

FCC TEST REPORT
FOR
Baolong Huf Shanghai Electronics Co.,Ltd.
TPMS TOOL-GJ002
Test Model: GJ002

Prepared for	: Baolong Huf Shanghai Electronics Co.,Ltd.
Address	: 1st Floor,Building 5,5500 Shenzhuan Rd,Songjiang,Shanghai
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Date of receipt of test sample	: August 08, 2019
Number of tested samples	: 1
Serial number	: Prototype
Date of Test	: August 08, 2019~August 23,2019
Date of Report	: August 26,2019

FCC TEST REPORT
FCC CFR 47 PART 15 C (15.209)**Report Reference No. : LCS190808016AEA**

Date of Issue..... : August 26, 2019

Testing Laboratory Name : Shenzhen LCS Compliance Testing Laboratory Ltd.Address..... : 1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue,
Bao'an District, Shenzhen, Guangdong, ChinaTesting Location/ Procedure : Full application of Harmonised standards ■
Partial application of Harmonised standards □
Other standard testing method □**Applicant's Name : Baolong Huf Shanghai Electronics Co.,Ltd.**

Address..... : 1st Floor,Building 5,5500 Shenzhuan Rd,Songjiang,Shanghai

Test Specification

Standard : FCC CFR 47 PART 15 C (15.209)

Test Report Form No..... : LCSEMC-1.0

TRF Originator : Shenzhen LCS Compliance Testing Laboratory Ltd.

Master TRF..... : Dated 2011-03A

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Test Item Description..... : TPMS TOOL-GJ002

Trade Mark : VALOR

Test Model : GJ002

Ratings..... : DC 6V (1.5*4V) Supply by the battery

Result : **Positive****Compiled by:**

Jayden Zhuo/ File administrators

Supervised by:

Aking Jin / Technique principal

Approved by:

Gavin Liang/ Manager

FCC -- TEST REPORT

Test Report No. : LCS190808016AEAAugust 26,2019
Date of issue

Test Model..... : GJ002

EUT..... : TPMS TOOL-GJ002

Applicant..... : Baolong Huf Shanghai Electronics Co.,Ltd.

Address..... : 1st Floor,Building 5,5500 Shenzhuan Rd,Songjiang,Shanghai

Telephone..... : /

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Manufacturer..... : Baolong Huf Shanghai Electronics Co.,Ltd.

Address..... : 1st Floor,Building 5,5500 Shenzhuan Rd,Songjiang,Shanghai

Telephone..... : /

Fax..... : /

Factory..... : Baolong Huf Shanghai Electronics Co.,Ltd.

Address..... : 1st Floor,Building 5,5500 Shenzhuan Rd,Songjiang,Shanghai

Telephone..... : /

Fax..... : /

Test Result**Positive**

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Revision History

Revision	Issue Date	Revisions	Revised By
000	August 26, 2019	Initial Issue	Gavin Liang

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1. GENERAL INFORMATION

1.1 Description of Device (EUT)

EUT : TPMS TOOL-GJ002
Test Model : GJ002
Hardware Version : QYGJ002-00-01PB-V07
Software Version : QYGJ002-00-02PR-V2.5
Power Supply : DC6V(1.5*4V)Supply by the battery
Operating Frequency : 125KHz
Channel Number : 1
Modulation Type : OOK
Antenna Description : PCB Antenna, 0dBi (Max.)

1.2 Support equipment List

Manufacturer	Description	Model	Serial Number	Certificate
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1.3 External I/O

I/O Port Description	Quantity	Cable
VGA Port	1	N/A

1.4 Description of Test Facility

FCC Registration Number is 254912.

Industry Canada Registration Number is 9642A-1.

EMSD Registration Number is ARCB0108.

UL Registration Number is 100571-492.

TUV SUD Registration Number is SCN1081.

TUV RH Registration Number is UA 50296516-001.

NVLAP Accreditation Code is 600167-0.

FCC Designation Number is CN5024.

CAB identifier: CN0071.

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.4:2014 and CISPR 16-1-4:2010 SVSWR requirement for radiated emission above 1GHz.

1.5 Statement of The Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16 – 4 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements” and is documented in the LCS quality system acc. To DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

1.6 Measurement Uncertainty

Test Item		Frequency Range	Uncertainty	Note
Radiation Uncertainty	:	9KHz~30MHz	$\pm 3.10\text{dB}$	(1)
	:	30MHz~200MHz	$\pm 2.96\text{dB}$	(1)
	:	200MHz~1000MHz	$\pm 3.10\text{dB}$	(1)
	:	1GHz~26.5GHz	$\pm 3.80\text{dB}$	(1)
	:	26.5GHz~40GHz	$\pm 3.90\text{dB}$	(1)
Conduction Uncertainty	:	150kHz~30MHz	$\pm 1.63\text{dB}$	(1)
Power disturbance	:	30MHz~300MHz	$\pm 1.60\text{dB}$	(1)

(1). This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

1.7 Description Of Test Modes

The EUT was set to transmit at 100% duty cycle for testing and the worst case was record.

