

TEST REPORT

FCC ID.	2AUARSCANSR
Test Report No.	TCT230731E906
Date of issue	Aug. 02, 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 Section 15.247 FCC KDB 558074 D01 15.247 Meas Guidance v05r02 ANSI C63.10:2013
Product Name	THINKSCAN MT, MUCAR MT, THINKCHECK M70 MOTO, THINKCHECK M70 PRO
Trade Mark	THINKCAR, XHINKCAR, MUCAR
Model/Type reference	TKSR6, TKM70
Rating(s)	Rechargeable Li-ion battery DC 3.7V
Date of receipt of test item	Jul. 31, 2023
Date (s) of performance of test	Jul. 31, 2023 - Aug. 02, 2023
Tested by (+signature) ...	Rleo LIU
Check by (+signature)	Beryl ZHAO
Approved by (+signature):	Tomsin

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1. General Product Information

1.1. EUT description

Product Name.....:	THINKSCAN MT, MUCAR MT, THINKCHECK M70 MOTO, THINKCHECK M70 PRO
Model/Type reference.....:	TKSR6
Sample Number.....:	TCT230731E906-0101
Bluetooth Version	V4.2
Operation Frequency	2402MHz~2480MHz
Transfer Rate	1/2/3 Mbits/s
Number of Channel	79
Modulation Type.....:	GFSK, $\pi/4$ -DQPSK, 8DPSK
Modulation Technology	FHSS
Antenna Type.....:	Internal Antenna
Antenna Gain.....:	1dBi
Rating(s)	Rechargeable Li-ion battery DC 3.7V

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	TKSR6	☒
Other models	TKM70	☐

Note: TKSR6 is tested model, other models are derivative models. The models are identical in circuit and PCB layout, different on the product names, model names and trademarks. So the test data of TKSR6 can represent the remaining models.

1.3. Operation Frequency

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
0	2402MHz	20	2422MHz	40	2442MHz	60	2462MHz
1	2403MHz	21	2423MHz	41	2443MHz	61	2463MHz
...	...	...	...	...	...	...	...
10	2412MHz	30	2432MHz	50	2452MHz	70	2472MHz
11	2413MHz	31	2433MHz	51	2453MHz	71	2473MHz
...	...	...	...	...	...	...	...
18	2420MHz	38	2440MHz	58	2460MHz	78	2480MHz
19	2421MHz	39	2441MHz	59	2461MHz	-	

Remark: Channel 0, 39 & 78 have been tested for GFSK, $\pi/4$ -DQPSK, 8DPSK modulation mode.

2. Test Result Summary

Requirement	CFR 47 Section	Result
Antenna Requirement	§15.203/§15.247 (c)	PASS
AC Power Line Conducted Emission	§15.207	PASS
Conducted Peak Output Power	§15.247 (b)(1)	PASS
20dB Occupied Bandwidth	§15.247 (a)(1)	PASS
Carrier Frequencies Separation	§15.247 (a)(1)	PASS
Hopping Channel Number	§15.247 (a)(1)	PASS
Dwell Time	§15.247 (a)(1)	PASS
Radiated Emission	§15.205/§15.209	PASS
Band Edge	§15.247(d)	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.
5. Those test results (AC Power Line Conducted Emission, Conducted Output Power, 20dB Occupied Bandwidth, Carrier Frequencies Separation, Hopping Channel Number, Dwell Time, Band Edge) was based on FCC ID: 2AUARSCANSR; Change product name, product model No., trade mark and shell material, Radiated Emission has been retested.

3. General Information

3.1. Test environment and mode

Operating Environment:	
Condition	Radiated Emission
Temperature:	25.1 °C
Humidity:	52 % RH
Atmospheric Pressure:	1010 mbar
Test Software:	
Software Information:	Engineering mode
Power Level:	Default
Test Mode:	
Engineering mode:	Keep the EUT in continuous transmitting by select channel and modulations with Fully-charged battery
The sample was placed 0.8m & 1.5m for the measurement below & above 1GHz 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. DH1 DH3 DH5 all have been tested , only worse case DH1 is reported.	

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
Adapter	JD-050200	2012010907576735	/	JD

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.
3. For conducted measurements (Output Power, 20dB Occupied Bandwidth, Carrier Frequencies Separation, Hopping Channel Number, Dwell Time, Spurious Emissions), the antenna of EUT is connected to the test equipment via temporary antenna connector, the antenna connector is soldered on the antenna port of EUT, and the temporary antenna connector is listed in the Test Instruments.

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

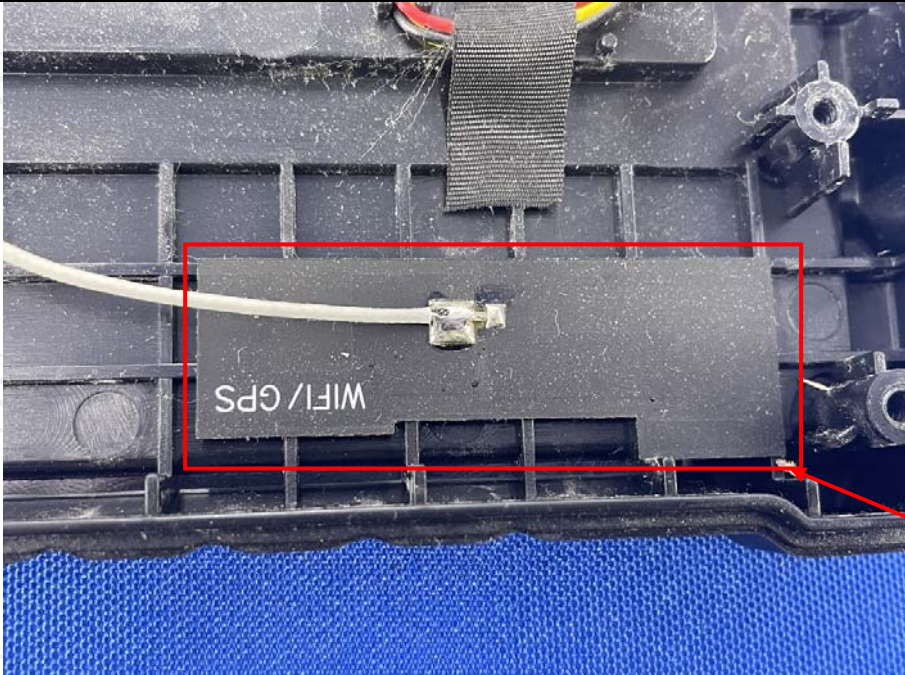
4.3. Measurement Uncertainty

The reported uncertainty of measurement $y \pm U$, 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

