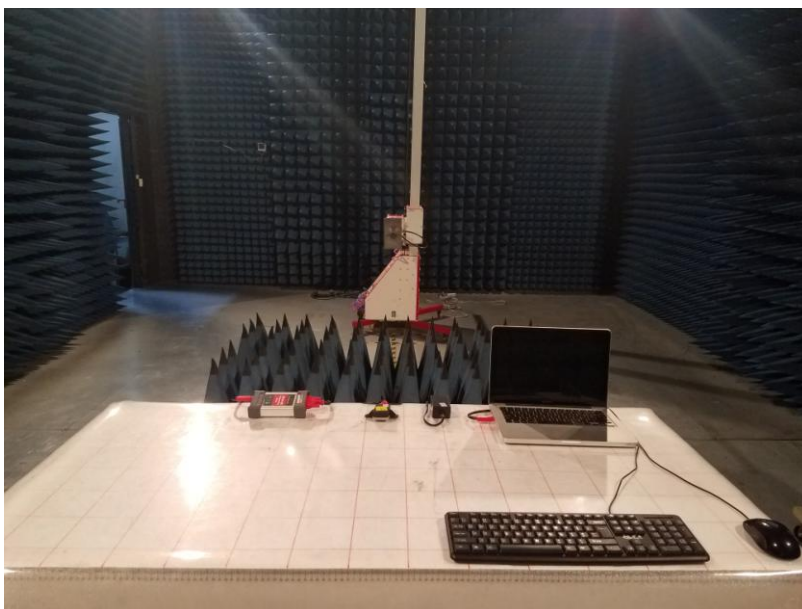
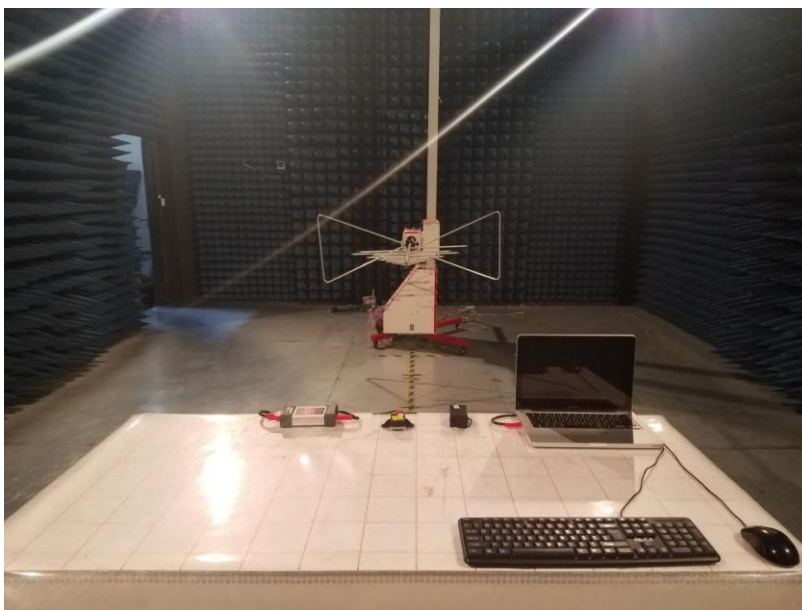
Freq MHz	Reading level dBuV	LISN/ISN factor dB/m	Cable loss dB	Level dBuV	Limit level dBuV	Over limit dB	Remark
0.17	47.13	0.40	0.09	47.62	65.03	-17.41	QP
0.17	34.00	0.40	0.09	34.49	55.03	-20.54	Average
0.44	48.18	0.34	0.11	48.63	57.15	-8.52	QP
0.44	41.07	0.34	0.11	41.52	47.15	-5.63	Average
0.63	39.47	0.28	0.12	39.87	56.00	-16.13	QP
0.63	31.10	0.28	0.12	31.50	46.00	-14.50	Average
1.00	37.88	0.20	0.15	38.23	56.00	-17.77	QP
1.00	26.67	0.20	0.15	29.02	46.00	-16.98	Average
1.40	38.92	0.20	0.16	39.28	56.00	-16.72	QP
1.40	29.41	0.20	0.16	29.77	46.00	-16.23	Average
3.42	39.99	0.20	0.18	40.37	56.00	-15.63	QP
3.42	31.52	0.20	0.18	31.90	46.00	-14.10	Average

**Notes:**

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level = Receiver Reading + LISN Factor + Cable Loss.

