TCT 通测检测
TESTING CENTRE TECHNOLOGY

TEST REPORT

FCC ID. ..... :	2AUAR393TKX11
Test Report No..... :	TCT230425E055
Date of issue..... :	Jul. 10, 2023
Testing laboratory ..... :	SHENZHEN TONGCE TESTING LAB
Testing location/ address:	2101 & 2201, Zhenchang Factory, Renshan Industrial Zone, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, 518103, People's Republic of China
Applicant's name..... :	THINKCAR TECH CO., LTD.
Address..... :	2606, building 4, phase II, TiananYungu, Gangtou community, Bantian, Longgang District, Shenzhen, China
Manufacturer's name ... :	THINKCAR TECH CO., LTD.
Address..... :	2606, building 4, phase II, TiananYungu, Gangtou community, Bantian, Longgang District, Shenzhen, China
Standard(s) ..... :	FCC CFR Title 47 Part 15 Subpart C
Product Name..... :	Remote Diagnostic Service
Trade Mark ..... :	THINKCAR, XHINKCAR, MUCAR
Model/Type reference..... :	TKX11, THINKTOOL Expert 393, THINKTOOL Euro 393, THINKTOOL Platinum 393, THINKTOOL X10 Pro, TKX10
Rating(s)..... :	Adapter Information: Model: PSYB0502500 Input: AC 100-240V, 50/60Hz, 0.6A Max Output: DC 5.0V, 2.5A, 12.5W Rechargeable Li-ion Battery DC 3.8V
Date of receipt of test item ..... :	Apr. 25, 2023
Date (s) of performance of test..... :	Apr. 25, 2023 - Jul. 10, 2023
Tested by (+signature) ... :	Brews XU
Check by (+signature).... :	Beryl ZHAO
Approved by (+signature):	Tomsin

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1. General Product Information

1.1. EUT description

Product Name.....:	Remote Diagnostic Service
Model/Type reference.....:	TKX11
Sample Number.....:	TCT230425E041-0101
Operation Frequency .....:	125kHz
Modulation Technology .....:	FSK
Antenna Type.....:	Internal Antenna
Rating(s).....:	Adapter Information: Model: PSYB0502500 Input: AC 100-240V, 50/60Hz, 0.6A Max Output: DC 5.0V, 2.5A, 12.5W Rechargeable Li-ion Battery DC 3.8V

Note: The antenna gain listed in this report is provided by applicant, and the test laboratory is not responsible for this parameter.

1.2. Model(s) list

No.	Model No.	Tested with
1	TKX11	☒
Other models	THINKTOOL Expert 393, THINKTOOL Euro 393, THINKTOOL Platinum 393, THINKTOOL X10 Pro, TKX10	☐

Note: TKX11 is tested model, other models are derivative models. The models are identical in circuit and PCB layout, different on the model names, trademarks and color. So the test data of TKX11 can represent the remaining models.

Hotline: 400-6611-140 Tel: 86-755-27673339 Fax: 86-755-27673332 http://www.tct-lab.com

2. Test Result Summary

Requirement	CFR 47 Section	Result
Antenna requirement	§15.203	PASS
AC Power Line Conducted Emission	§15.207	PASS
Spurious Emission	§15.209(a)(f)	PASS

Note:

1. PASS: Test item meets the requirement.

2. Fail: Test item does not meet the requirement.

3. N/A: Test case does not apply to the test object.

4. The test result judgment is decided by the limit of test standard.

3. General Information

3.1. Test environment and mode

Operating Environment:		
Condition	Conducted Emission	Radiated Emission
Temperature:	23.5 °C	26.3 °C
Humidity:	52 % RH	55 % RH
Atmospheric Pressure:	1010 mbar	1010 mbar
Test Mode:		
Engineering mode:	Keep the EUT in continuous transmitting.	
The sample was placed 0.8m for the measurement below above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case(Z axis) are shown in Test Results of the following pages.		

3.2. 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.

Equipment	Model No.	Serial No.	FCC ID	Trade Name
/	/	/	/	/

Note:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.

2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

4. Facilities and Accreditations

4.1. Facilities

The test facility is recognized, certified, or accredited by the following organizations:

- FCC - Registration No.: 645098
  SHENZHEN TONGCE TESTING LAB
  Designation Number: CN1205
  The testing lab has been registered and fully described in a report with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.
- IC - Registration No.: 10668A-1
  SHENZHEN TONGCE TESTING LAB
  CAB identifier: CN0031
  The testing lab has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing.

4.2. Location

SHENZHEN TONGCE TESTING LAB
Address: 2101 & 2201, Zhenchang Factory Renshan Industrial Zone, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, 518103, People's Republic of China
TEL: +86-755-27673339

4.3. Measurement Uncertainty

The reported uncertainty of measurement y ± U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

No.	Item	MU
1	Conducted Emission	± 3.10 dB
2	RF power, conducted	± 0.12 dB
3	Spurious emissions, conducted	± 0.11 dB
4	All emissions, radiated(<1 GHz)	± 4.56 dB
5	All emissions, radiated(1 GHz - 18 GHz)	± 4.22 dB
6	All emissions, radiated(18 GHz- 40 GHz)	± 4.36 dB