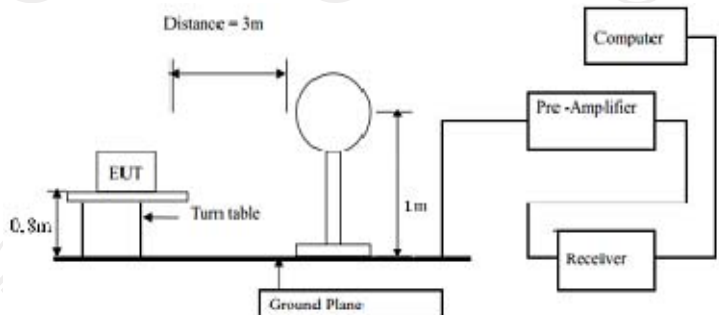
5. Test Results and Measurement Data

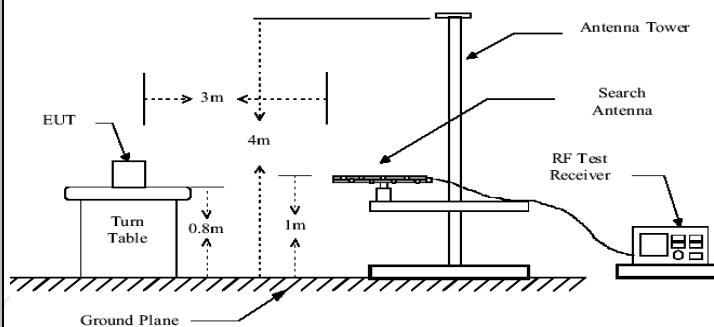
5.1. Antenna requirement

Standard requirement:	FCC Part15 C Section 15.203 /247(c)
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. 15.247(c) (1)(i) requirement: (i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.	
E.U.T Antenna:	
The Bluetooth antenna is internal antenna which permanently attached, and the best case gain of the antenna is 1dBi.	
	

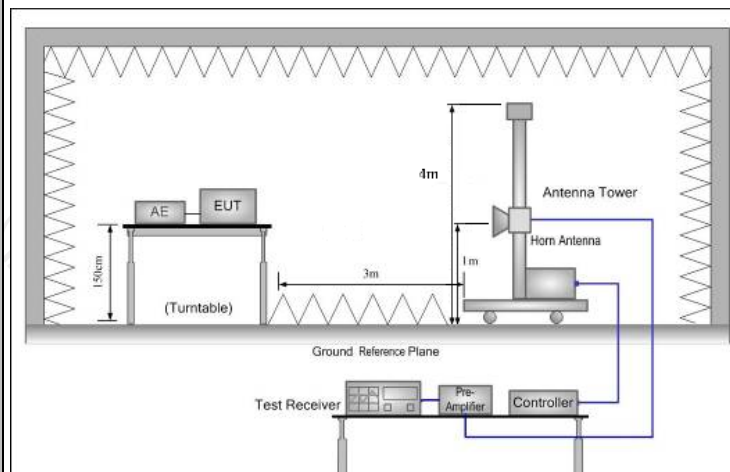
5.2. Radiated Spurious Emission Measurement

5.2.1. 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			
Receiver Setup:	Frequency	Detector	RBW	VBW
	9kHz- 150kHz	Quasi-peak	200Hz	1kHz
	150kHz- 30MHz	Quasi-peak	9kHz	30kHz
	30MHz-1GHz	Quasi-peak	120KHz	300KHz
	Above 1GHz	Peak	1MHz	3MHz
		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			



Above 1GHz



Test Mode:

Transmitting mode with modulation

Test Procedure:

1. The testing follows the guidelines in Spurious Radiated Emissions of ANSI C63.10:2013 Measurement Guidelines.
2. 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 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. 3. Set to the maximum power setting and enable the EUT transmit continuously. 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, RBW=1MHz for $f > 1$ GHz ; VBW$\geq$RBW; Sweep = auto; Detector function = peak; Trace = max hold for peak (3) For average measurement: use duty cycle correction factor method per 15.35(c). Duty cycle = On time/100 milliseconds On time = $N_1 \cdot L_1 + N_2 \cdot L_2 + \dots + N_{n-1} \cdot L_{n-1} + N_n \cdot L_n$ Where N_1 is number of type 1 pulses, L_1 is length of type 1 pulses, etc. Average Emission Level = Peak Emission Level + $20 \cdot \log(\text{Duty cycle})$ Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
Test results:	PASS

5.2.2. Test Instruments

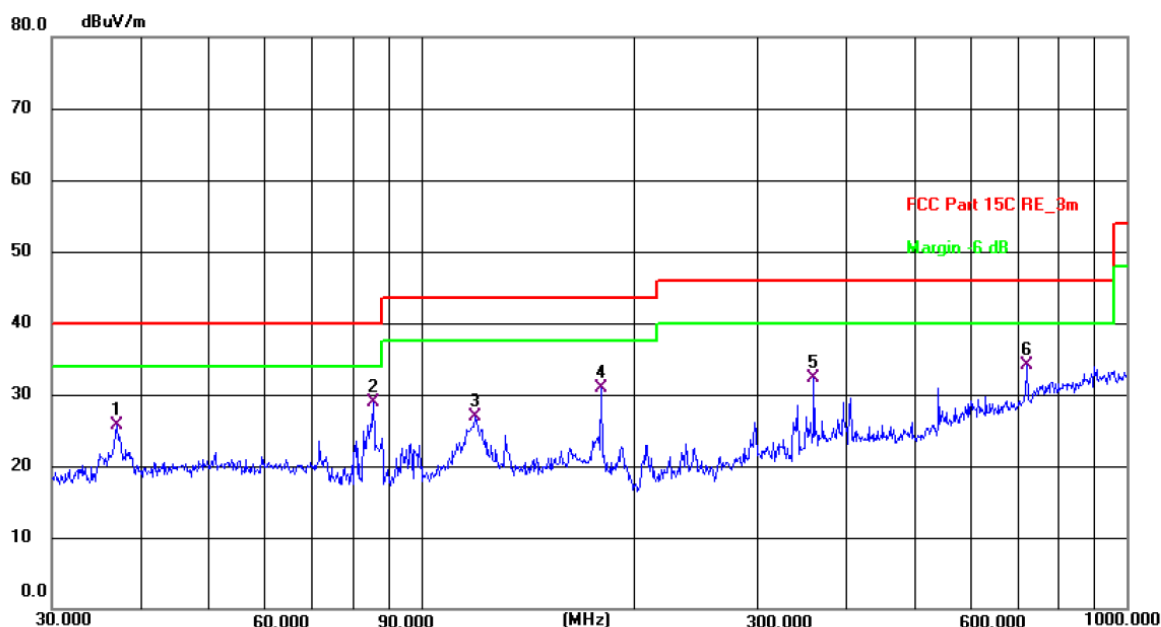
Radiated Emission Test Site (966)				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI Test Receiver	R&S	ESIB7	100197	Jun. 29, 2024
Spectrum Analyzer	R&S	FSQ40	200061	Jun. 29, 2024
Pre-amplifier	SKET	LNPA_0118G-45	SK2021012102	Feb. 20, 2024
Pre-amplifier	SKET	LNPA_1840G-50	SK202109203500	Feb. 20, 2024
Pre-amplifier	HP	8447D	2727A05017	Jun. 27, 2024
Loop antenna	Schwarzbeck	FMZB1519B	00191	Jul. 02, 2024
Broadband Antenna	Schwarzbeck	VULB9163	340	Jul. 01, 2024
Horn Antenna	Schwarzbeck	BBHA 9120D	631	Jul. 01, 2024
Horn Antenna	Schwarzbeck	BBHA 9170	00956	Feb. 24, 2024
Antenna Mast	Keleto	RE-AM	/	/
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	/	/

5.2.3. Test Data

Please refer to following diagram for individual

Below 1GHz

Horizontal:



Site: #1 3m Anechoic Chamber

Polarization: **Horizontal**

Temperature: 25.1(C)