All the modulation types were tested and only the worst case (OOK) was recorded in this report.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10: 2013 and FCC CFR PART 15C 15.209.

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section 15.209 under the FCC Rules Part 15 Subpart C.

2.3 General Test Procedures

2.3.1 Conducted Emissions (N/A)

According to the requirements in Section 6.2 of ANSI C63.10: 2013, AC power-line conducted emissions shall be measured in the frequency range between 0.15 MHz and 30MHz using Quasi-peak and average detector modes.

2.3.2 Radiated Emissions

The EUT is placed on a turn table and the turntable shall rotate GJ002 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 6.3 of ANSI C63.10: 2013

3. SYSTEM TEST CONFIGURATION

3.1 Justification

N/A.

3.2 EUT Exercise Software

N/A.

3.3 Special Accessories

N/A.

3.4 Block Diagram/Schematics

Please refer to the report.

3.5 Equipment Modifications

Shenzhen LCS Compliance Testing Laboratory Ltd. has not done any modification on the EUT.

3.6 Test Setup

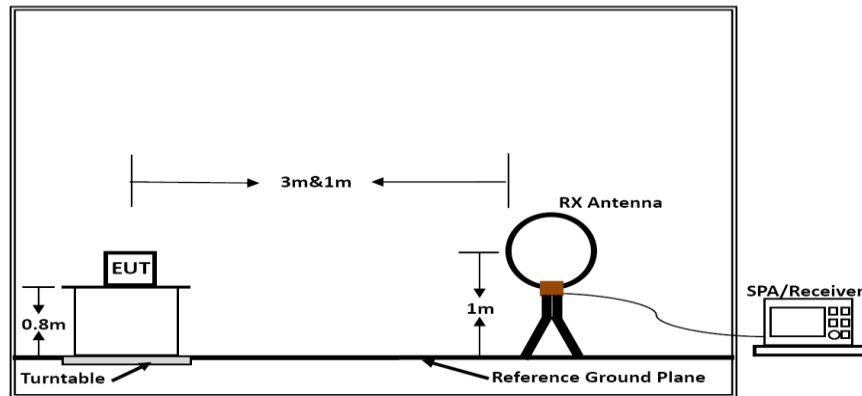
Please refer to the test setup photo.

4. SUMMARY OF TEST RESULT

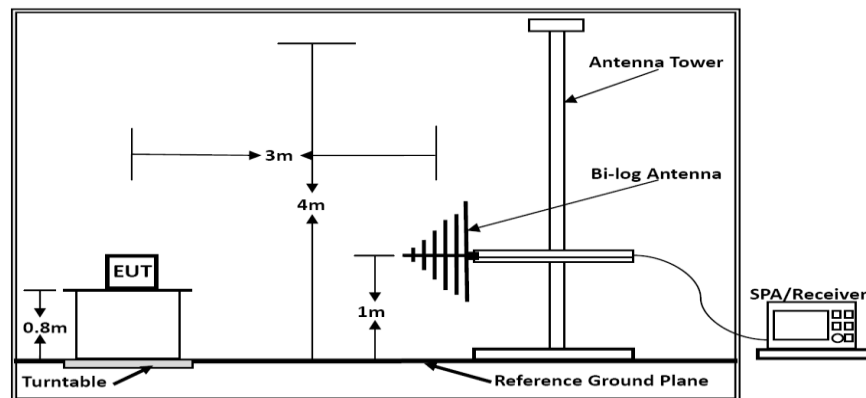
FCC Rules	Test Items	Result
15.207	Power-line Conducted Emissions	N/A
15.205 & 15.209	Radiated Emissions	PASS
15.215	20dB Bandwidth	PASS
15.203	Antenna Requirement	PASS

