

FCC - TEST REPORT

Report Number : **68.950.21.0720.01** Date of Issue: **2021-11-12**

Model : QI02S, QI03S, QI04S, QI05S, QI06S, QI07S, QI08S, QI09S

Product Type : Wireless Charger

Applicant : Loctek Ergonomic Technology Corp.

Address : 588 Qihang South Road, Binhai Industrial Zone, Yinzhou District
: 315145 Ningbo, Zhejiang, PEOPLE'S REPUBLIC OF CHINA

Manufacturer : Loctek Ergonomic Technology Corp.

Address : 588 Qihang South Road, Binhai Industrial Zone, Yinzhou District
: 315145 Ningbo, Zhejiang, PEOPLE'S REPUBLIC OF CHINA

Test Result : ☒ **Positive** ☐ **Negative**

Total pages including Appendices : **18**

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1 Table of Contents

1	Table of Contents	2
2	Details about the Test Laboratory.....	3
3	Description of the Equipment Under Test.....	4
4	Summary of Test Standards.....	5
5	Summary of Test Results.....	6
6	General Remarks	7
7	Test Setups	8
8	Technical Requirement	9
8.1	Conducted Emission Test	9
8.2	20 dB Bandwidth	12
8.3	Radiated Emission Test.....	13
9	Test Equipment List	17
10	System Measurement Uncertainty	18

2 Details about the Test Laboratory

Details about the Test Laboratory

Test Site 1

Company name: TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12 & 13, Zhiheng Wisdomland Business Park, Nantou Checkpoint
Road 2, Nanshan District
Shenzhen 518052
P.R. China

Telephone: 86 755 8828 6998

Fax: 86 755 828 5299

FCC Registration 514049

No.:

3 Description of the Equipment Under Test

Product:	Wireless Charger
Model no.:	QI02S, QI03S, QI04S, QI05S, QI06S, QI07S, QI08S, QI09S
FCC ID:	2ARK8-QI02S
Rating:	Input: 20-36VDC == 1.0A Max
RF Transmission Frequency:	115KHz and 178KHz
Antenna Type:	Integrated coil antenna
Antenna Gain:	0dBi
Description of the EUT:	The Equipment Under Test (EUT) is a Wireless Charger which operated at 115KHz and 178KHz.

Remark:

The QI03S, QI04S, QI05S, QI06S, QI07S, QI08S, QI09S have the same technical construction including circuit diagram, PCB Layout, components and component layout, all electrical construction and mechanical construction, with Wireless Charger, QI02S. The difference place only in model name of the different models.

Due to the similarity among all models, model carbon QI02S was chosen as the representative model to perform RF full tests, other models were deemed to fulfill relevant rf requirements without further testing

4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2020 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators

All the test methods were according to ANSI C63.10 (2013).

5 Summary of Test Results

Technical Requirements					
FCC Part 15 Subpart C					
Test Condition		Test Site	Test Result		
			Pass	Fail	N/A
§15.207	Conducted emission AC power port	Site 1	☒	☐	☐
--	20dB bandwidth	Site 1	☒	☐	☐
§15.205	Restricted bands of operation	Site 1	☒	☐	☐
§15.209	Radiated emission	Site 1	☒	☐	☐
§15.203	Antenna requirement	See note 1	☒	☐	☐

Note 1: The EUT uses an Integrated coil antenna, which gain is 0dBi. In accordance to §15.203, it is considered sufficiently to comply with the provisions of this section.

6 General Remarks

Remarks

This submittal(s) (test report) complies with Section 15.207, 15.209, 15.205 of the FCC Part 15, Subpart C rules.

SUMMARY:

All tests according to the regulations cited on page 5 were

■ - Performed

□ - **Not** Performed

The Equipment under Test

■ - **Fulfills** the general approval requirements.

□ - **Does not** fulfill the general approval requirements.