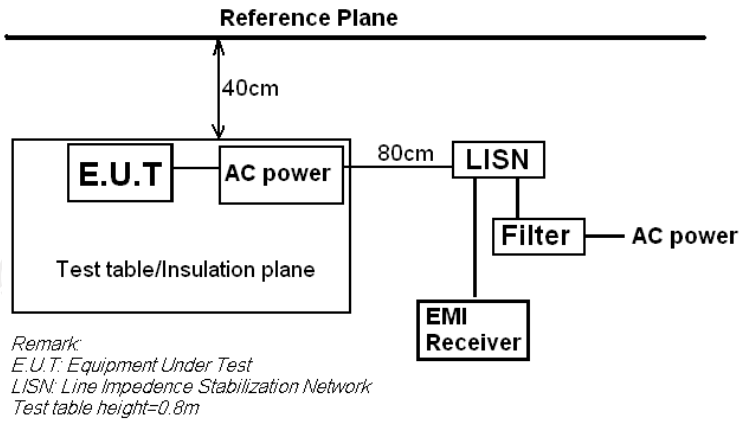
5. Test Results and Measurement Data

5.1. Antenna requirement

Standard requirement:	FCC Part15 C Section 15.203
15.203 requirement: 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.	
E.U.T Antenna:	
The antenna is internal antenna which permanently attached.	

5.2. Conducted Emission

5.2.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.207
Test Method:	ANSI C63.10: 2013
Frequency Range:	150 kHz to 30 MHz
Receiver setup:	RBW=9 kHz, VBW=30 kHz, Sweep time=auto
Limits:	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
Test Setup:	
Test Mode:	Charging +Transmitting Mode
Test Procedure:	1. The E.U.T is connected to an adapter through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment. 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). 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 C63.10: 2013 on conducted measurement.
Test Result:	PASS

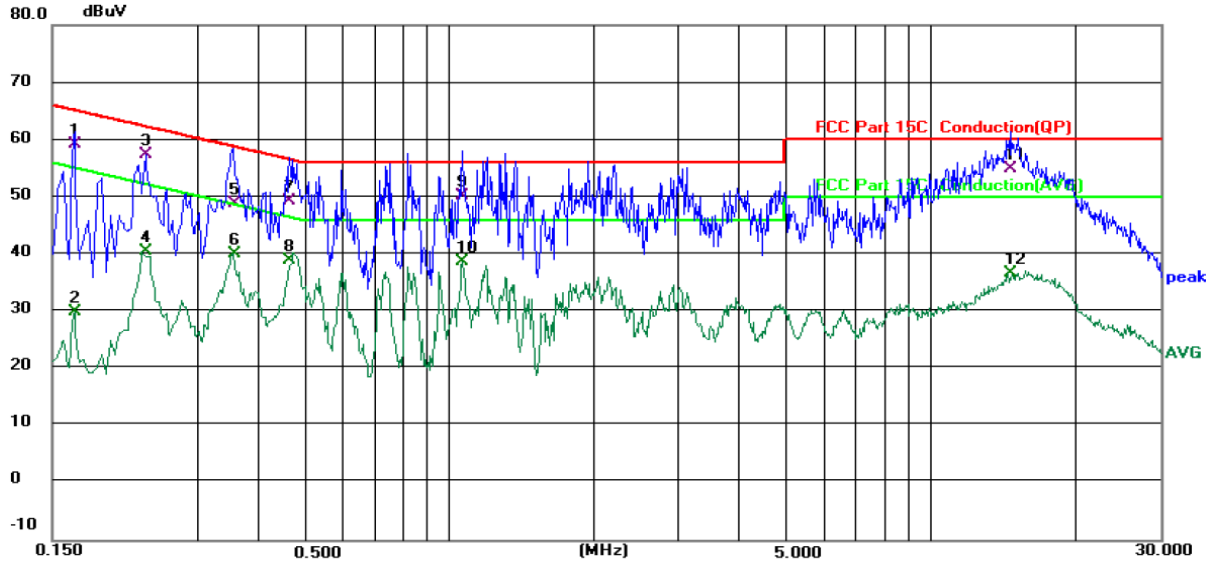
5.2.2. Test Instruments

Conducted Emission Shielding Room Test Site (843)				
Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
EMI Test Receiver	R&S	ESCI3	100898	Jun. 30, 2024
Line Impedance Stabilisation Newtork(LISN)	Schwarzbeck	NSLK 8126	8126453	Feb. 20, 2024
Line-5	TCT	CE-05	/	Jul. 03, 2024
EMI Test Software	Shurple Technology	EZ-EMC	/	/

5.2.3. Test data

Please refer to following diagram for individual

Conducted Emission on Line Terminal of the power line (150 kHz to 30MHz)



