



CERTIFICATE #5473.01

Test Report No.:  
FCC2023-0031

## TEST REPORT

**Applicant** : Zhejiang Shenghuabo Electric  
**Product Name** : Appliance Corporation  
**Model No.** : Tire pressure receiver  
**Model No.** : 10002.01

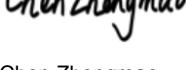
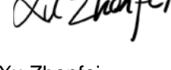
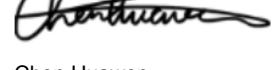
**CVC Testing Technology Co., Ltd.**  
威凯检测技术有限公司

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<b>Applicant</b>		<b>Name :</b> Zhejiang Shenghuabo Electric Appliance Corporation <b>Address :</b> Ruian International Auto&Parts industry Park, wenzhou, zhejiang, china	
<b>Manufacturer</b>		<b>Name :</b> Zhejiang Shenghuabo Electric Appliance Corporation <b>Address:</b> Ruian International Auto&Parts industry Park, wenzhou, zhejiang, china	
<b>Equipment under Test</b>		<b>Product Name :</b> Tire pressure receiver <b>Model No. :</b> 10002.01 <b>Trade mark :</b> — <b>Serial no. :</b> — <b>Sampling :</b> 1-1	
Date of Receipt.	2023-06-13	Date of Issue <b>2023-06-13~ 2023-06-24</b>	
<b>Test Specification</b>		<b>Test Result</b>	
FCC CFR47 Part 15B		PASS	
<b>Evaluation of Test Result</b>		The equipment under test was found to comply with the requirements of the standards applied.	
<b>Seal of CVC</b>			
Tested by:	Reviewed by:	Approved by:	
			
Chen Zhengmao Name <input type="checkbox"/>	Xu Zhenfei Name <input type="checkbox"/>	Chen Huawen Name <input type="checkbox"/>	
<b>Other Aspects: NONE.</b>			
Abbreviations:OK, Pass= passed	Fail = failed	N/A= not applicable	EUT= equipment, sample(s) under tested
This test report relates only to the EUT, and shall not be reproduced except in full, without written approval of <b>CVC</b> .			

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## 1. General Product Information

### 1.1 General information

Product Name	Tire pressure receiver
Model No.	10002.01
Power Supply	9V-16VDC, 12VDC rated, IGN
Highest frequency of the internal sources	Less than 108MHz
FCC ID	2BBMK-MMS-TPMS-1000
Remark: /	

## 2. Test Sites

### 2.1 Test Facilities

The tests and measurements refer to this report were performed by EMC testing Lab. of Vkan Certification & Testing Co., Ltd.

Add.: No.3, Tiantaiyi Road, Kaitai Avenue, Science City, Guangzhou, 510663, P. R. China

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The EMC testing laboratory has been recognized by CNAS, and authorized by Nemko of Norway since 1997, and accredited by DAkkS of Germany since 2007, and assessed and found eligible to participated in the TDAP of VDE testing and certification Institute since 2004, and registered by FCC since 2001.

### 2.2 Description of Non-standard Method and Deviations

The testing and measurement methods used in this report are applied by all standard methods. Not any non-standard method or deviation from the used standards was used.

### 2.3 List of Test and Measurement Instruments

Refer to Appendix.

## **3. Test Configuration**

### **3.1 Test Mode**

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

## **4. Summary of measurement results**

Summary of measurements of results	Clause in FCC rules	Class / Severity	Verdict
Conducted Emissions	FCC CFR47 Part 15B Section 15.107	Class B	PASS
Radiated Emissions	FCC CFR47 Part 15B Section 15.109	Class B	PASS

## 5. Measurement procedure

### 5.1 Conducted Emission

Ambient condition:

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement:

The EUT is placed on a non-metallic table of 80cm height above the horizontal metal reference ground plane. During the test, the EUT was operating in its typical mode. The test method is according to ANSI C63.4-2014. Connect the AC power line of the EUT to the L.I.S.N. Use EMI receiver to detect the average and Quasi-peak value. RBW is set to 9 kHz, VBW is set to 30kHz. The measurement result should include both L line and N line.

The test is in receiving tire pressure mode.

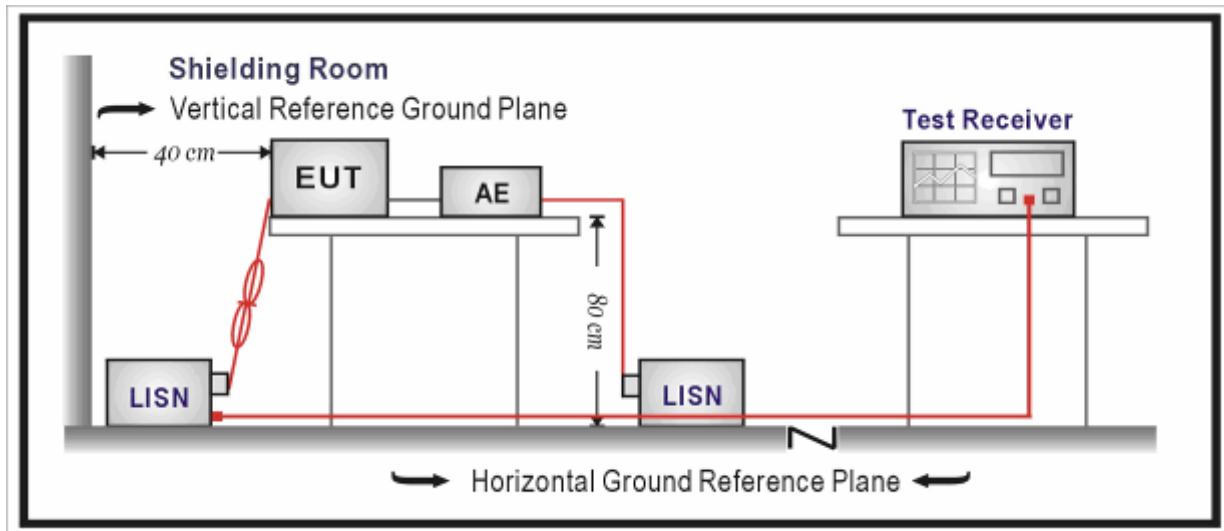
Limits:

Frequency (MHz)	Conducted Limits(dB $\mu$ V)			
	Class A		Class B	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	66 to 56 *	56 to 46 *	79	66
0.5 - 5	56	46	73	60
5 - 30	60	50	73	60

Note 1: The lower limit shall apply at the transition frequencies.

Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

## Test Setup:



Note: AC Power source is used to change the voltage 120V/60Hz.

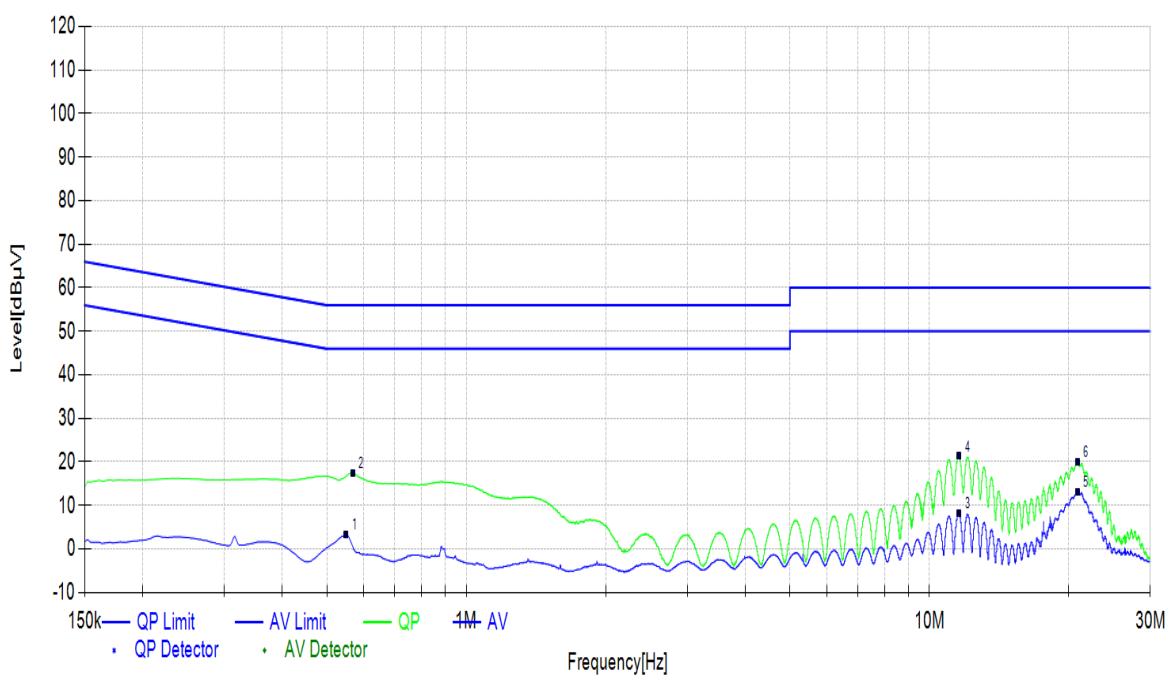
## Measurement Uncertainty:

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor  $k = 1.96$ .  $U = 2.66$  dB.