## 8 Test Setup Photo

Radiated Emission



## Conducted Emission

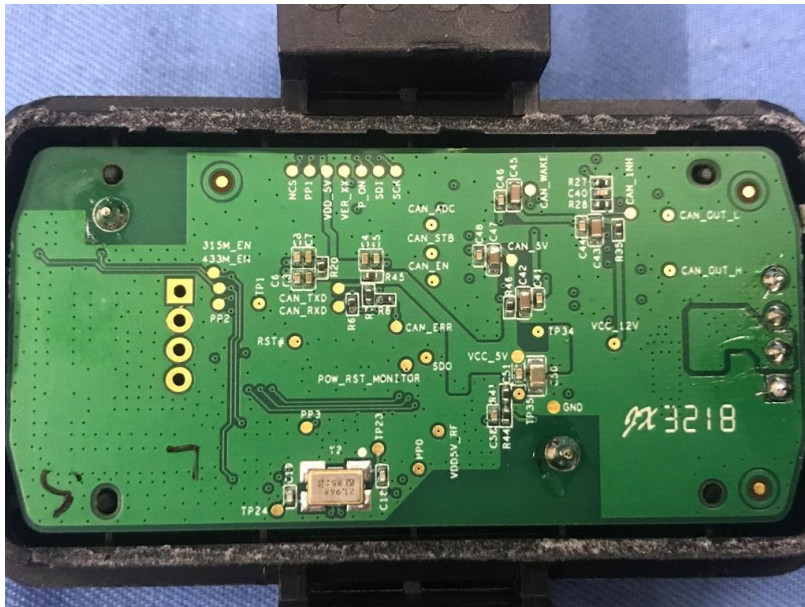


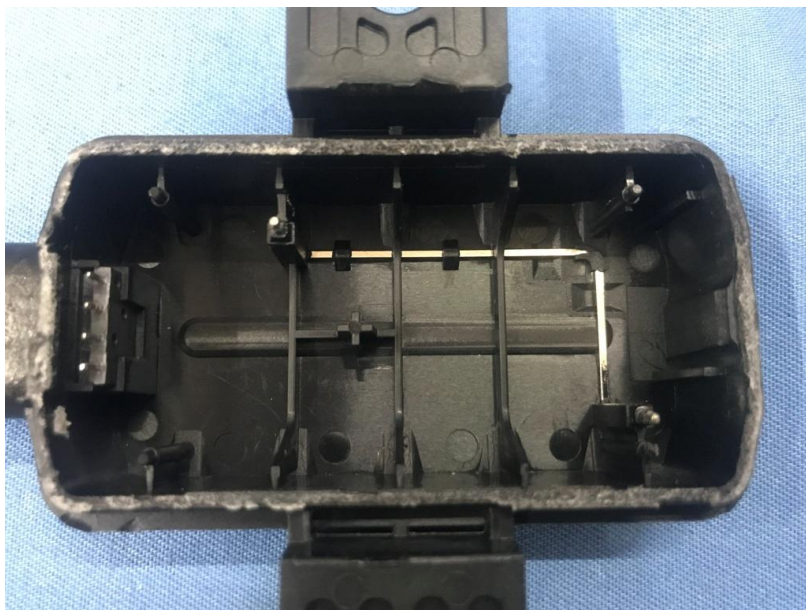
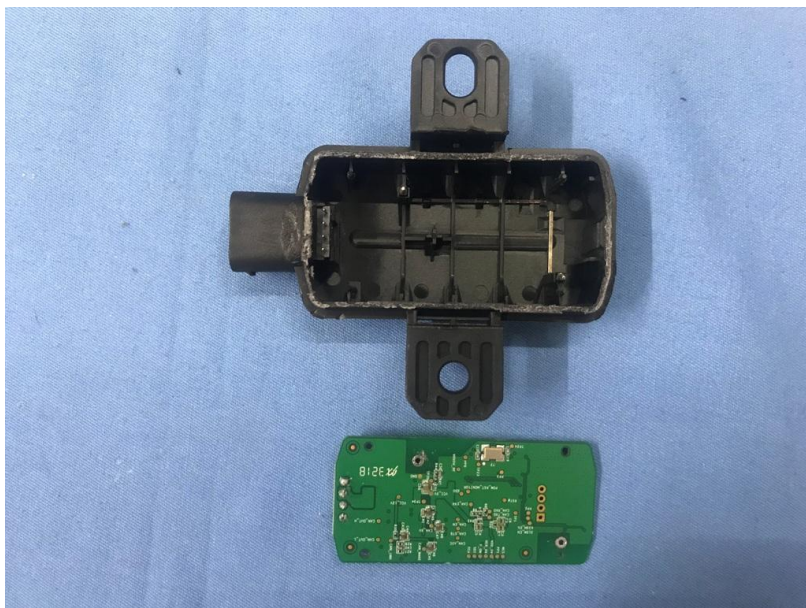
## 9 EUT Constructional Details