5. RADIATED MEASUREMENT

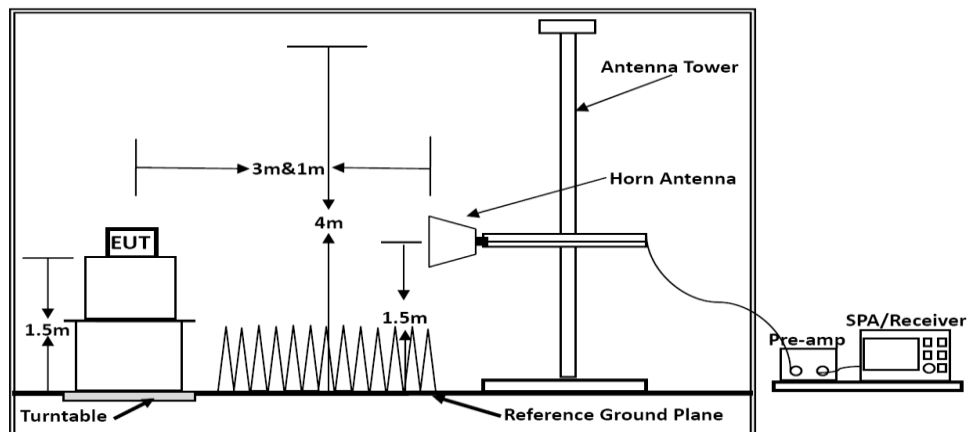
5.1 Block Diagram of Test Setup



Below 30MHz



Below 1GHz



Above 1GHz

Above 18 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade from 3m to 1m.

Distance extrapolation factor = $20 \log (\text{specific distance [3m]} / \text{test distance [1.5m]})$ (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor [6 dB].

5.2 Radiated Emission Limit

15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

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	GJ0020-4400	(12\)
13.36-13.41			

\1\ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

\2\ Above 38.6

According to §15.247 (d): 20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

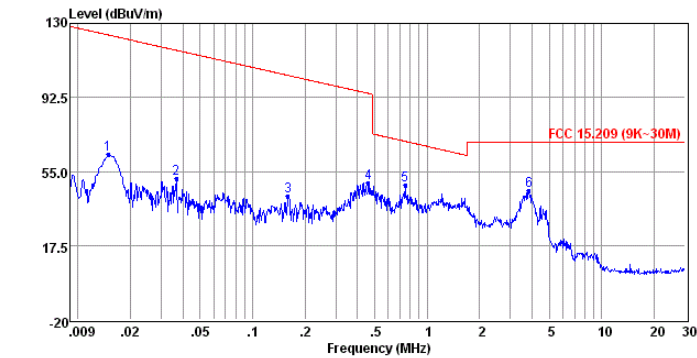
Limit calculation and transfer to 3m distance as showed in the following table:

Frequency (MHz)	Limit (dBuV/m)	Distance (m)
0.009-0.490	$20\log(2400/F(KHz))+40\log(300/3)$	3
0.490-1.705	$20\log(2400/F(KHz))+40\log(30/3)$	3
1.705-30.0	69.5	3
30-88	40.0	3
88-216	43.5	3
216-960	46.0	3
Above 960	54.0	3

5.3 Test Results

PASS.

The test data please refer to following page:

9KHz ~ 30MHz (TX-125KHz)

	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	0.01	42.96	0.30	20.59	63.85	124.16	-60.31	QP
2	0.04	30.37	0.30	20.62	51.29	116.39	-65.10	QP
3	0.16	21.94	0.30	20.44	42.68	103.65	-60.97	QP
4	0.46	28.72	0.30	20.35	49.37	94.54	-45.17	QP
5	0.75	27.37	0.30	20.32	47.99	70.26	-22.27	QP
6	3.82	24.46	0.30	20.29	45.05	69.50	-24.45	QP

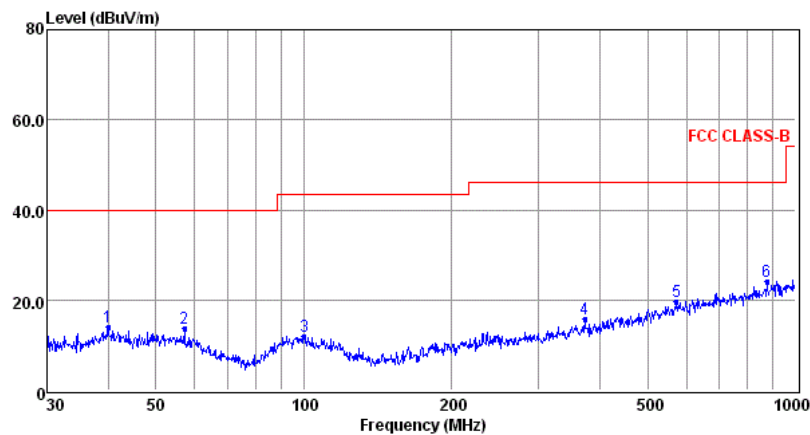
Note: 1. All readings are Quasi-peak values.