**Test Results:**

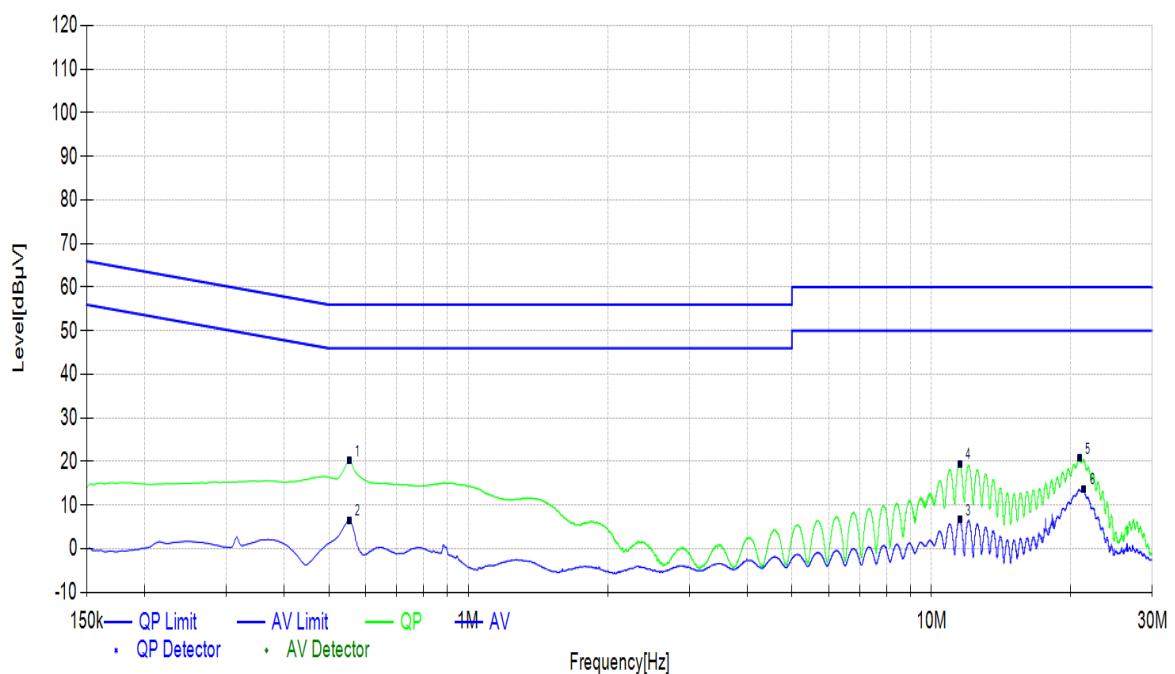
Power Line	L
Worst Case Operating Mode:	receiving tire pressure mode

Conducted Emission					
Port: AC Power Line(Power line L)					
Freq. (MHz)	QP Limits (dB $\mu$ V)	QP Level (dB $\mu$ V)	Freq. (MHz)	AV Limits (dB $\mu$ V)	AV Level (dB $\mu$ V)
20.8635	60.00	20.03	11.5778	50.00	8.17
0.5685	56.00	17.50	20.8635	50.00	13.21
11.5823	60.00	21.36	0.5505	46.00	3.30



Power Line	N
Worst Case Operating Mode:	receiving tire pressure mode

Conducted Emission					
Port: AC Power Line(Power line N)					
Freq. (MHz)	QP Limits (dB $\mu$ V)	QP Level (dB $\mu$ V)	Freq. (MHz)	AV Limits (dB $\mu$ V)	AV Level (dB $\mu$ V)
0.5528	56.00	20.22	0.5528	46.00	6.60
11.5283	60.00	19.49	21.3338	50.00	13.72
20.8680	60.00	20.72	11.5193	50.00	6.71



## 5.2 Radiated Emission

Ambient condition:

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

### Method of Measurement:

The test set-up was made in accordance to the general provisions of ANSI C63.4-2014. The Equipment Under Test (EUT) was set up on a non-conductive table in the semi-anechoic chamber. The test was performed at the distance of 3 m between the EUT and the receiving antenna. The radiated emissions measurements were made in a typical installation configuration.

Sweep the whole frequency band through the range from 9 kHz to the 10th harmonic of the carrier, and the emissions less than 20 dB below the permissible value are reported.

During the test, below 30MHz, the center of the loop shall be 1 meters; above 30MHz, the height of receive antenna shall be moved from 1 to 4 meters, and the antenna shall be performed under horizontal and vertical polarization. The turntable shall be rotated from 0 to 360 degrees for detecting the maximum of radiated spurious signal level. The measurements shall be repeated with orthogonal polarization of the test antenna. The data of cable loss and antenna factor has been calibrated in full testing frequency range before the testing.

Set the spectrum analyzer in the following:

Below 1GHz (detector: Peak and Quasi-Peak)

RBW=100kHz / VBW=300kHz / Sweep=AUTO

Above 1GHz(detector: Peak):

(a)PEAK: RBW=1MHz VBW=3MHz/ Sweep=AUTO

(b)AVERAGE: RBW=1MHz / VBW=3MHz / Sweep=AUTO

The test is in receiving tire pressure mode.

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## Limits for class B:

Limit in restricted band(Part 15.109)

Frequency (MHz)	Measurement Distance (m)	Field strength(uV/m)	Level (dBuV/m)
30 - 88	3	100	40
88 - 216	3	150	43.5
216 - 960	3	200	46
Above 960-1000	3	500	54

Note 1: The lower limit shall apply at the transition frequency.

Note 2: Distance refers to the distance in meters between the measuring instrument Antenna and the closed point of any part of the device or system.

Note 3: E field strength (dBuV/m) = 20 log E field strength (uV/m)

Limit in radiated emission measurement (Part 15.109)