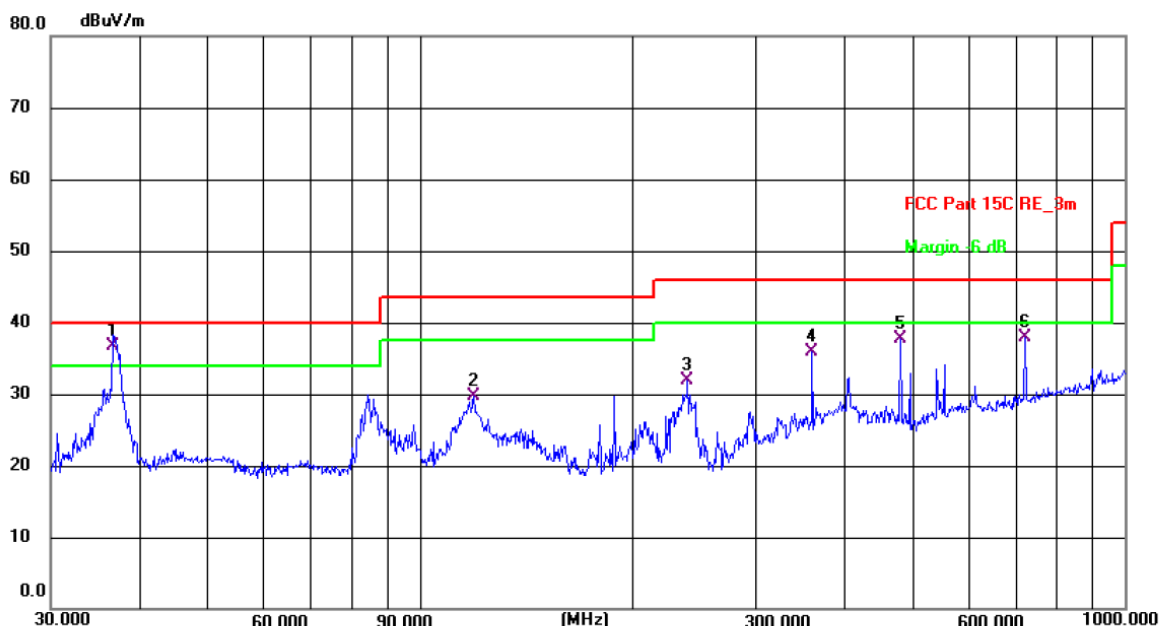
Humidity: 52 %

Limit: FCC Part 15C RE_3m

Power: DC 3.7 V

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	37.0248	12.03	13.67	25.70	40.00	-14.30	QP	P	
2 *	85.5973	19.82	9.13	28.95	40.00	-11.05	QP	P	
3	119.4360	14.74	12.08	26.82	43.50	-16.68	QP	P	
4	180.0164	18.95	11.93	30.88	43.50	-12.62	QP	P	
5	360.4476	16.78	15.56	32.34	46.00	-13.66	QP	P	
6	721.7258	11.28	22.84	34.12	46.00	-11.88	QP	P	

Vertical:



Site: #1 3m Anechoic Chamber

Polarization: **Vertical**

Temperature: 25.1(C) Humidity: 52 %

Limit: FCC Part 15C RE_3m

Power: DC 3.7 V

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1 *	36.7661	23.09	13.65	36.74	40.00	-3.26	QP	P	
2	119.4360	17.64	12.08	29.72	43.50	-13.78	QP	P	
3	239.9873	19.27	12.72	31.99	46.00	-14.01	QP	P	
4	360.4476	20.44	15.56	36.00	46.00	-10.00	QP	P	
5	480.5276	19.24	18.55	37.79	46.00	-8.21	QP	P	
6	721.7258	15.11	22.84	37.95	46.00	-8.05	QP	P	

Note: 1. The low frequency, which started from 9KHz~30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

2. Measurements were conducted in all three channels (high, middle, low) and three modulation (GFSK, Pi/4 DQPSK, 8DPSK) and the worst case Mode (Highest channel and 8DPSK) was submitted only.

3. Freq. = Emission frequency in MHz

Measurement (dBuV/m) = Reading level (dBuV) + Corr. Factor (dB)

Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

Limit (dBuV/m) = Limit stated in standard

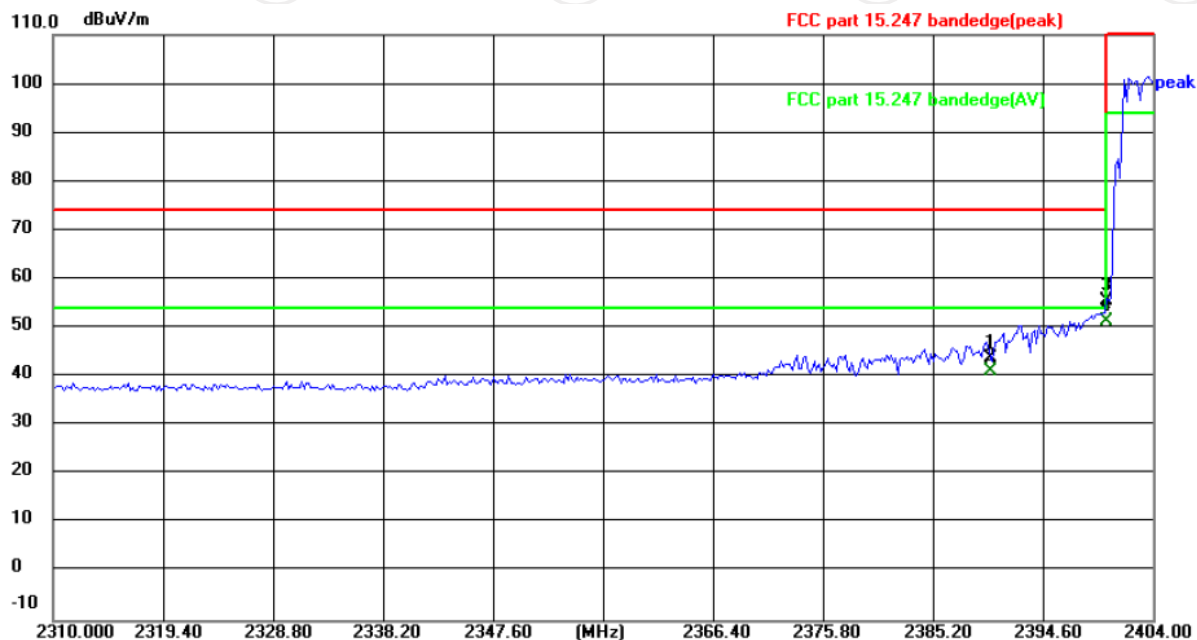
Over (dB) = Measurement (dBuV/m) – Limits (dBuV/m)

* is meaning the worst frequency has been tested in the test frequency range.