2. Measured= Reading + Antenna Factor + Cable Loss

3. The emission that are 20db below the official limit are not reported

*****Note:**

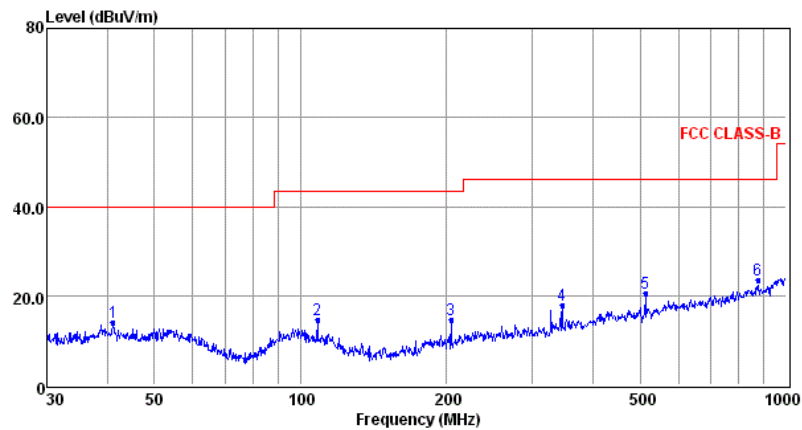
- 1). Factor= Antenna Factor + Cable Loss – Amplifier Gain.
- 2). The EUT was configured as normal. The measurement antenna was positioned with its plane perpendicular to the ground at the specified distances (Antenna Position: Horizontal). Only record the worst test data in this report.

30MHz ~ 1GHz (TX-125KHz)

Env./Ins: 21.9°C/53.4%
pol: HORIZONTAL

	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	39.99	-0.12	0.38	13.58	13.84	40.00	-26.16	QP
2	57.19	0.29	0.47	12.88	13.64	40.00	-26.36	QP
3	100.23	-1.77	0.60	13.14	11.97	43.50	-31.53	QP
4	373.31	-0.02	1.10	14.54	15.62	46.00	-30.38	QP
5	572.61	0.31	1.49	17.94	19.74	46.00	-26.26	QP
6	875.25	1.44	1.87	20.84	24.15	46.00	-21.85	QP

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that are 20db below the official limit are not reported



Env./Ins: 21.9°C/53.4%
pol: VERTICAL

	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	41.13	-0.22	0.50	13.57	13.85	40.00	-26.15	QP
2	108.27	1.38	0.68	12.41	14.47	43.50	-29.03	QP
3	204.24	2.82	0.99	10.70	14.51	43.50	-28.99	QP
4	345.60	2.57	1.13	14.21	17.91	46.00	-28.09	QP
5	513.63	2.36	1.30	16.83	20.49	46.00	-25.51	QP
6	875.25	0.67	1.87	20.84	23.38	46.00	-22.62	QP

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that are 20db below the official limit are not reported