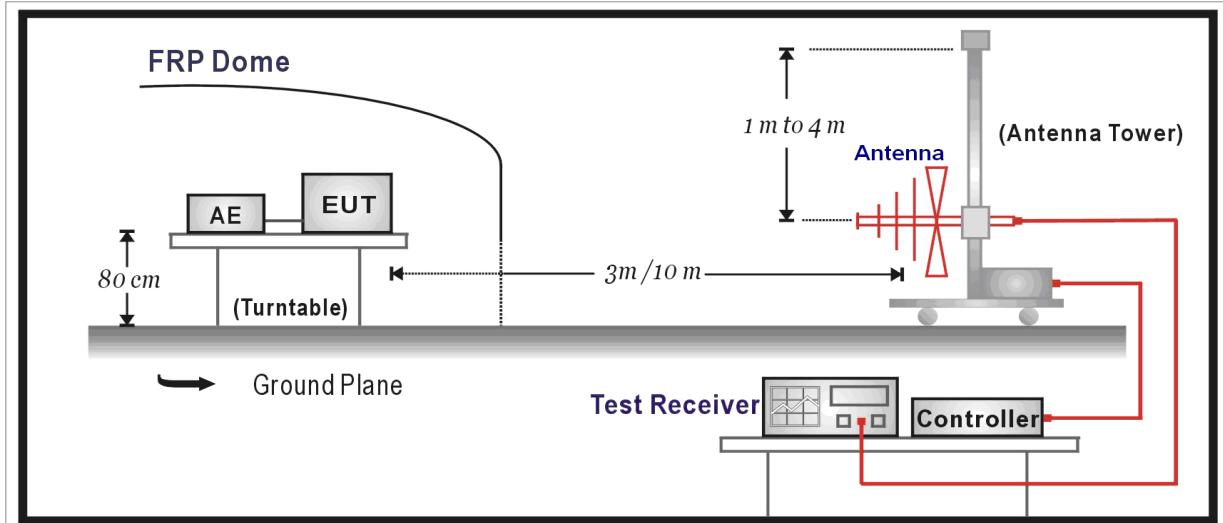
Frequency(MHz)	Field strength(dBuV/m) @3m	
Above 1000	74(peak)	54(average)

According to FCC Part 15.33(b),for an unintentional radiator, including a digital device, the spectrum shall be investigated from the lowest radio frequency signal generated or used in the device, without going below the lowest frequency for which a radiated emission limit is specified, up to the frequency shown in the following table:

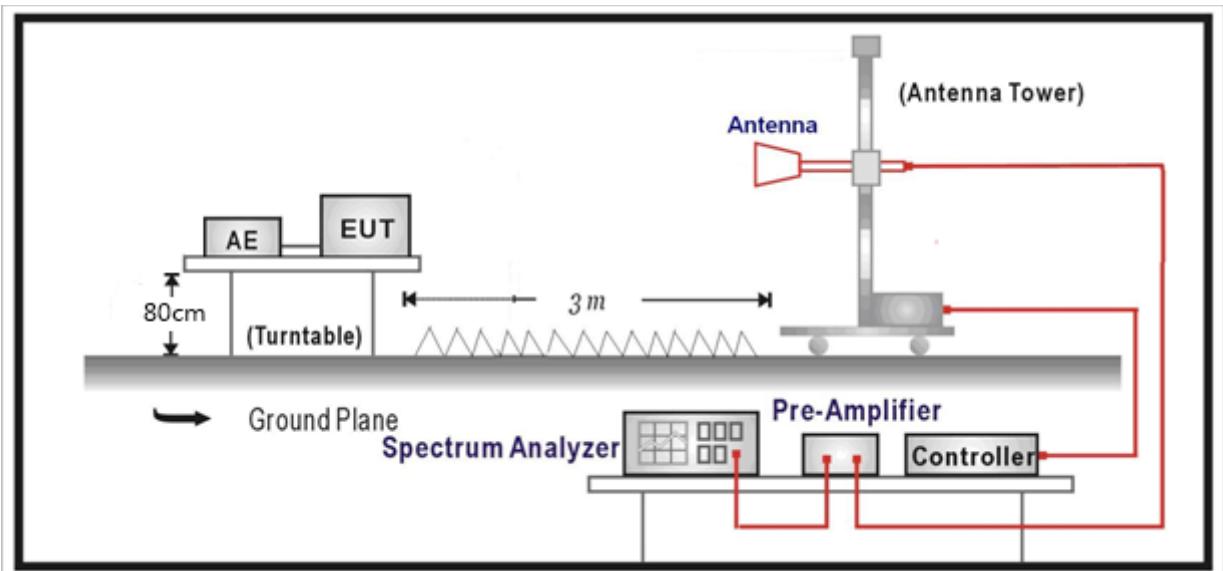
Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Above 1.705	30
1.705 - 108	1000
108 - 500	2000
500 - 1000	5000
Above 1000	5th harmonic of the highest frequency or 40 GHz, whichever is lower.

## Test Setup:

Below 1GHz Test Setup:



Above 1GHz Test Setup:



## Measurement Uncertainty:

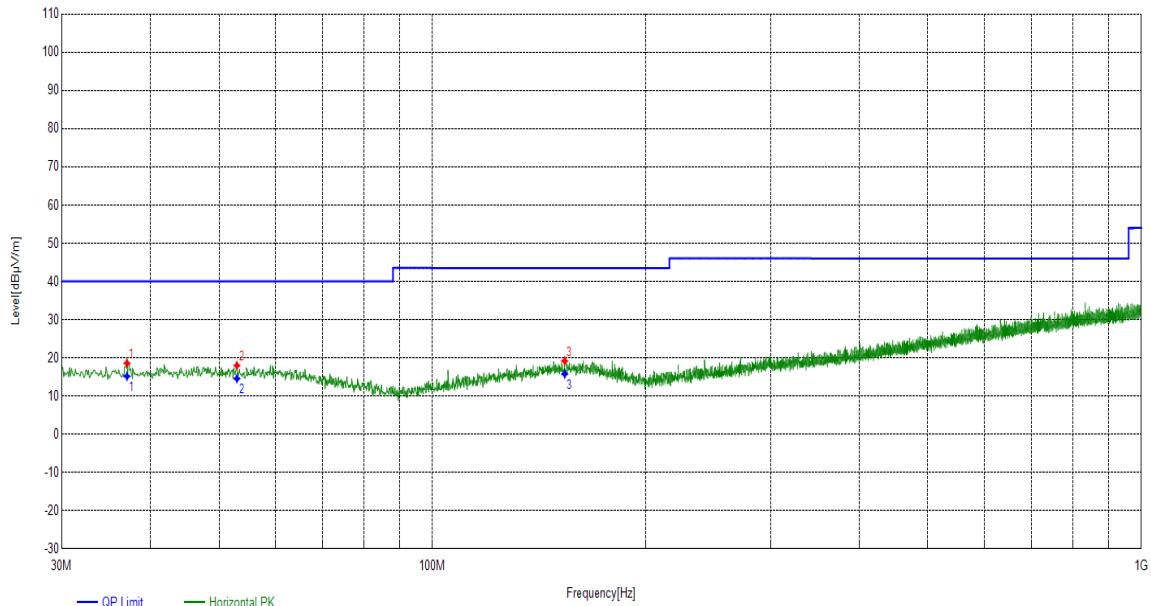
The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor  $k = 1.96$ .

Frequency	Uncertainty
above 1G	4.84 dB
below 1G	4.10 dB

**Test Results:****SPURIOUS EMISSIONS 30MHz~1GHz:**

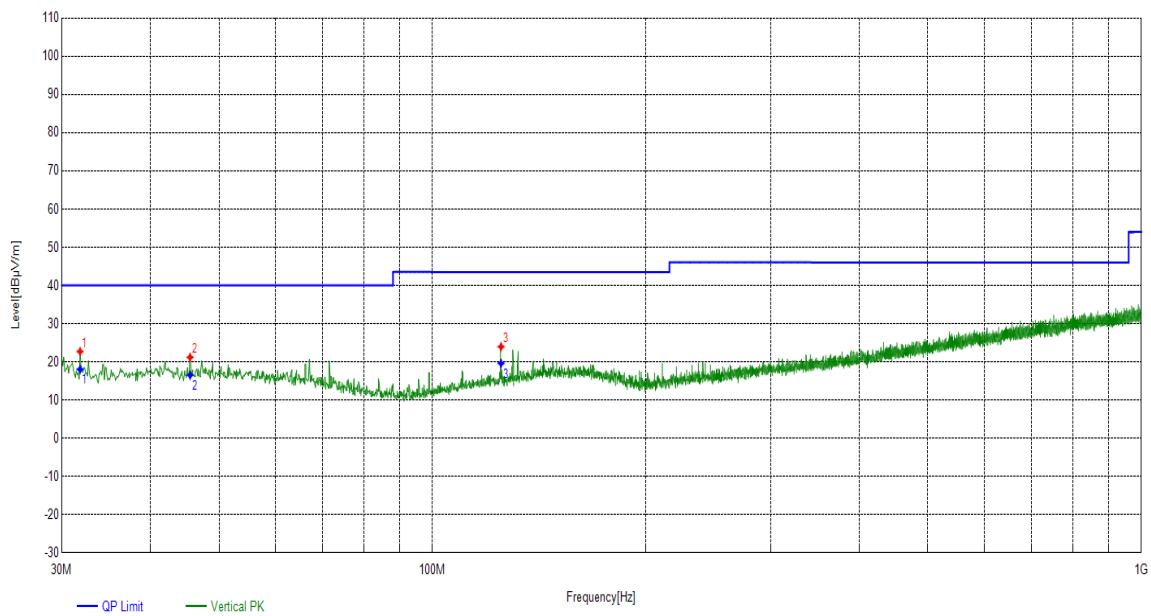
Radiated Emission	30MHz-1GHz
Polarity	Horizontal
Worst Case Operating Mode:	receiving tire pressure mode

radiated emission								
Frequency [MHz]	Polarity	Factor [dB]	QP Value [dB $\mu$ V/m]	QP Limit [dB $\mu$ V/m]	QP Margin [dB]	Height [cm]	Angle [°]	Pass/Fail
37.0817	Horizontal	19.66	15.17	40.00	24.83	190	7	PASS
52.9913	Horizontal	20.27	14.56	40.00	25.44	170	318	PASS
153.6874	Horizontal	20.78	15.76	43.51	27.75	250	359	PASS



Radiated Emission	30MHz-1GHz
Polarity	Vertical
Worst Case Operating Mode:	receiving tire pressure mode

radiated emission								
Frequency [MHz]	Polarity	Factor [dB]	QP Value [dB $\mu$ V/m]	QP Limit [dB $\mu$ V/m]	QP Margin [dB]	Height [cm]	Angle [°]	Pass/Fail
31.8432	Vertical	19.23	18.04	40.00	21.96	170	155	PASS
45.5216	Vertical	20.20	16.53	40.00	23.47	120	40	PASS
124.9725	Vertical	18.77	19.60	43.51	23.91	230	172	PASS