Test Result of Radiated Spurious at Band edges

Lowest channel 2402:

Horizontal:



Site

Polarization: **Horizontal**

Temperature: 24(°C)

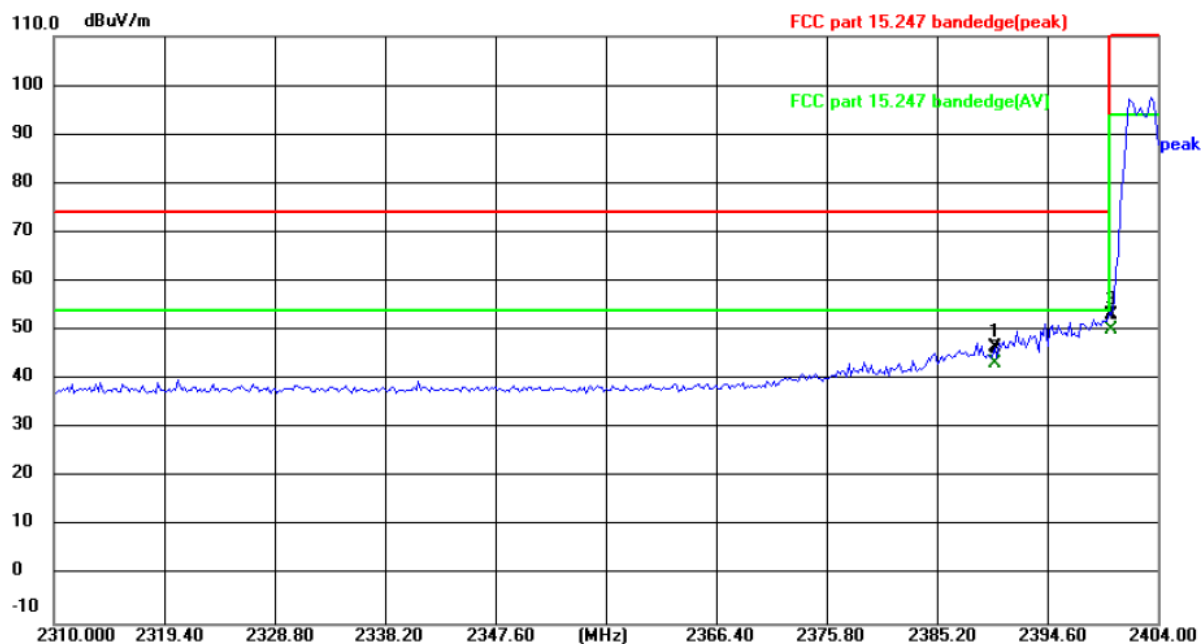
Limit: FCC part 15.247 bandedge(peak)

Power: DC 3.7 V

Humidity: 52 %

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2390.000	58.76	-14.99	43.77	74.00	-30.23	peak
2	2390.000	56.25	-14.99	41.26	54.00	-12.74	AVG
3	2400.000	70.55	-14.95	55.60	74.00	-18.40	peak
4 *	2400.000	66.33	-14.95	51.38	54.00	-2.62	AVG

Vertical:



Site

Polarization: **Vertical**

Temperature: 24(°C)

Limit: FCC part 15.247 bandedge(peak)

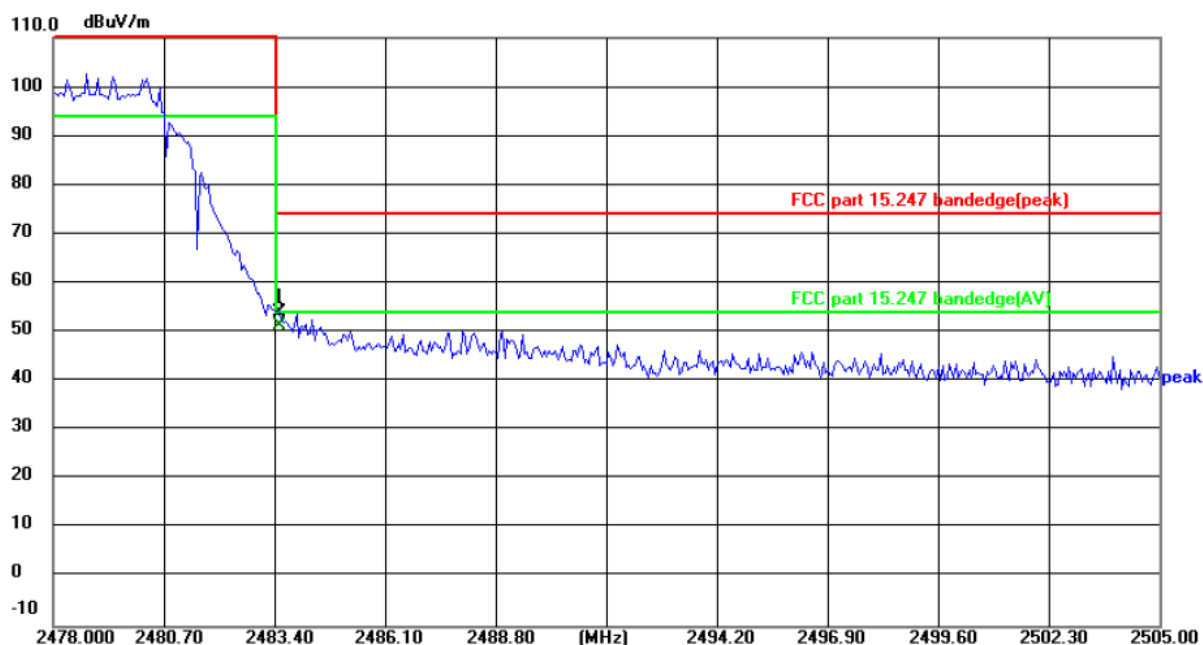
Power: DC 3.7 V

Humidity: 52 %

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2390.000	61.51	-14.99	46.52	74.00	-27.48	peak
2	2390.000	58.15	-14.99	43.16	54.00	-10.84	AVG
3	2400.000	68.06	-14.95	53.11	74.00	-20.89	peak
4 *	2400.000	65.03	-14.95	50.08	54.00	-3.92	AVG

Highest channel 2480:

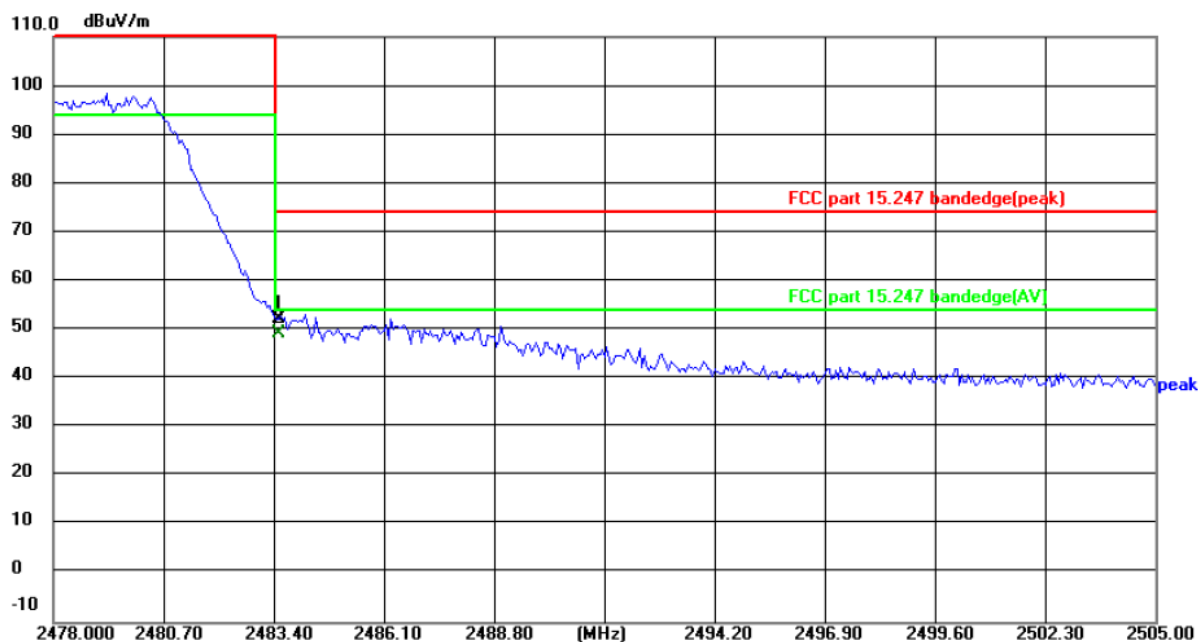
Horizontal:



Site: Polarization: **Horizontal** Temperature: 24(°C)
 Limit: FCC part 15.247 bandedge(peak) Power: DC 3.7 V Humidity: 52 %

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2483.500	68.70	-14.58	54.12	74.00	-19.88	peak
2 *	2483.500	65.83	-14.58	51.25	54.00	-2.75	AVG

Vertical:



Site: Polarization: **Vertical** Temperature: 24(°C)
 Limit: FCC part 15.247 bandedge(peak) Power: DC 3.7 V Humidity: 52 %

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2483.500	66.73	-14.58	52.15	74.00	-21.85	peak
2 *	2483.500	63.84	-14.58	49.26	54.00	-4.74	AVG

Note: Measurements were conducted in all three modulation (GFSK, Pi/4 DQPSK, 8DPSK), and the worst case Mode (8DPSK) was submitted only.

Above 1GHz

Modulation Type: 8DPSK									
Low channel: 2402 MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
4804	H	45.09	---	0.66	45.75	---	74	54	-8.25
7206	H	35.82	---	9.50	45.32	---	74	54	-8.68
---	H	---	---	---	---	---	---	---	---
4804	V	45.57	---	0.66	46.23	---	74	54	-7.77
7206	V	36.20	---	9.50	45.70	---	74	54	-8.30
---	V	---	---	---	---	---	---	---	---

Middle channel: 2441 MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
4882	H	45.35	---	0.99	46.34	---	74	54	-7.66
7323	H	36.73	---	9.87	46.6	---	74	54	-7.4
---	H	---	---	---	---	---	---	---	---
4882	V	43.61	---	0.99	44.60	---	74	54	-9.40
7323	V	35.49	---	9.87	45.36	---	74	54	-8.64
---	V	---	---	---	---	---	---	---	---

High channel: 2480 MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
4960	H	45.64	---	1.33	46.97	---	74	54	-7.03
7440	H	37.92	---	10.22	48.14	---	74	54	-5.86
---	H	---	---	---	---	---	---	---	---
4960	V	46.50	---	1.33	47.83	---	74	54	-6.17
7440	V	37.86	---	10.22	48.08	---	74	54	-5.92
---	V	---	---	---	---	---	---	---	---

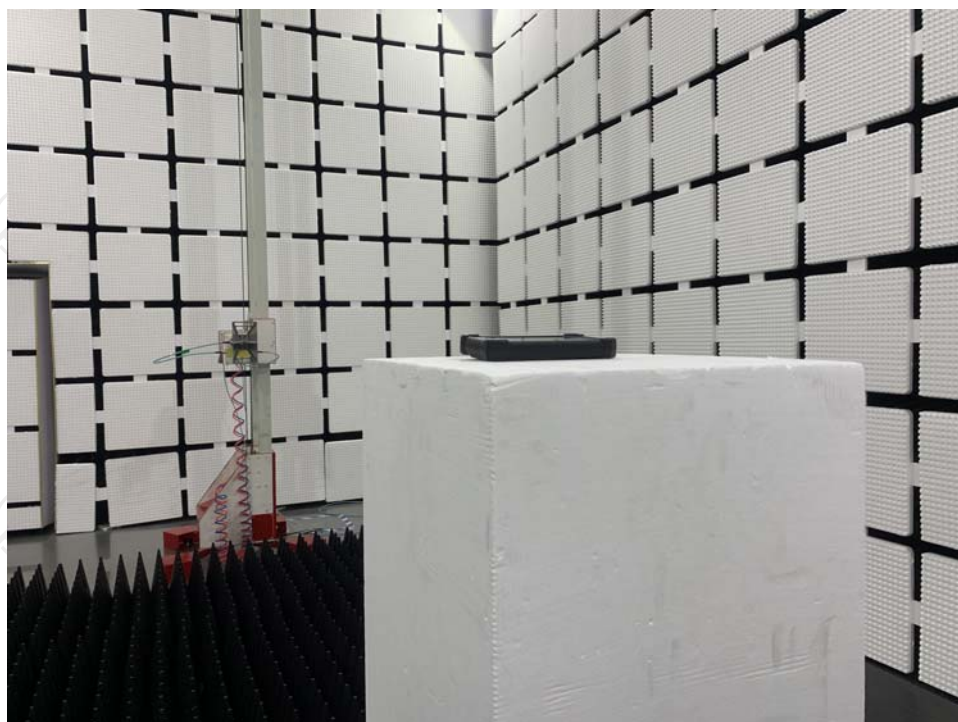
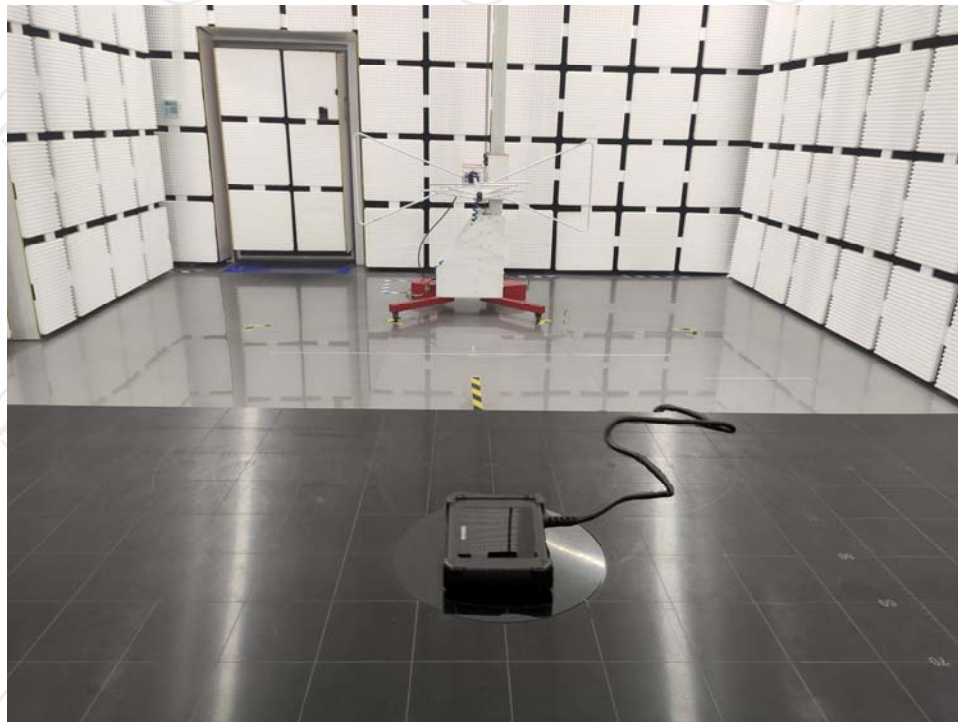
Note:

1. Emission Level=Peak Reading + Correction Factor; Correction Factor= Antenna Factor + Cable loss – Pre-amplifier
2. Margin (dB) = Emission Level (Peak) (dBμV/m)-Average limit (dBμV/m)
3. The emission levels of other frequencies are very lower than the limit and not show in test report.
4. Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.
5. Data of measurement shown "----" in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.
6. Measurements were conducted in all three modulation (GFSK, Pi/4 DQPSK, 8DPSK), and the worst case Mode (8DPSK) was submitted only.
7. All the restriction bands are compliance with the limit of 15.209.