Site 844 Shielding Room | Phase: *L1* | Temperature: 23.5 (℃) | Humidity: 52 %

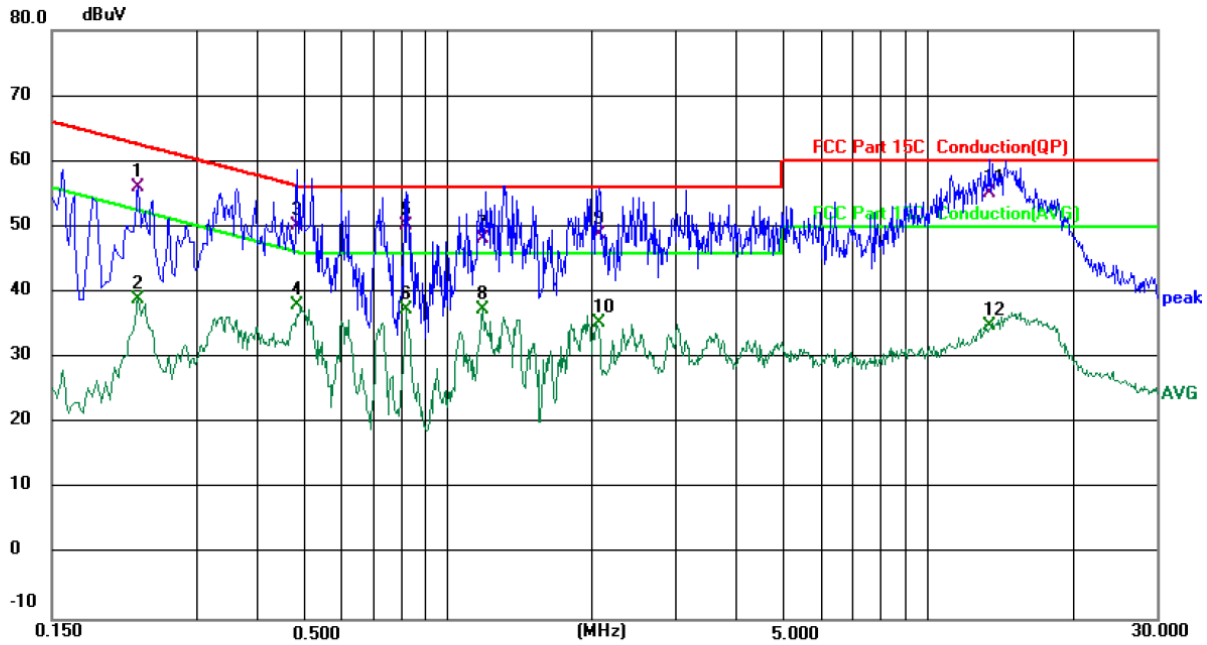
Limit: FCC Part 15C Conduction(QP) | Power:AC 120 V/60 Hz

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1660	49.07	10.13	59.20	65.16	-5.96	QP	
2		0.1660	19.79	10.13	29.92	55.16	-25.24	AVG	
3	*	0.2340	47.45	9.95	57.40	62.31	-4.91	QP	
4		0.2340	30.48	9.95	40.43	52.31	-11.88	AVG	
5		0.3539	39.31	9.59	48.90	58.87	-9.97	QP	
6		0.3539	30.49	9.59	40.08	48.87	-8.79	AVG	
7		0.4660	39.81	9.49	49.30	56.58	-7.28	QP	
8		0.4660	29.41	9.49	38.90	46.58	-7.68	AVG	
9		1.0700	41.19	8.91	50.10	56.00	-5.90	QP	
10		1.0700	29.75	8.91	38.66	46.00	-7.34	AVG	
11		14.6340	44.73	10.17	54.90	60.00	-5.10	QP	
12		14.6340	26.54	10.17	36.71	50.00	-13.29	AVG	

Note:

Freq. = Emission frequency in MHz
Reading level (dBµV) = Receiver reading
Corr. Factor (dB) = LISN factor + Cable loss
Measurement (dBµV) = Reading level (dBµV) + Corr. Factor (dB)
Limit (dBµV) = Limit stated in standard
Margin (dB) = Measurement (dBµV) – Limits (dBµV)
Q.P. =Quasi-Peak
AVG =average
** is meaning the worst frequency has been tested in the frequency range 150 kHz to 30MHz*

Conducted Emission on Neutral Terminal of the power line (150 kHz to 30MHz)



Site 844 Shielding Room | Phase: *N* | Temperature: 23.5 (℃) | Humidity: 52 %

Limit: FCC Part 15C Conduction(QP) | Power:AC 120 V/60 Hz

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.2260	46.15	9.95	56.10	62.60	-6.50	QP	
2		0.2260	29.03	9.95	38.98	52.60	-13.62	AVG	
3		0.4858	40.73	9.47	50.20	56.24	-6.04	QP	
4		0.4858	28.65	9.47	38.12	46.24	-8.12	AVG	
5		0.8256	40.95	9.15	50.10	56.00	-5.90	QP	
6		0.8256	28.14	9.15	37.29	46.00	-8.71	AVG	
7		1.1900	38.21	9.99	48.20	56.00	-7.80	QP	
8		1.1900	27.29	9.99	37.28	46.00	-8.72	AVG	
9		2.0659	38.88	10.02	48.90	56.00	-7.10	QP	
10		2.0659	25.35	10.02	35.37	46.00	-10.63	AVG	
11	*	13.4178	44.87	10.23	55.10	60.00	-4.90	QP	
12		13.4178	24.57	10.23	34.80	50.00	-15.20	AVG	

Note1:

Freq. = Emission frequency in MHz
Reading level (dBµV) = Receiver reading
Corr. Factor (dB) = LISN factor + Cable loss
Measurement (dBµV) = Reading level (dBµV) + Corr. Factor (dB)
Limit (dBµV) = Limit stated in standard
Margin (dB) = Measurement (dBµV) – Limits (dBµV)
Q.P. =Quasi-Peak
AVG =average
** is meaning the worst frequency has been tested in the frequency range 150 kHz to 30MHz.*