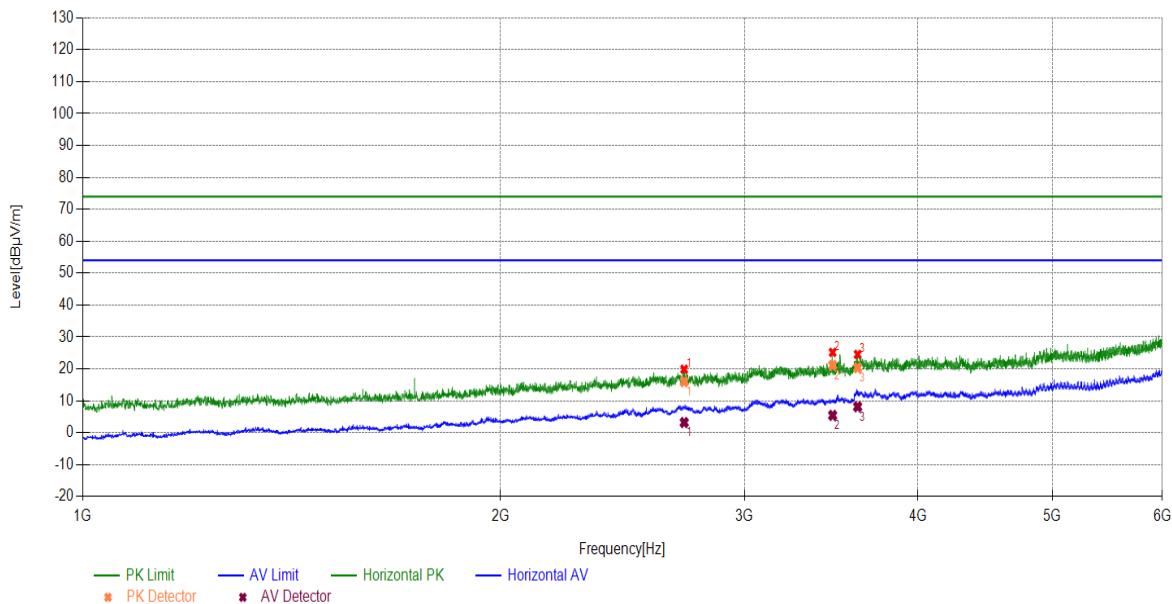
Note: 1. Quasi-Peak = Reading value + Correction factor

2. Correction Factor = Antenna factor+ Insertion loss(cable loss+amplifier gain)

## SPURIOUS EMISSIONS 1GHz~6GHz:

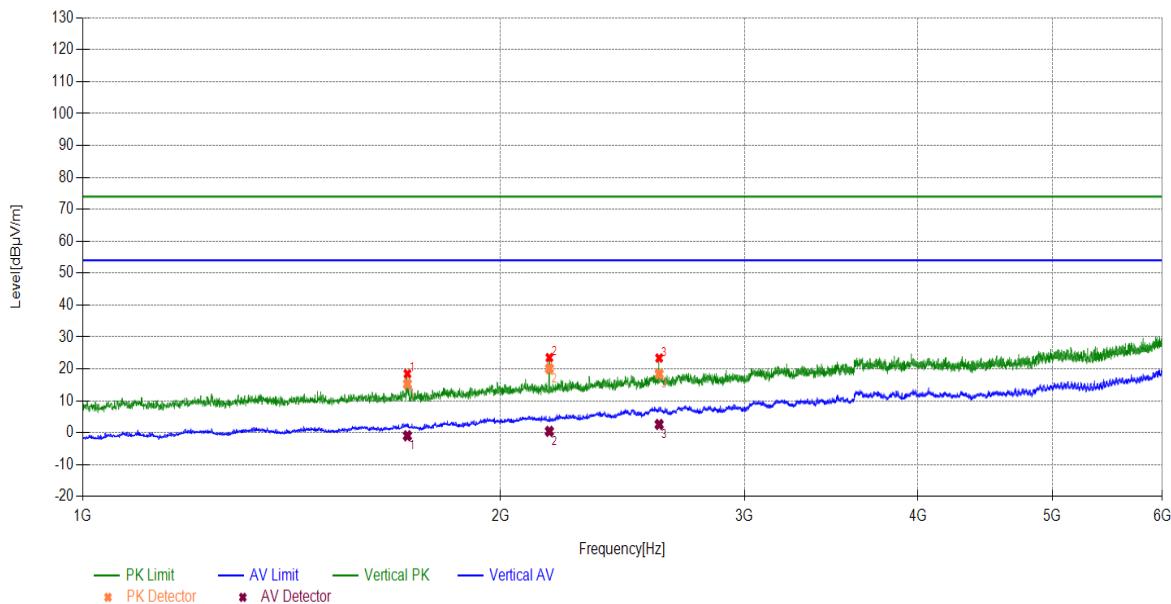
Radiated Emission	1GHz~6GHz
Polarity	Horizontal
Worst Case Operating Mode:	receiving tire pressure mode

radiated emission							
Frequency [MHz]	Level [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/Fail
2713.6714	15.99	74.00	58.01	PK	100	79	PASS
3471.7472	21.14	74.00	52.86	PK	100	210	PASS
3618.7619	20.39	74.00	53.61	PK	100	174	PASS
2713.6714	3.22	54.00	50.78	AV	100	79	PASS
3471.7472	5.46	54.00	48.54	AV	100	210	PASS
3618.7619	8.16	54.00	45.84	AV	100	174	PASS