Appendix B: Photographs of Test Setup

Product: THINKSCAN MT, MUCAR MT, THINKCHECK M70 MOTO, THINKCHECK M70 PRO

Model: TKSR6
Radiated Emission

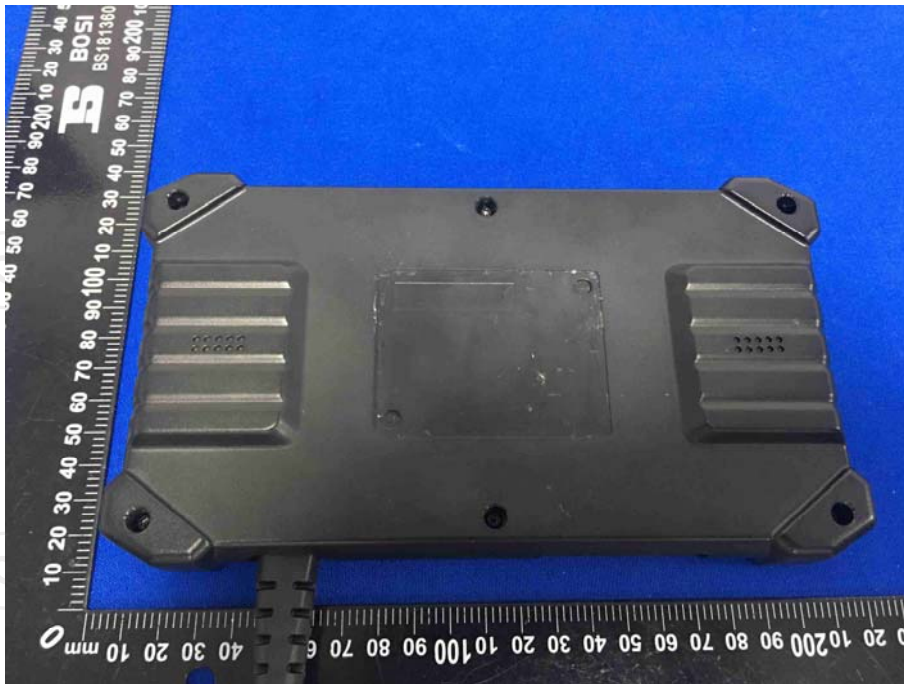


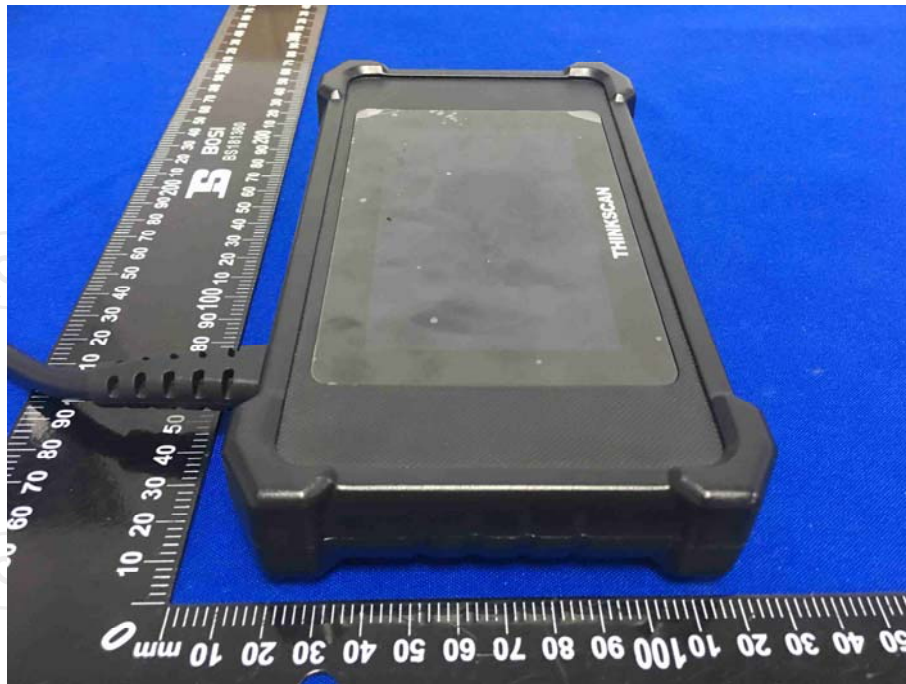
Appendix C: Photographs of EUT