5.3. Radiated Spurious Emission Measurement

5.3.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.209
Test Method:	ANSI C63.10: 2013
Frequency Range:	9 kHz to 25 GHz
Measurement Distance:	3 m
Antenna Polarization:	Horizontal & Vertical
Operation mode:	Refer to item 3.1

Receiver Setup:

Frequency	Detector	RBW	VBW	Remark
9kHz- 150kHz	Quasi-peak	200Hz	1kHz	Quasi-peak Value
150kHz-30MHz	Quasi-peak	9kHz	30kHz	Quasi-peak Value
30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak Value
Above 1GHz	Peak	1MHz	3MHz	Peak Value
	Peak	1MHz	10Hz	Average Value

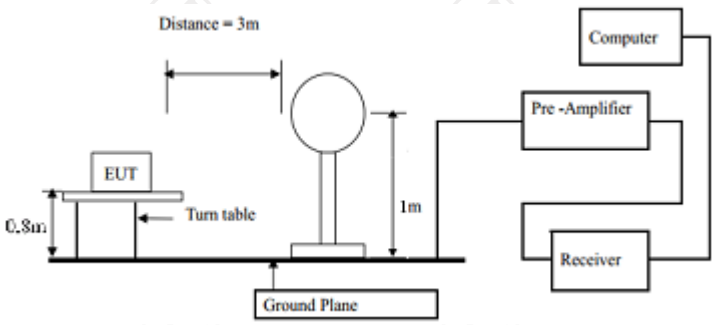
Limit:

Frequency	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	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Frequency	Field Strength (microvolts/meter)	Measurement Distance (meters)	Detector
Above 1GHz	500	3	Average
	5000	3	Peak

Test setup:

For radiated emissions below 30MHz



30MHz to 1GHz

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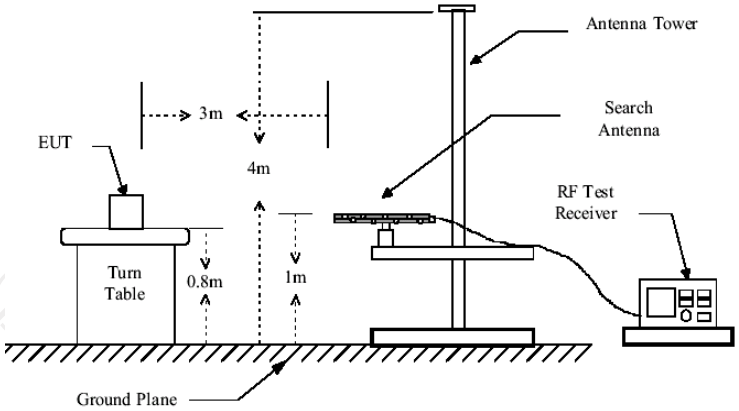
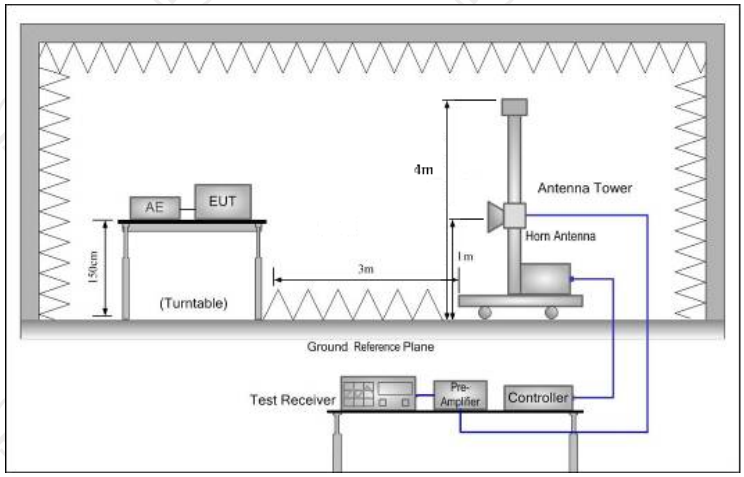


Above 1GHz


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<tr>
<td>Test Procedure:</td>
<td>1. For the radiated emission test below 1GHz:
The EUT was placed on a turntable with 0.8 meter above ground. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high PASS filter are used for the test in order to get better signal level.
For the radiated emission test above 1GHz:
Place the measurement antenna on a turntable with 1.5 meter above ground, which is away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final</td>
</tr>
</table>

	measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane. 2. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level 3. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported. 4. Use the following spectrum analyzer settings: (1) Span shall wide enough to fully capture the emission being measured; (2) Set RBW=120 kHz for f < 1 GHz; VBW ≥RBW; Sweep = auto; Detector function = peak; Trace = max hold; (3) Set RBW = 1 MHz, VBW= 3MHz for f 1 GHz for peak measurement. For average measurement: VBW = 10 Hz, when duty cycle is no less than 98 percent. VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.
Test mode:	Refer to section 3.1 for details
Test results:	PASS

Hotline: 400-6611-140 Tel: 86-755-27673339 Fax: 86-755-27673332 http://www.tct-lab.com