Radiated Emission	1GHz~6GHz
Polarity	Vertical
Worst Case Operating Mode:	receiving tire pressure mode

radiated emission							
Frequency [MHz]	Level [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/Fail
1714.0714	15.24	74.00	58.76	PK	100	193	PASS
2169.617	20.08	74.00	53.92	PK	100	357	PASS
2603.1603	18.43	74.00	55.57	PK	100	357	PASS
1714.0714	-0.94	54.00	54.94	AV	100	193	PASS
2169.617	0.45	54.00	53.55	AV	100	357	PASS
2603.1603	2.61	54.00	51.39	AV	100	357	PASS



Note: 1. Quasi-Peak = Reading value + Correction factor

2. Correction Factor = Antenna factor+ Insertion loss(cable loss+amplifier gain)

## 6. Test Setup Photograph

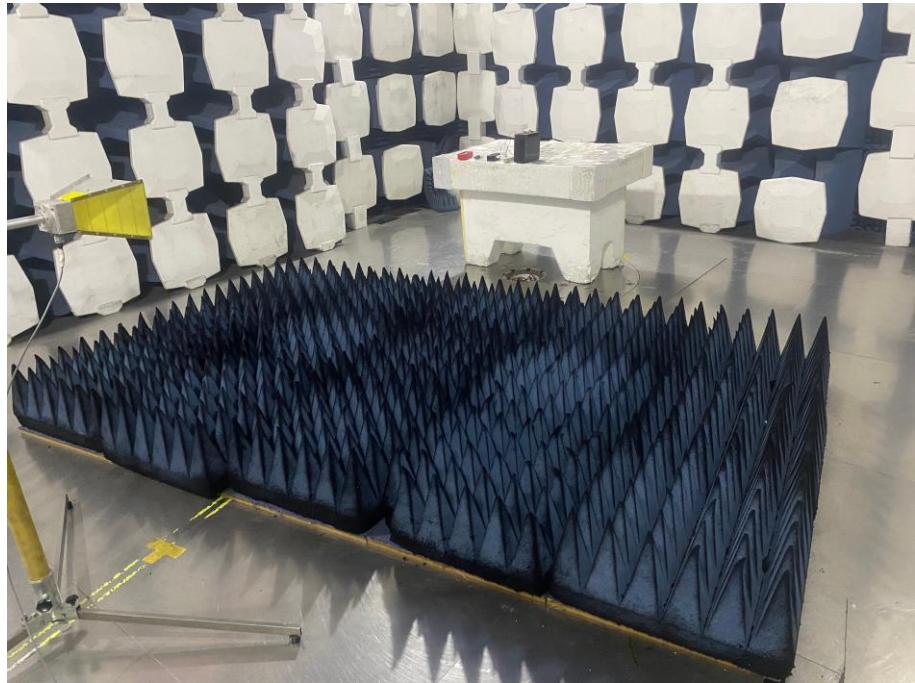
(1) Conducted Emission Test Setup



(2) Radiated emission Test Setup(Below 1GHz)



(3) Radiated emission Test Setup(Above 1GHz)