Product: THINKSCAN MT, MUCAR MT, THINKCHECK M70 MOTO, THINKCHECK M70 PRO

Model: TKSR6
External Photos





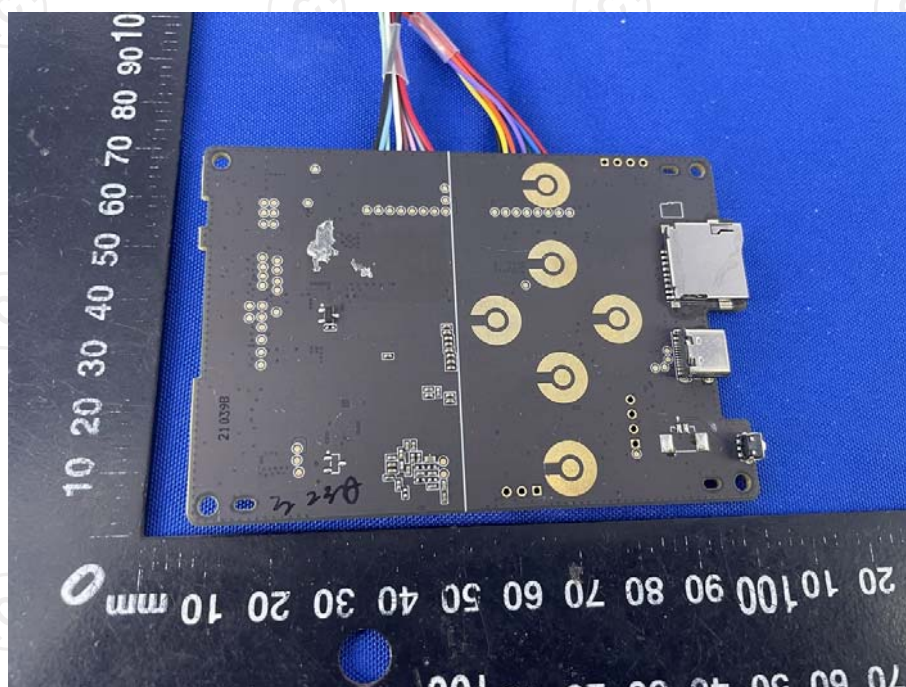
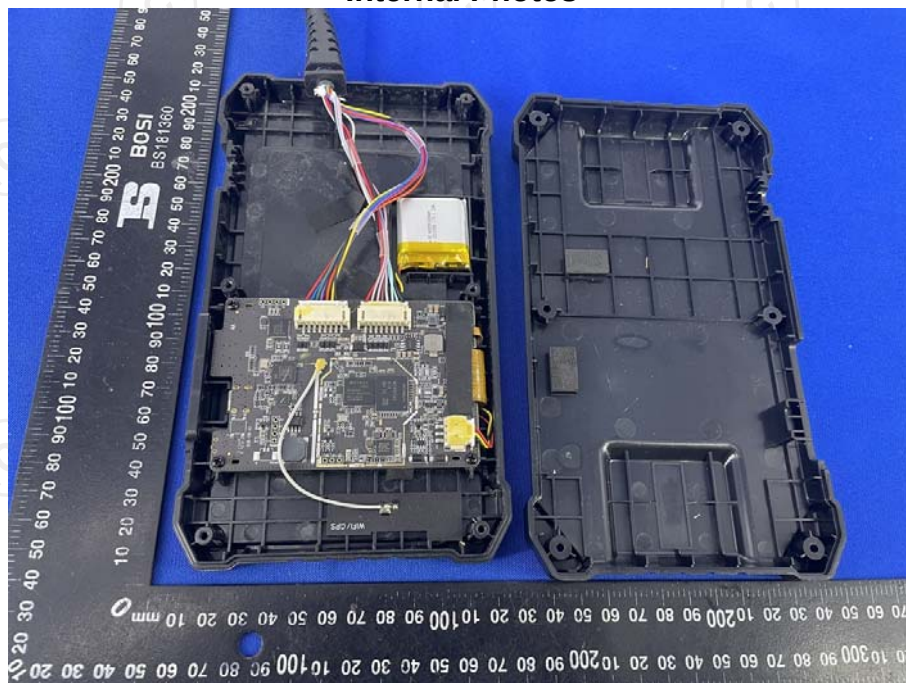


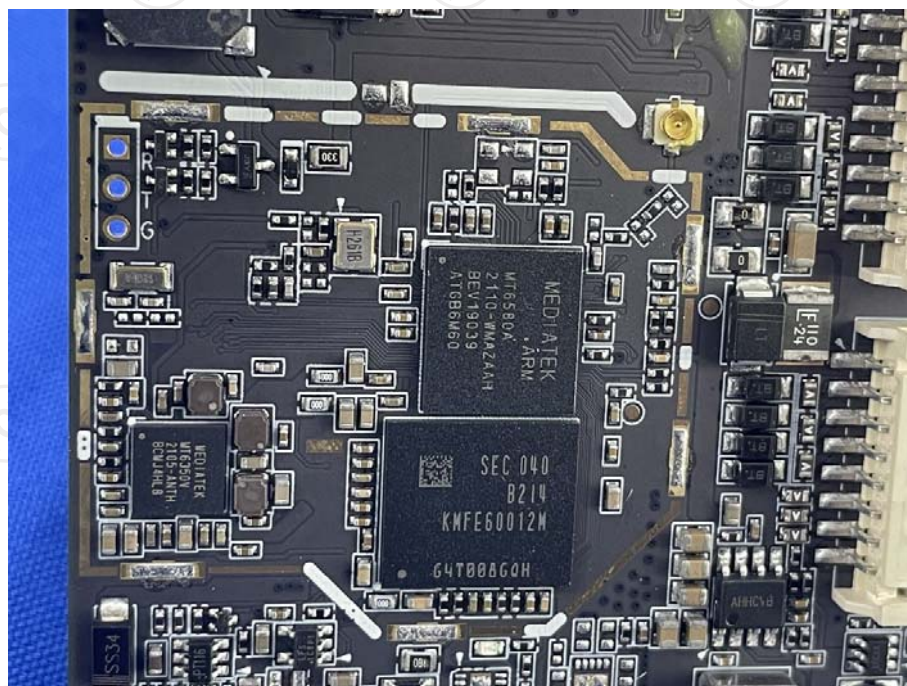
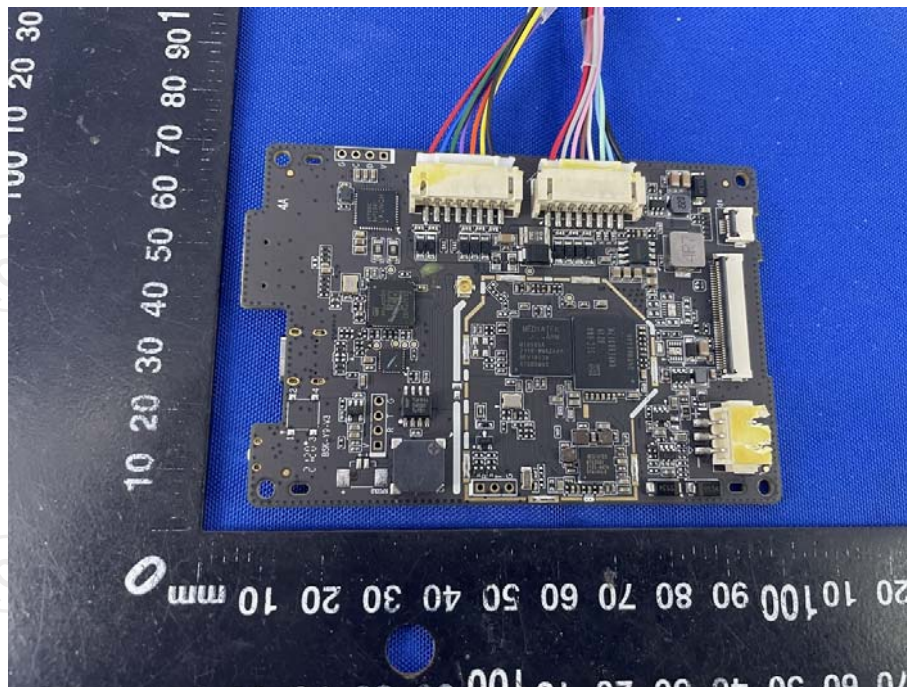