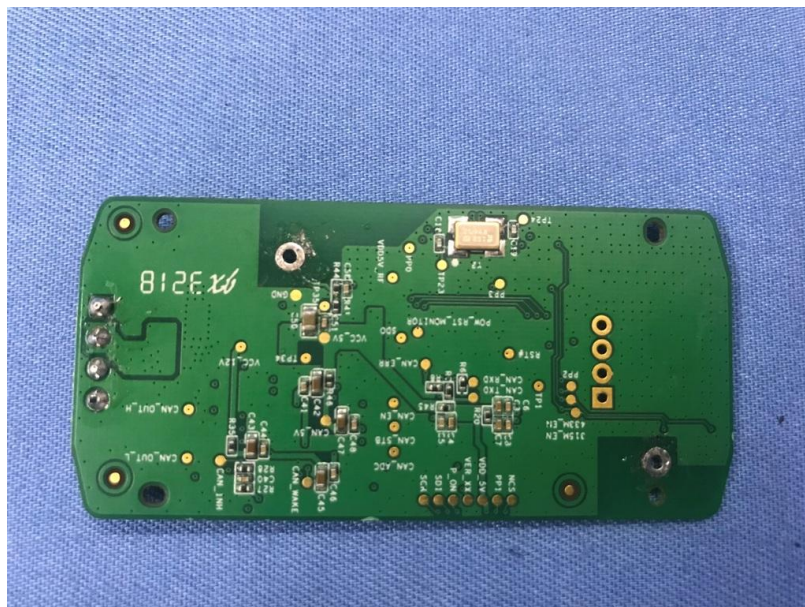
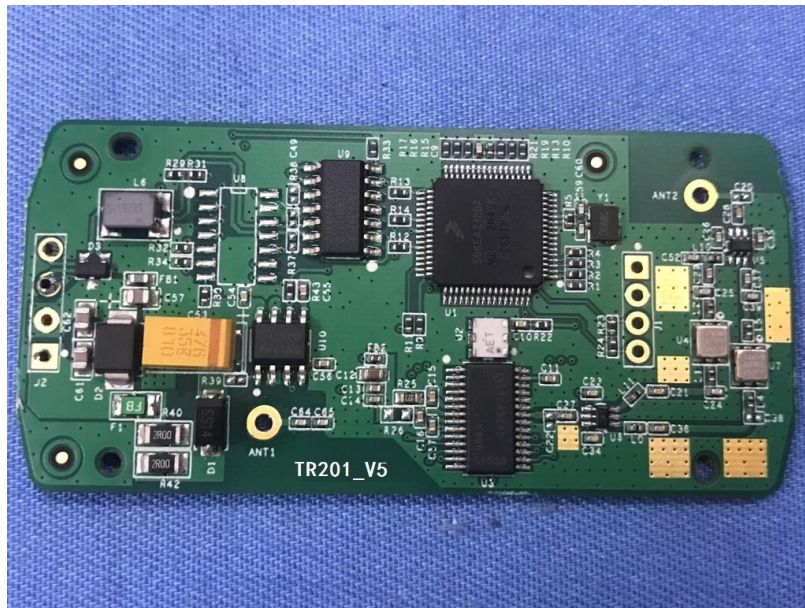












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