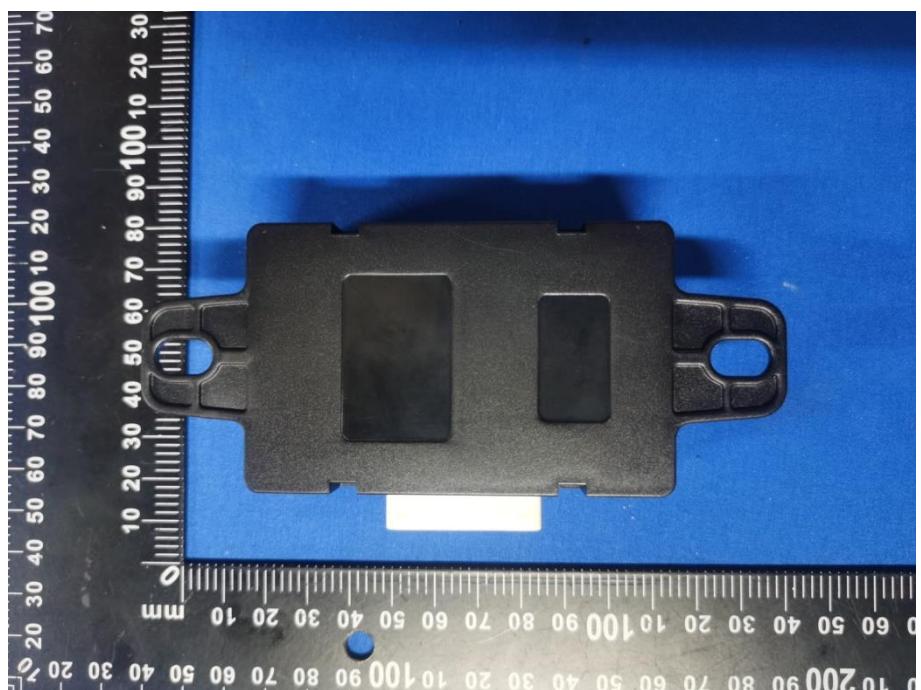


## 7. EUT Photograph

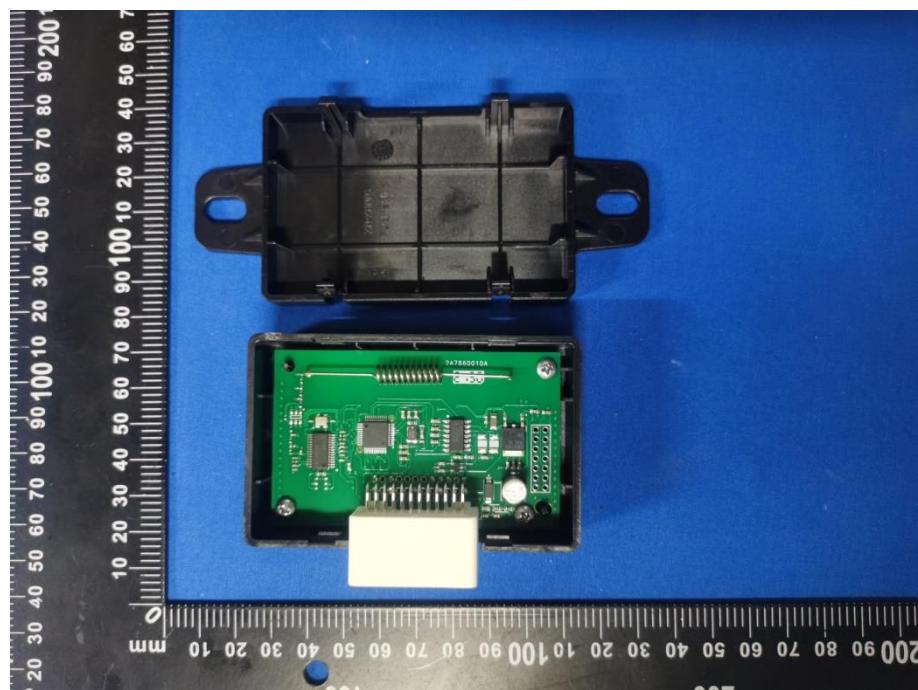
(1) EUT Photo



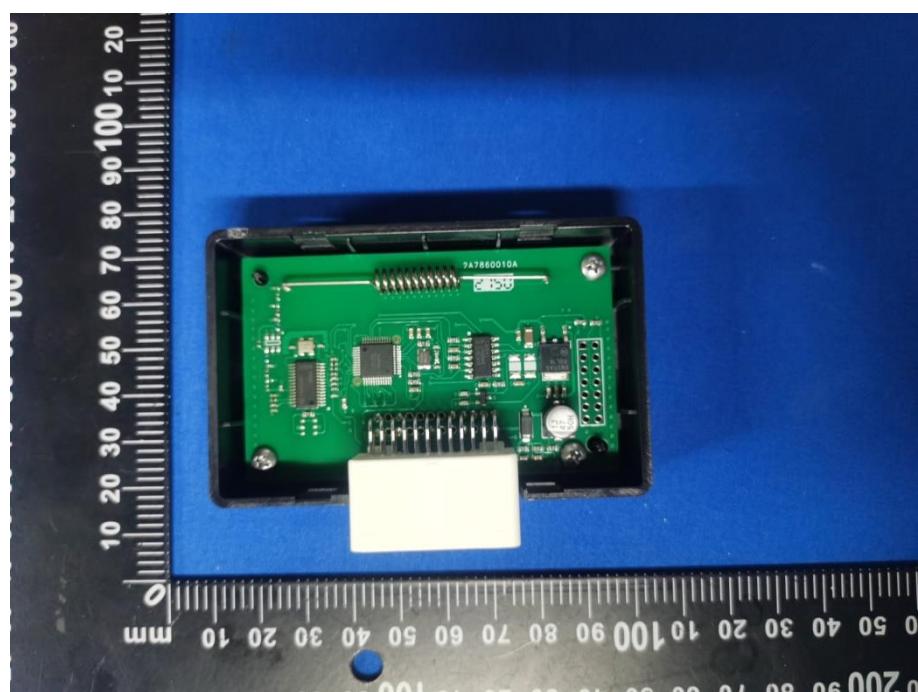
(2) EUT Photo



(3) EUT Photo



(4) EUT Photo



## 8. Measurement Equipment

Test Equipment	Type/Mode	Equipment No.	Manufacturer	Cal. Due	Used
EMI Test Receiver	ESR3	VGDY-0705	R&S	2024-03-15	✓
LISN	NSLK 8127	VGDY-0150	SCHWARZBECK	2023-09-04	✓
Plus Limiter (#2)	VTSD 9561	VGDY-0152	SCHWARZBECK	2023-10-09	✓
Shielding Room(#2)	GP1A	WKNF-0006	LEINING	2024-08-08	✓
EMI Test Receiver	ESR3	VGDY-0569	R&S	2024-03-15	✓
Broadband Antenna(5m)	VULB 9163	EM-000382	SCHWARZBECK	2024-05-07	✓
Semi-Anechoic Chamber(5m)	SAC-5	EM-000557	COMTEST	2024-11-02	✓
EMI Test Receiver (3M)	N9038A-508	EM-000397	Agilent	2024-02-22	✓
Broadband Antenna(3m)	VULB 9163	EM-000342	SCHWARZBECK	2024-06-10	✓
Semi-Anechoic Chamber(3m)	FACT-4	WKNA-0024	ETS	2024-12-11	✓

### Description Of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Description	Brand	Model No.	FCC ID	Serial Number	Supplied by
Tire pressure sensor	/	MMS-TPMS-0036	2BBMK-MMS-TPMS-0036	7EE1EE5C	/

The End