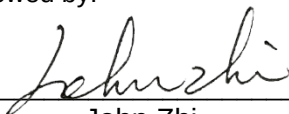
Sample Received Date: 2021-10-22

Testing Start Date: 2021-11-04

Testing End Date: 2021-11-12

- TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch -

Reviewed by:

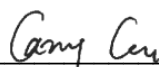

John Zhi
Project Manager

Prepared by:



Warlen Song
Project Engineer

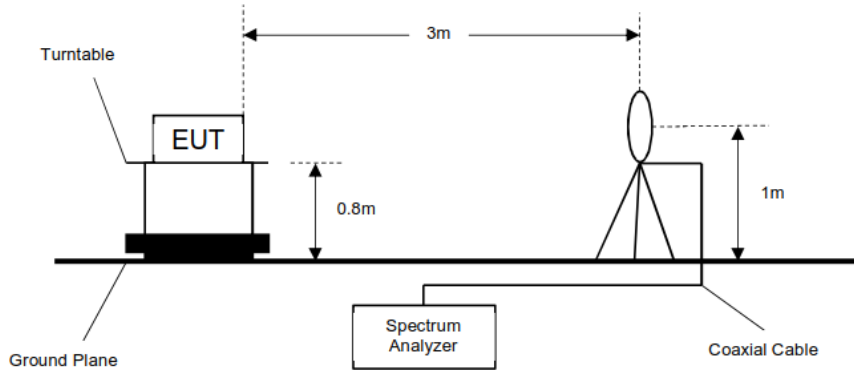
Tested by:


Carry Cai
Test Engineer

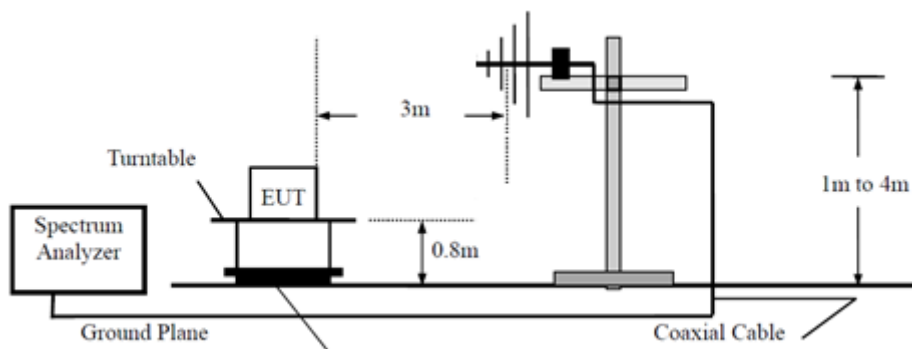
7 Test Setups

7.1 Radiated test setups

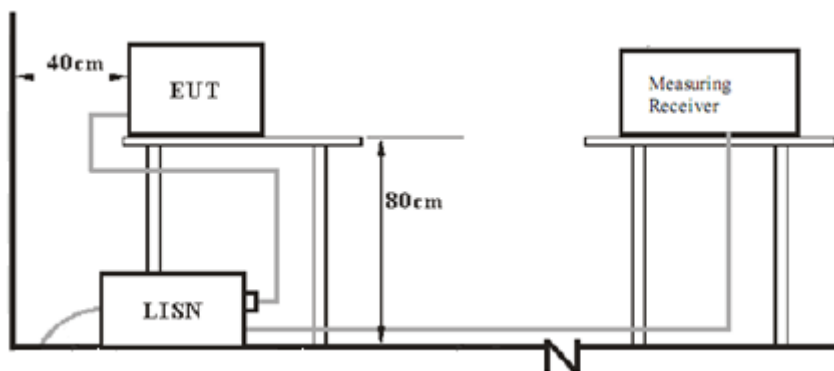
Below 30MHz



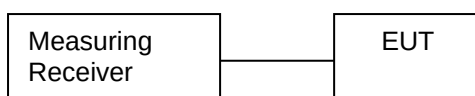
30MHz-1GHz



7.2 AC Power Conducted test setups



7.3 Conducted RF test setups



8 Technical Requirement

8.1 Conducted Emission Test

Test Method

1. The EUT was placed on a table, which is 0.8m above ground plane
2. The power line of the EUT is connected to the AC mains through an Artificial Mains Network (A.M.N.).
3. Maximum procedure was performed to ensure EUT compliance
4. A EMI test receiver is used to test the emissions from both sides of AC line