5.3.2. Test Instruments

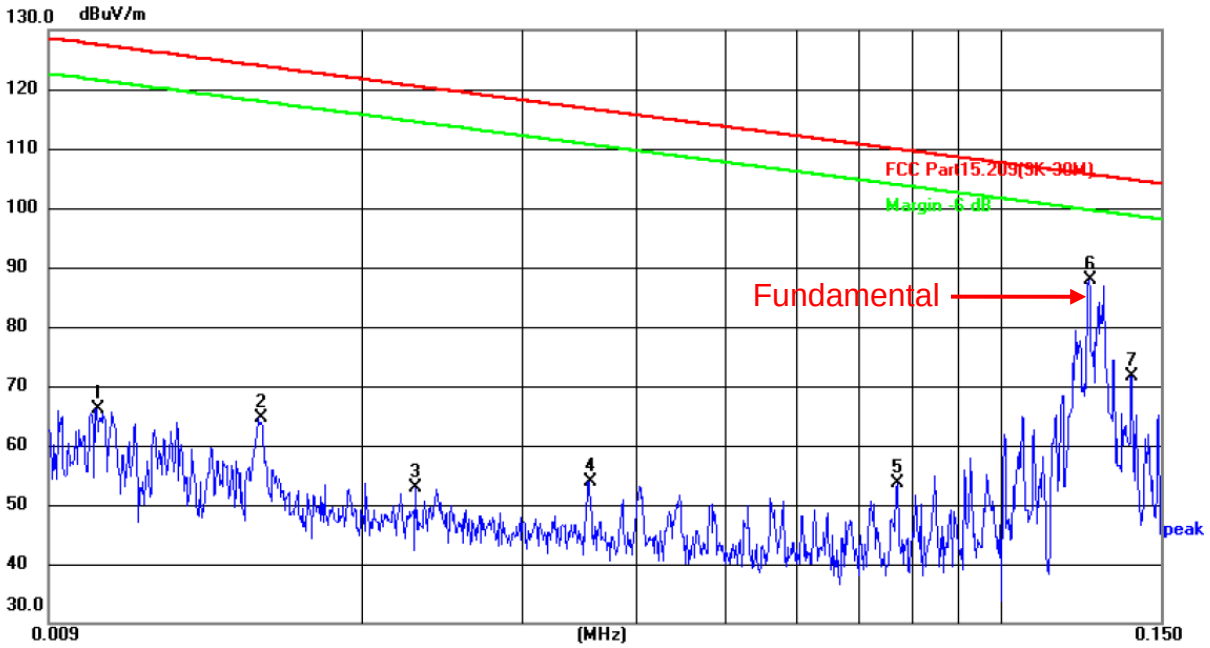
Radiated Emission Test Site (966)				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
EMI Test Receiver	R&S	ESIB7	100197	Jun. 30, 2024
Spectrum Analyzer	R&S	FSQ40	200061	Jun. 30, 2024
Pre-amplifier	SKET	LNPA_0118G-45	SK2021012102	Feb. 20, 2024
Pre-amplifier	SKET	LNPA_1840G-50	SK202109203500	Feb. 20, 2024
Pre-amplifier	HP	8447D	2727A05017	Jun. 30, 2024
Loop antenna	Schwarzbeck	FMZB1519B	00191	Jun. 11, 2024
Broadband Antenna	Schwarzbeck	VULB9163	340	Jun. 30, 2024
Horn Antenna	Schwarzbeck	BBHA 9120D	631	Jun. 30, 2024
Horn Antenna	Schwarzbeck	BBHA 9170	00956	Feb. 24, 2024
Coaxial cable	SKET	RC-18G-N-M	/	Feb. 24, 2024
Coaxial cable	SKET	RC_40G-K-M	/	Feb. 24, 2024
EMI Test Software	Shurple Technology	EZ-EMC	/	/

5.3.3. Test Data

Please refer to following diagram for individual

9KHz-30MHz

9KHz-150KHz:

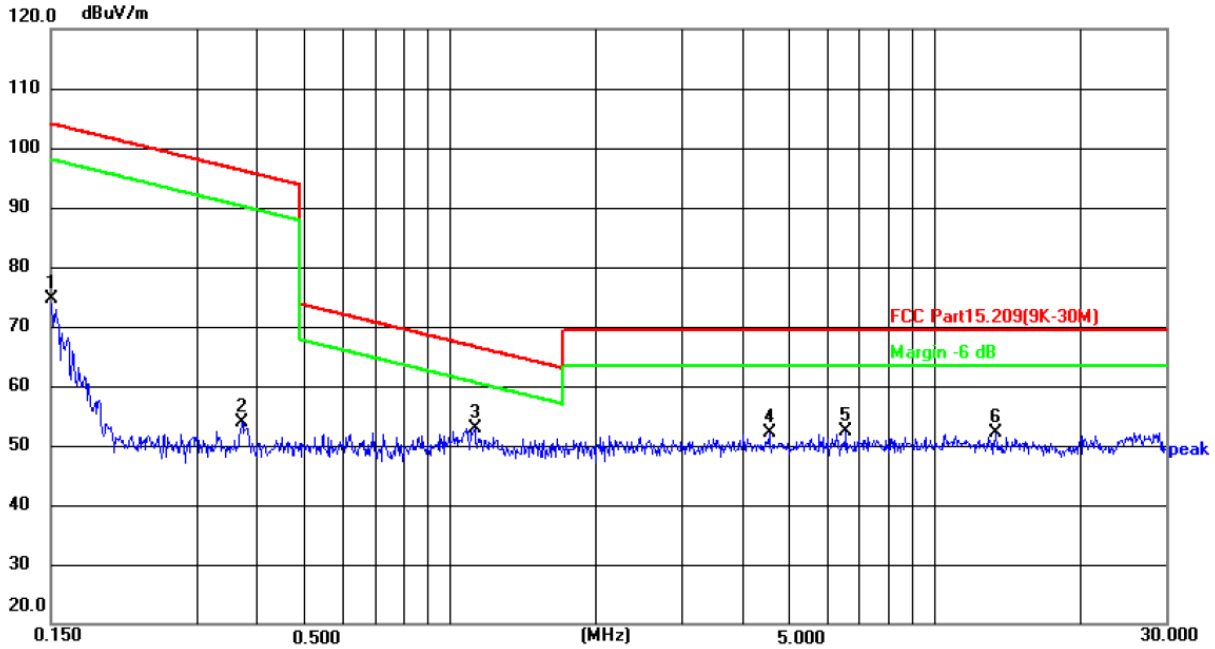


Site: #3 3m Anechoic Chamber Polarization: ***Horizontal*** Temperature: 23.3(℃) Humidity: 48 %

Limit: FCC Part15.209(9K-30M) Power:DC 3.8 V

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	0.0102	45.46	20.73	66.19	127.43	-61.24	peak	P	
2	0.0153	43.97	20.67	64.64	123.91	-59.27	peak	P	
3	0.0228	32.37	20.56	52.93	120.45	-67.52	peak	P	
4	0.0353	33.48	20.52	54.00	116.65	-62.65	peak	P	
5	0.0769	32.68	21.05	53.73	109.89	-56.16	peak	P	
6 *	0.1251	67.58	20.35	87.93	105.66	-17.73	peak	P	
7	0.1396	51.33	20.39	71.72	104.71	-32.99	peak	P	

150KHz-30MHz:



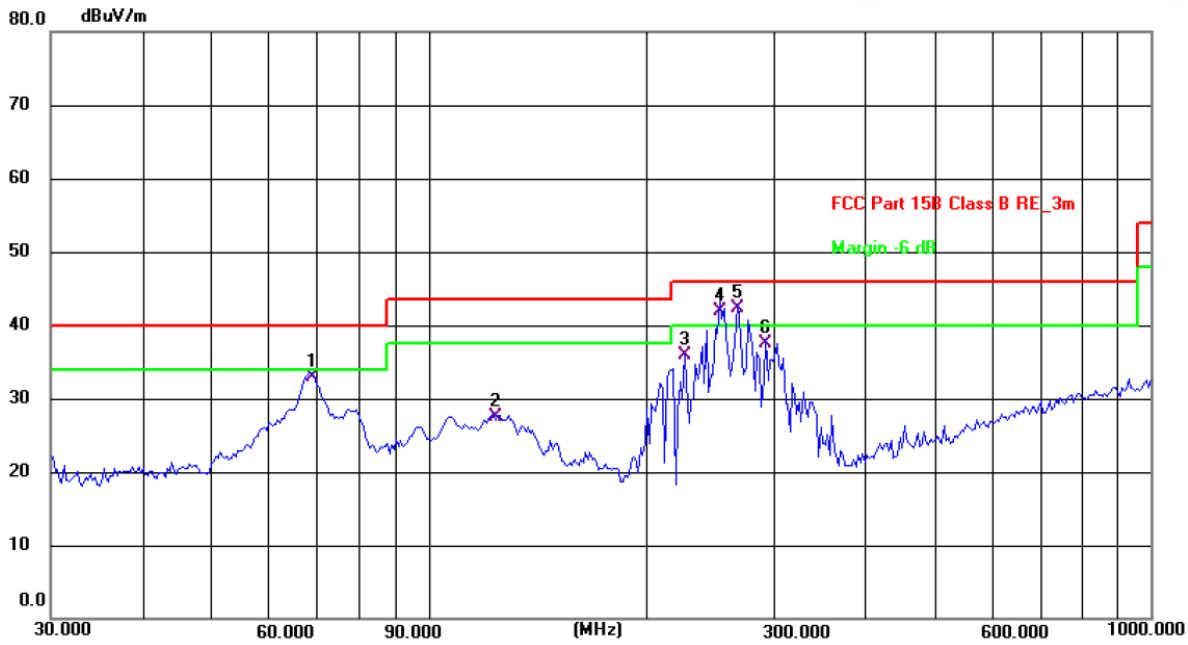
Site: #3 3m Anechoic Chamber Polarization: ***Horizontal*** Temperature: 23.3(℃) Humidity: 48 %

Limit: FCC Part15.209(9K-30M) Power:DC 3.8 V

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	0.1504	53.90	20.72	74.62	104.06	-29.44	peak	P	
2	0.3721	32.61	21.23	53.84	96.19	-42.35	peak	P	
3 *	1.1262	30.05	22.93	52.98	66.59	-13.61	peak	P	
4	4.5615	22.42	29.78	52.20	69.50	-17.30	peak	P	
5	6.5747	18.87	33.63	52.50	69.50	-17.00	peak	P	
6	13.3725	32.41	19.65	52.06	69.50	-17.44	peak	P	

30MHz-1GHz

Horizontal:

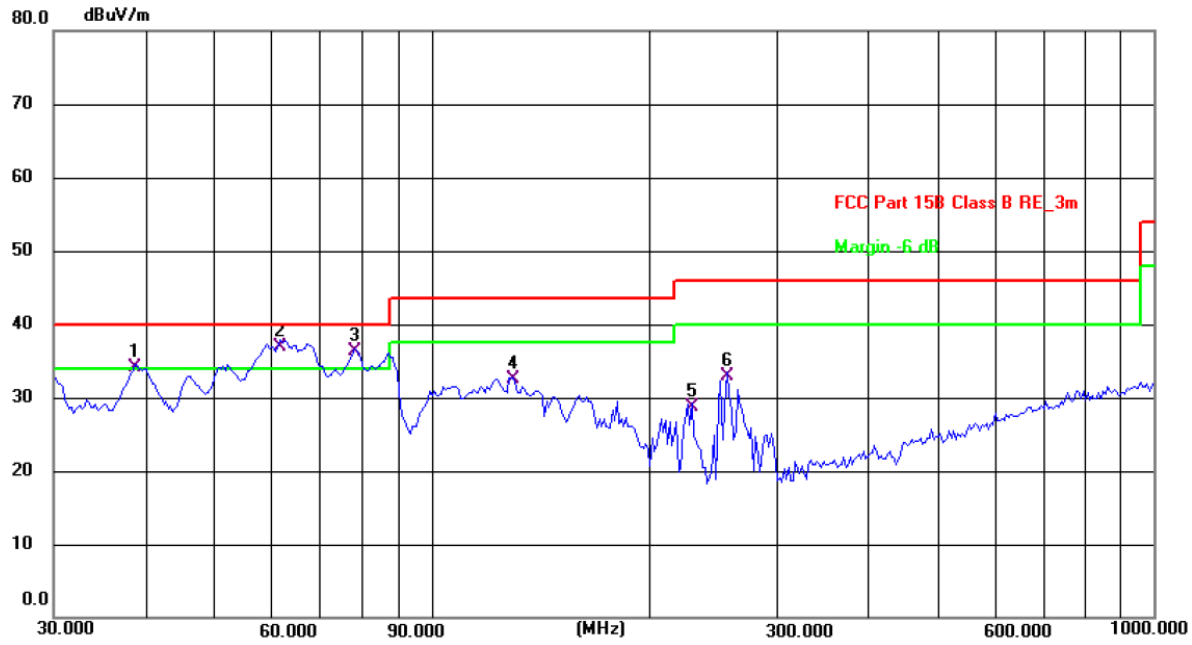


Site: #1 3m Anechoic Chamber Polarization: ***Horizontal*** Temperature: 26.3(C) Humidity: 55 %

Limit: FCC Part 15B Class B RE_3m Power: DC 3.8 V

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	69.1140	21.85	10.99	32.84	40.00	-7.16	QP	P	
2	122.8337	14.78	12.78	27.56	43.50	-15.94	QP	P	
3	226.0994	24.04	11.77	35.81	46.00	-10.19	QP	P	
4 !	252.9481	29.50	12.50	42.00	46.00	-4.00	QP	P	
5 *	267.5452	29.36	13.01	42.37	46.00	-3.63	QP	P	
6	293.0842	23.82	13.76	37.58	46.00	-8.42	QP	P	

Vertical:



Site: #1 3m Anechoic Chamber Polarization: ***Vertical*** Temperature: 26.3(C) Humidity: 55 %

Limit: FCC Part 15B Class B RE_3m Power: DC 3.8 V

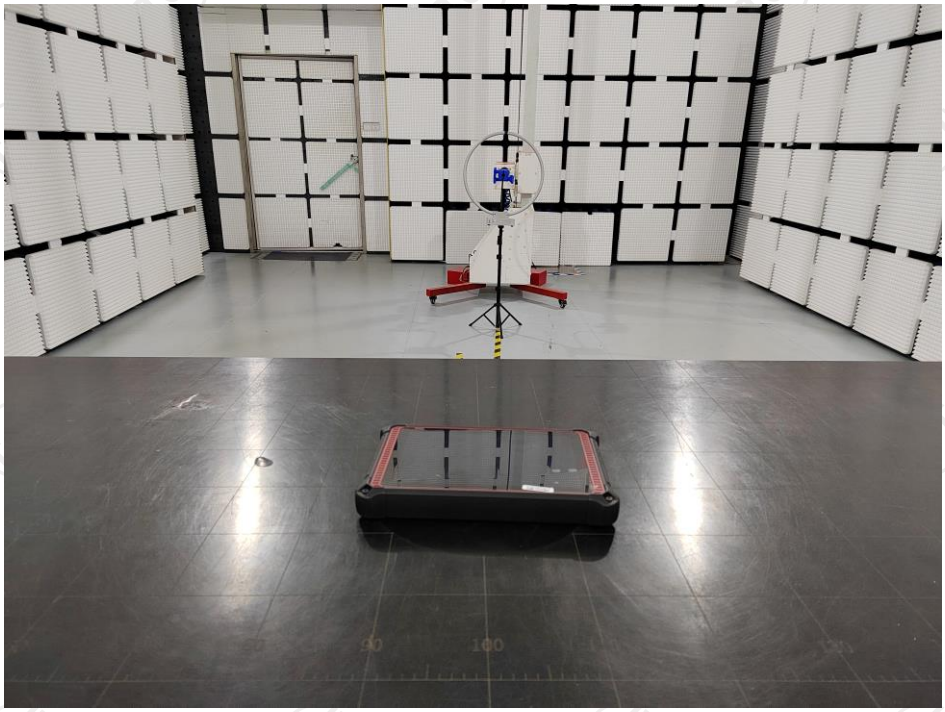
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1 !	38.8877	20.01	14.11	34.12	40.00	-5.88	QP	P	
2 *	61.7779	24.24	12.61	36.85	40.00	-3.15	QP	P	
3 !	78.4133	26.29	9.95	36.24	40.00	-3.76	QP	P	
4	129.0142	19.43	13.12	32.55	43.50	-10.95	QP	P	
5	229.2930	16.67	11.96	28.63	46.00	-17.37	QP	P	
6	256.5210	20.34	12.57	32.91	46.00	-13.09	QP	P	