6. BANDWIDTH OF THE OPERATING FREQUENCY

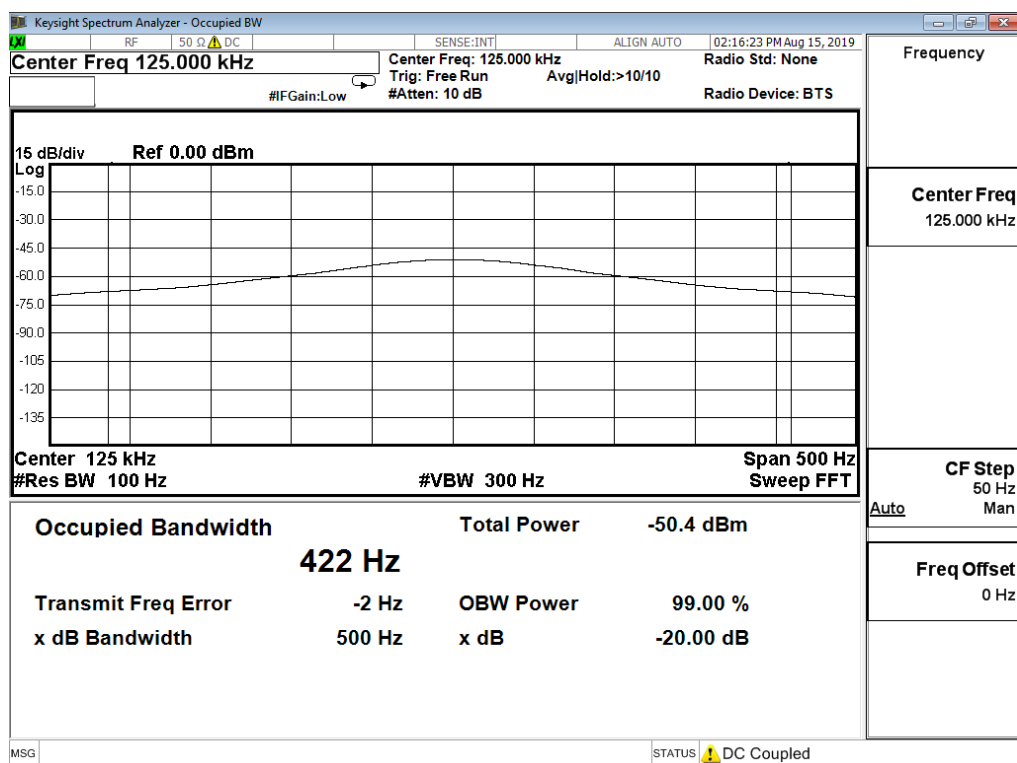
6.1 Standard Applicable

According to its specifications, the EUT must comply with the 20dB Bandwidth measurement of the Section 15.215 under the FCC Rules Part 15 Subpart C.

6.2 Test Result

EUT	TPMS TOOL-GJ002	
RBW	100Hz	
VBW	300Hz	
SPAN	500Hz	
Carrier Freq. (KHz)	20dB Bandwidth (KHz)	Limit (KHz)
125	0.5	None

Please refer to the test plot:



7. ANTENNA REQUIREMENT

7.1 Standard Applicable

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 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.

7.2 Antenna Connected Construction

The antenna used for transmitting is permanently attached and no consideration of replacement. Please see EUT photo for details.

8. TEST SETUP PHOTOGRAPHS OF EUT

Please refer to separated files for Test Setup Photos of the EUT.

9. EXTERIOR PHOTOGRAPHS OF THE EUT

Please refer to separated files for External Photos of the EUT.

10. INTERIOR PHOTOGRAPHS OF THE EUT

Please refer to separated files for Internal Photos of the EUT.

11. LIST OF MEASURING EQUIPMENT

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Power Meter	R&S	NRVS	100444	2019-06-11	2020-06-10
2	Power Sensor	R&S	NRV-Z81	100458	2019-06-11	2020-06-10
3	Power Sensor	R&S	NRV-Z32	10057	2019-06-11	2020-06-10
4	Test Software	Tonscend	JS1120-2	/	N/A	N/A
5	RF Control Unit	Tonscend	JS0806-2	N/A	2019-06-11	2020-06-10
6	MXA Signal Analyzer	Agilent	N9020A	MY50510140	2019-06-11	2020-06-10
7	DC Power Supply	Agilent	E3642A	N/A	2018-11-15	2019-11-14
8	EMI Test Software	AUDIX	E3	/	N/A	N/A
9	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2019-06-12	2020-06-11
10	Positioning Controller	MF	MF-7082	N/A	2019-06-12	2020-06-11
11	Active Loop Antenna	SCHWARZBECK	FMZB 1519B	00005	2019-07-24	2020-07-23
12	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2019-07-24	2020-07-23
13	Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1925	2019-06-30	2020-06-29
14	Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	791	2018-09-20	2019-09-19
15	Broadband Preamplifier	SCHWARZBECK	BBV 9719	9719-025	2018-09-20	2019-09-19
16	EMI Test Receiver	R&S	ESR 7	101181	2019-06-12	2020-06-11
17	RS SPECTRUM ANALYZER	R&S	FSP40	100503	2018-11-15	2019-11-14
18	AMPLIFIER	QuieTek	QTK	CHM/0809065	2018-11-15	2019-11-14
19	RF Cable-R03m	Jye Bao	RG142	CB021	2019-06-12	2020-06-11
20	RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	2019-06-12	2020-06-11
21	6dB Attenuator	/	100W/6dB	1172040	2019-06-11	2020-06-10
22	3dB Attenuator	/	2N-3dB	/	2019-06-11	2020-06-10
23	EMI Test Receiver	R&S	ESPI	101840	2019-06-11	2020-06-10
24	Artificial Mains	R&S	ENV216	101288	2019-06-12	2020-06-11
25	10dB Attenuator	SCHWARZBECK	MTS-IMP-136	261115-001-0032	2019-06-11	2020-06-10

Note: All equipment is calibrated through CHINA CEPREI LABORATORY and GUANGZHOU LISAI CALIBRATION AND TEST CO., LTD.

-----THE END OF REPORT-----