Limit

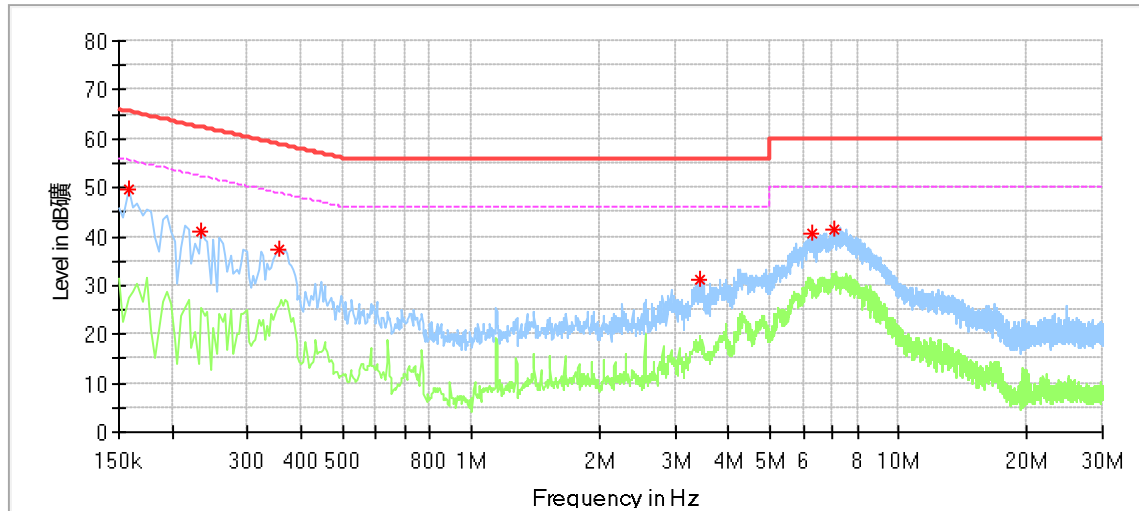
According to §15.207, conducted emissions limit as below:

Frequency	QP Limit	AV Limit
MHz	dB μ V	dB μ V
0.150-0.500	66-56*	56-46*
0.500-5	56	46
5-30	60	50

*Decreasing linearly with logarithm of the frequency

Conducted Emission

Model: QI02S
 Test mode: Normal Charging
 Test Voltage: AC 120V/60Hz
 Remark: /



Critical Freqs

Frequency (MHz)	MaxPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Line	Corr. (dB)
0.158000	49.73	---	65.57	15.84	L1	9.25
0.234000	40.82	---	62.31	21.48	L1	9.23
0.354000	37.26	---	58.87	21.61	L1	9.21
3.442000	31.06	---	56.00	24.94	L1	9.26
6.282000	40.58	---	60.00	19.42	L1	9.34
7.030000	41.37	---	60.00	18.63	L1	9.36

Final Result

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Line	Corr. (dB)
---	---	---	---	---	---	---

Remark:

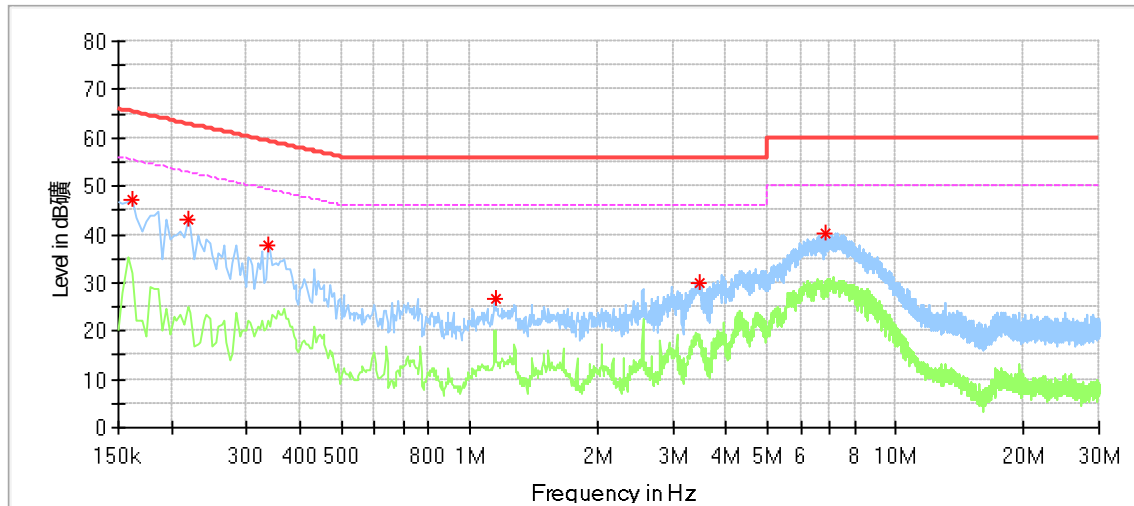
Level=Reading Level + Correction Factor

Correction Factor=Cable Loss + LISN Factor

(The Reading Level is recorded by software which is not shown in the sheet)