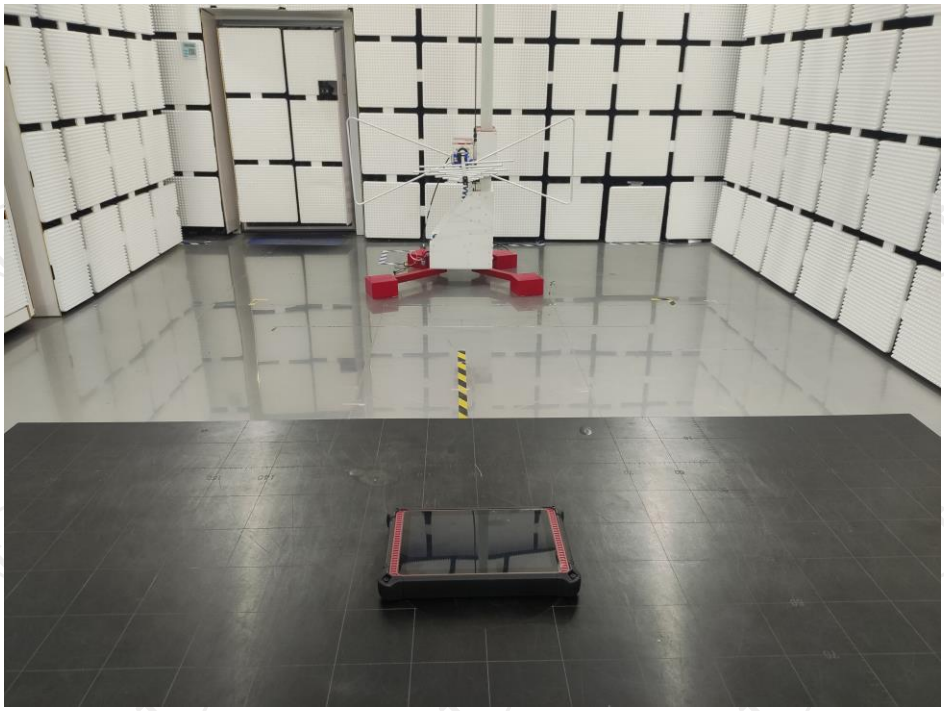
Note:

Emission Level=Peak Reading + Correction Factor; Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

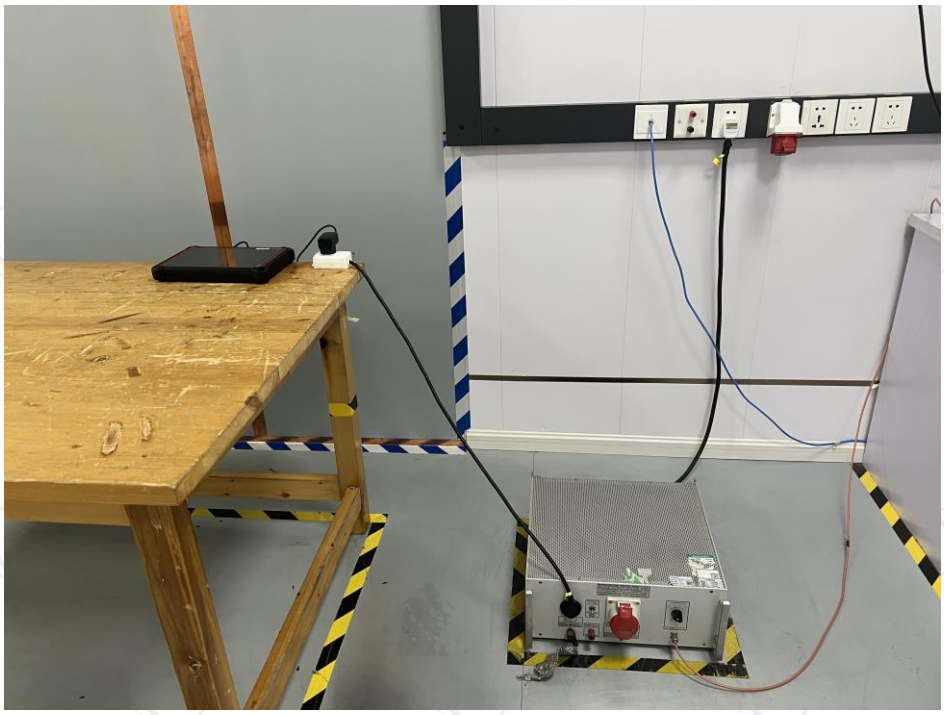
Appendix B: Photographs of Test Setup

Product: Remote Diagnostic Service
Model: TKX11
Radiated Emission





Conducted Emission



Appendix C: Photographs of EUT

Refer to the test report No. TCT230425E041

********END OF REPORT********