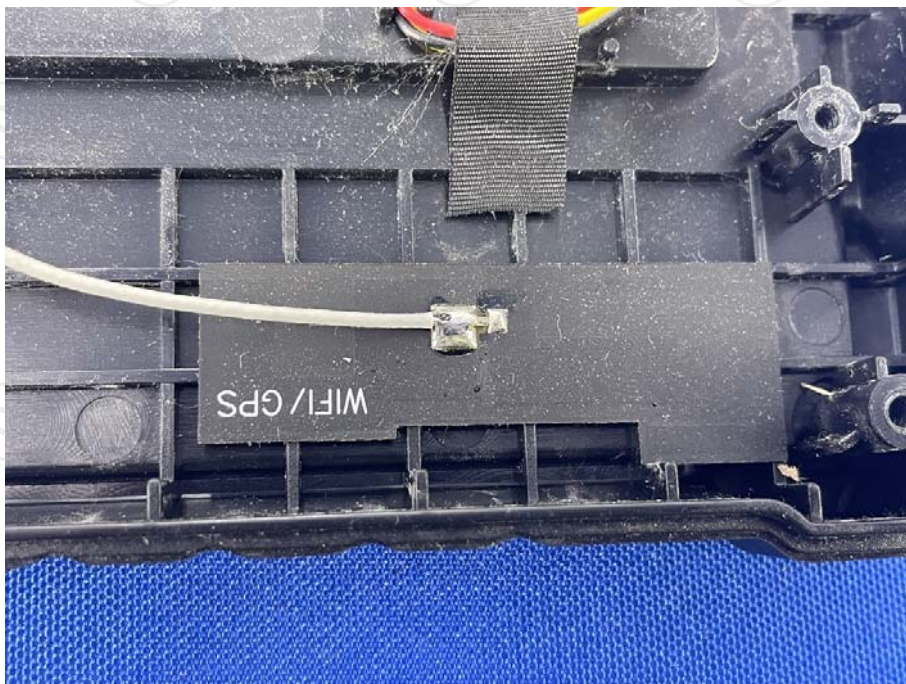
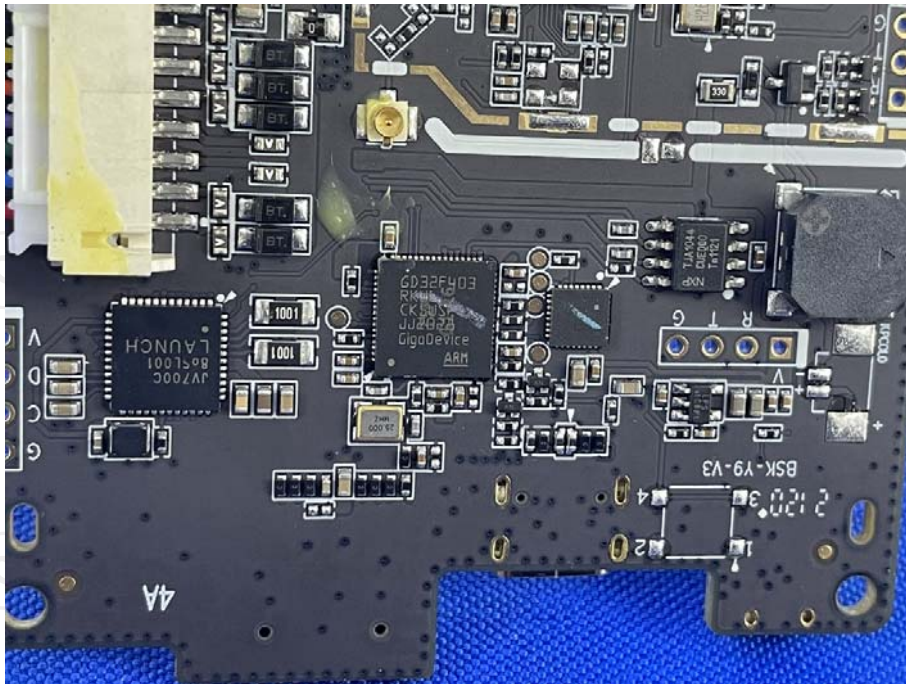
Product: THINKSCAN MT, MUCAR MT, THINKCHECK M70 MOTO, THINKCHECK M70 PRO

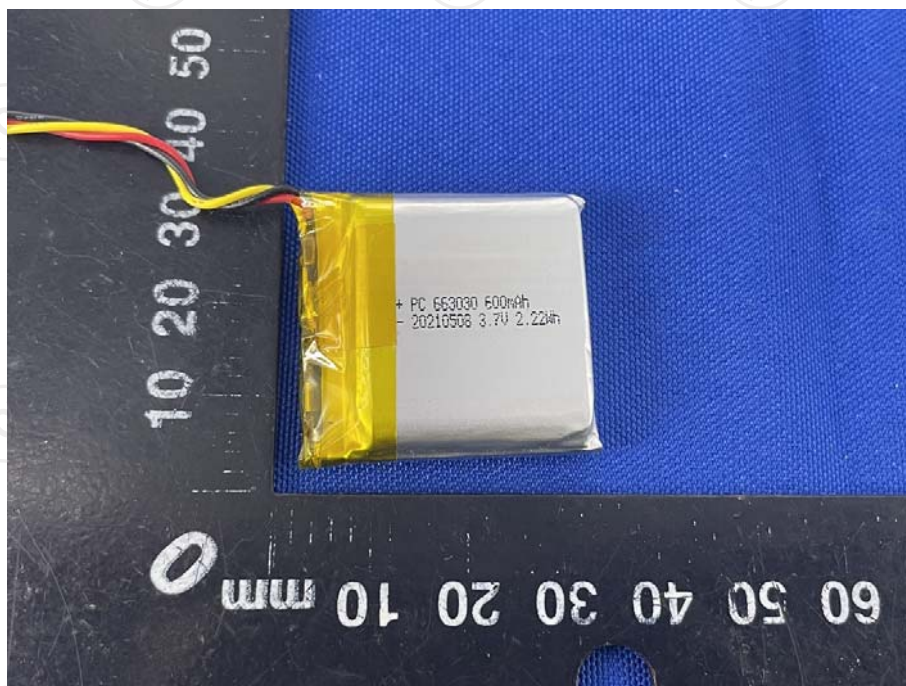
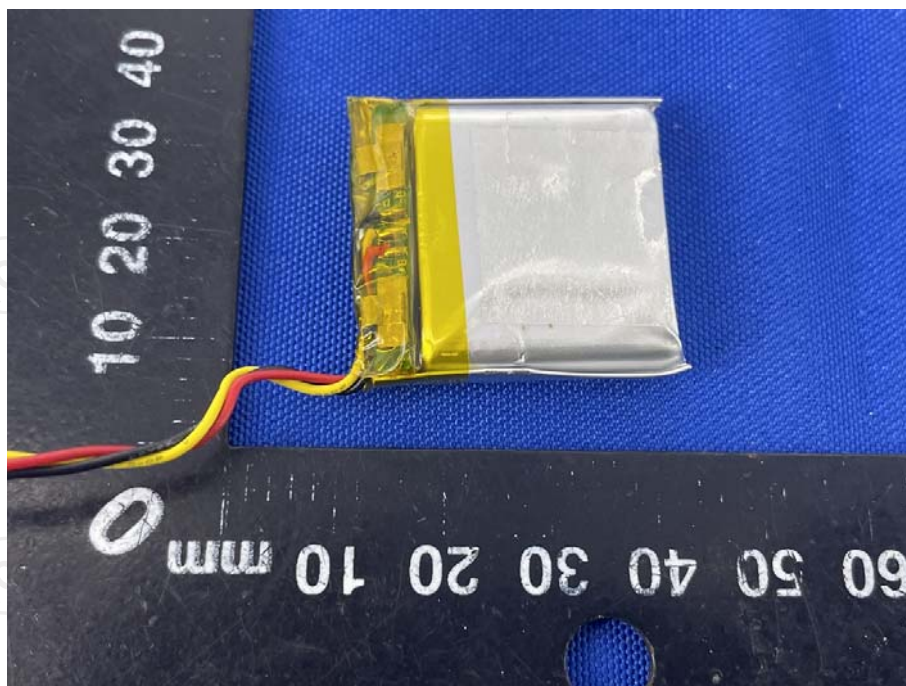
Model: TKSR6

Internal Photos









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