Conducted Emission

Model: QI02S
 Test mode: Normal Charging
 Test Voltage: AC 120V/60Hz
 Remark: /



Critical Freqs

Frequency (MHz)	MaxPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Line	Corr. (dB)
0.162000	47.23	---	65.36	18.13	N	9.41
0.218000	42.87	---	62.90	20.02	N	9.39
0.338000	37.55	---	59.25	21.70	N	9.39
1.150000	26.85	---	56.00	29.15	N	9.40
3.466000	29.89	---	56.00	26.11	N	9.45
6.858000	40.26	---	60.00	19.74	N	9.55

Final Result

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Line	Corr. (dB)
---	---	---	---	---	---	---

Remark:

Level=Reading Level + Correction Factor

Correction Factor=Cable Loss + LISN Factor

(The Reading Level is recorded by software which is not shown in the sheet)

8.2 20 dB Bandwidth

Test Method

1. Use the following spectrum analyzer settings:
RBW=200Hz, VBW $\geq$ 3RBW, Sweep = auto, Detector function = peak, Trace = max hold
2. Use the automatic bandwidth measurement capability of an instrument, may be employed using the X dB bandwidth mode with X set to 20 dB, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be $\geq$ 20 dB.
3. Allow the trace to stabilize, record the X dB Bandwidth value.

Limit

Limit [kHz]

No Limit

Test result

Frequency kHz	20dB bandwidth kHz	Result		Result
		F _L (kHz)	F _H (kHz)	
115.69kHz	0.6946	114.993	--	Pass
177.63kHz	0.6946	--	177.97	Pass

The fundamental frequency is outside the restricted bands of 15.205 section.

8.3 Radiated Emission Test

Test Method

- 1: The EUT was placed on a turn table which is 0.8m above ground for below 1GHz at 3 meters chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- 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.
- 3: The height of antenna 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.
- 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.
- 5: Use the following spectrum analyzer settings According to C63.10:

Limit

the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency MHz	Field Strength $\mu\text{V/m}$	Field Strength $\text{dB}\mu\text{V/m}$	Detector	Measurement distance meters
0.009-0.490	2400/F(kHz)	48.5-13.8	AV	300
0.490-1.705	24000/F(kHz)	33.8-23.0	QP	30
1.705-30	30	29.5	QP	30
30-88	100	40	QP	3
88-216	150	43.5	QP	3
216-960	200	46	QP	3
960-1000	500	54	QP	3
Above 1000	500	54	AV	3
Above 1000	5000	74	PK	3

Note 1: Limit $3\text{m}(\text{dB}\mu\text{V/m}) = \text{Limit } 300\text{m}(\text{dB}\mu\text{V/m}) + 40\text{Log}(300\text{m}/3\text{m})$ (Below 30MHz)

Note 2: Limit $3\text{m}(\text{dB}\mu\text{V/m}) = \text{Limit } 30\text{m}(\text{dB}\mu\text{V/m}) + 40\text{Log}(30\text{m}/3\text{m})$ (Below 30MHz)

Radiated emissions test (9KHz-30MHz)

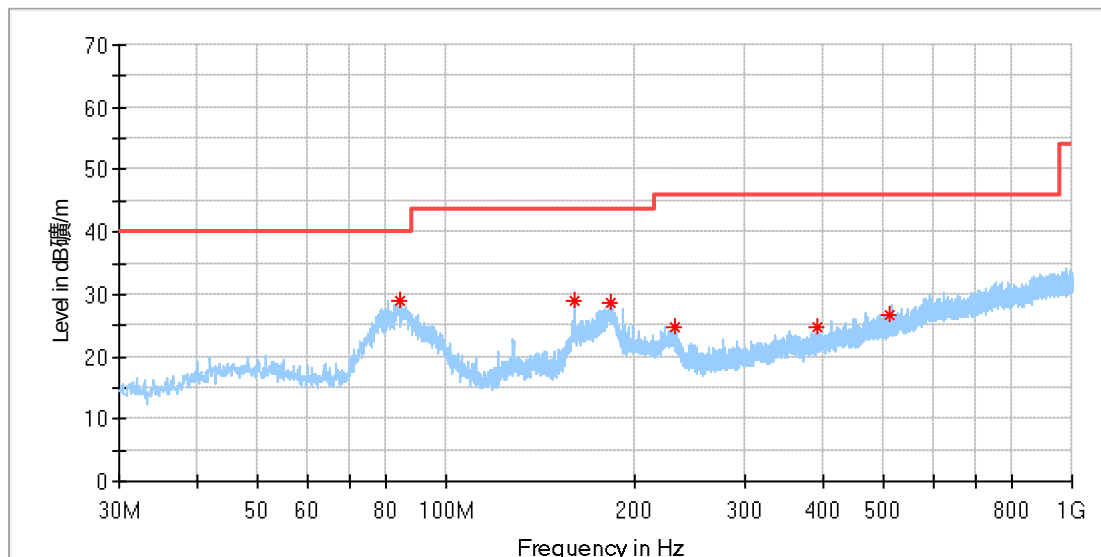
Frequency Band	Frequency MHz	Emission Level dBμV/m	Polarization	Limit dBμV/m	Detector	Margin dBμV/m	Correct factor (dB)	Result
9KHz-30MHz	0.0090*	41.46	H	128.52	Average	87.06	19.67	Pass
	0.131294	63.32	H	105.55	Average	42.23	19.67	Pass
	0.388800	42.17	H	95.81	Average	53.64	19.70	Pass
	Other frequency	--	H	--	Average	--	--	Pass
	0.0090*	42.09	V	128.52	Average	86.43	19.67	Pass
	0.131341	59.92	V	105.24	Average	45.32	19.67	Pass
	0.393775	38.95	V	95.70	Average	56.75	19.68	Pass
	Other frequency	--	V	--	Average	--	--	Pass

Remark:

- (1) “*” means the emission(s) appear within the restrict bands shall follow the requirement of section 15.205.
- (2) Data of measurement within this frequency range shown “--” in the table above means the reading of emissions are the noise floor or attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (3) Above 1GHz: Corrector factor = Antenna Factor + Cable Loss- Amplifier Gain
Below 1GHz: Corrector factor = Antenna Factor + Cable Loss

Radiated emissions test (30MHz-1000MHz)

Model: QI02S
 Test Mode: Normal Charging
 Test Voltage: AC 120V/60Hz
 Remark: /



Critical Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
84.198750	29.03	40.00	10.97	200.0	H	1.0	14.82
159.798125	29.11	43.50	14.39	200.0	H	0.0	16.18
183.381250	28.60	43.50	14.90	200.0	H	194.0	17.40
231.881250	24.66	46.00	21.34	200.0	H	0.0	19.98
392.537500	24.66	46.00	21.34	200.0	H	287.0	24.00
509.180000	26.81	46.00	19.19	200.0	H	330.0	26.37

Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
---	---	---	---	---		---	---

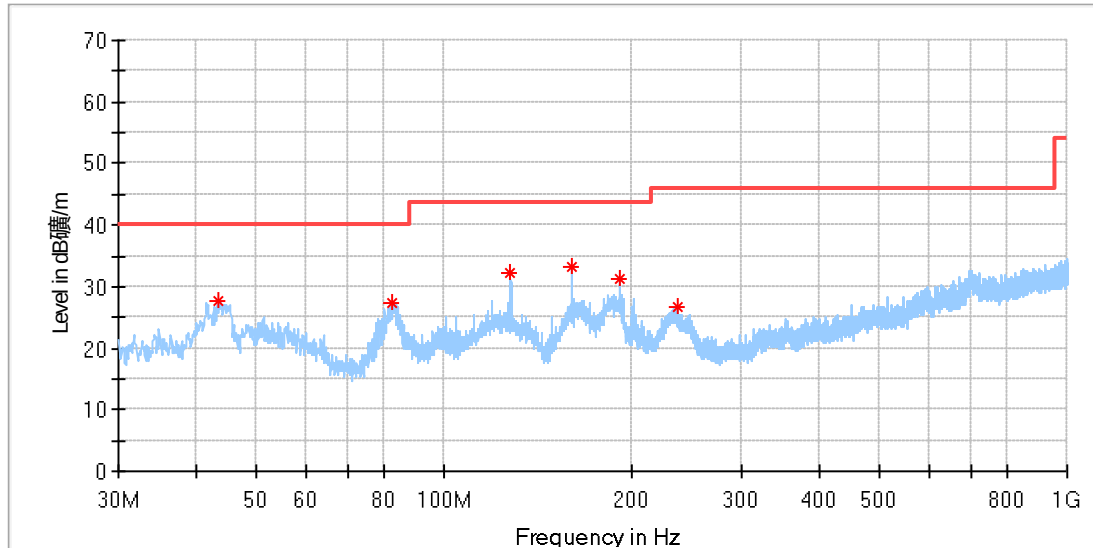
Remark:

Level=Reading Level + Correction Factor

Correction Factor=Antenna Factor + Cable Loss

(The Reading Level is recorded by software which is not shown in the sheet)

Model: QI02S
 Test Mode: Normal Charging
 Test Voltage: AC 120V/50Hz
 Remark: /



Critical Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
43.276875	27.75	40.00	12.25	100.0	V	0.0	20.29
82.561875	27.23	40.00	12.77	100.0	V	151.0	14.45
127.848750	32.20	43.50	11.30	100.0	V	21.0	16.00
159.858750	33.08	43.50	10.42	100.0	V	195.0	16.18
191.868750	31.12	43.50	12.38	100.0	V	80.0	18.55
236.670625	26.69	46.00	19.31	100.0	V	210.0	20.22

Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
---	---	---	---	---	---	---	---

Remark:

Level=Reading Level + Correction Factor

Correction Factor=Antenna Factor + Cable Loss

(The Reading Level is recorded by software which is not shown in the sheet)

9 Test Equipment List

Radiated Emission Test 1# Test

DESCRIPTION	MANUFACTURE R	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL INTERVAL (YEAR)	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 7	68-4-74-19-001	102176	1	2022-6-4
Loop Antenna	Rohde & Schwarz	HFH2-Z2	68-4-80-14-006	100398	1	2022-9-1
Pre-amplifier	Rohde & Schwarz	SCU 18	68-4-29-14-001	102230	1	2022-6-6
Attenuator	Agilent	8491A	68-4-81-16-001	MY39264334	1	2022-6-3
3m Semi-anechoic chamber	TDK	SAC-3 #1	68-4-90-14-001	----	3	2022-10-28
Test software	Rohde & Schwarz	EMC32	68-4-90-14-001-A10	Version10.35.02	N/A	N/A

Radiated Emission Test

DESCRIPTION	MANUFACTURE R	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL INTERVAL (YEAR)	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 26	68-4-74-14-002	101269	1	2022-6-4
Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9162	68-4-80-19-003	284	1	2022-2-2
Pre-amplifier	Rohde & Schwarz	SCU 18F	68-4-29-19-001	100745	1	2022-10-24
Pre-amplifier	Rohde & Schwarz	SCU 08F2	68-4-29-19-004	08400018	1	2022-10-24
Pre-amplifier	Rohde & Schwarz	SCU 40A	68-4-29-14-002	100432	1	2022-7-27
3m Semi-anechoic chamber	TDK	SAC-3 #2	68-4-90-19-006	----	3	2022-12-29
Test software	Rohde & Schwarz	EMC32	68-4-90-19-006-A01	Version10.3 5.02	N/A	N/A

Conducted Emission Test

DESCRIPTION	MANUFACTURE R	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL INTERVAL (YEAR)	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 3	68-4-74-14-001	101782	1	2022-6-4
LISN	Rohde & Schwarz	ENV4200	68-4-87-14-001	100249	1	2022-6-5
LISN	Rohde & Schwarz	ENV432	68-4-87-16-001	101318	1	2022-6-5
LISN	Rohde & Schwarz	ENV216	68-4-87-14-002	100326	1	2022-6-5
Attenuator	Shanghai Huaxiang	TS2-26-3	68-4-81-16-003	080928189	1	2022-6-3
Test software	Rohde & Schwarz	EMC32	68-4-90-14-003-A10	Version9.15.00	N/A	N/A
Shielding Room	TDK	CSR #1	68-4-90-19-004	----	1	2022-11-07

RF Test

DESCRIPTION	MANUFACTURE R	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL INTERVAL (YEAR)	CAL. DUE DATE
Signal Analyzer	Rohde & Schwarz	FSV40	68-4-74-14-004	101030	1	2022-6-3

10 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

System Measurement Uncertainty	
Test Items	Extended Uncertainty
Uncertainty for Conducted Emission 150kHz-30MHz (for test using AMN ENV432 or ENV4200)	3. 21dB
Uncertainty for Radiated Emission in 3m chamber 9KHz-30MHz	4.60 dB
Uncertainty for Radiated Emission in 3m chamber 30MHz-1000MHz	Horizontal: 4.70dB; Vertical: 4.67dB

---The End---