TCT 通测检测 TESTING CENTRE TECHNOLOGY

TEST REPORT

FCC ID. ..... :	2AUARTOOLT900	
Test Report No..... :	TCT220712E040	
Date of issue..... :	Mar. 21, 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 15.231	
Product Name..... :	Automotive Diagnostic Tool	
Trade Mark ..... :	THINKCAR, XHINKCAR, MUCAR	
Model/Type reference..... :	TK900, THINKCAR T-Wand 900, THINKTOOL T900, THINKSCAN PRO, THINKCAR TPMS 900, MUCAR VO7, MUCAR VO7 S	
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 7.6V	
Date of receipt of test item ..... :	Jul. 12, 2022	
Date (s) of performance of test..... :	Jul. 12, 2022 - Mar. 21, 2023	
Tested by (+signature) ... :	Aaron MO	
Check by (+signature).... :	Beryl ZHAO	
Approved by (+signature):	Tomsin	

General disclaimer:

This report shall not be reproduced except in full, without the written approval of SHENZHEN TONGCE TESTING LAB. This document may be altered or revised by SHENZHEN TONGCE TESTING LAB personnel only, and shall be noted in the revision section of the document. The test results in the report only apply to the tested sample.

Table of Contents

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

1. General Product Information

1.1. EUT description

Product Name.....:	Automotive Diagnostic Tool
Model/Type reference.....:	TK900
Sample Number.....:	TCT220712E018-0101
Operation Frequency.....:	315MHz, 433.92MHz
Modulation Technology.....:	FSK
Antenna Type.....:	Internal Antenna
Antenna Gain.....:	0dBi
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 7.6V

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	TK900	☒
Other models	THINKCAR T-Wand 900, THINKTOOL T900, THINKSCAN PRO, THINKCAR TPMS 900, MUCAR VO7, MUCAR VO7 S	☐

Note: TK900 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 TK900 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/§15.247 (c)	PASS
Conduction Emission, 0.15MHz to 30MHz	§15.207	PASS
Manually Activated Transmitter	§15.231(a)	PASS
Radiation Emission	§15.231(b), §15.205, §15.209, §15.35	PASS
Occupied Bandwidth	§15.231(c)	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.

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

3. General Information

3.1. Test Environment and Mode

Operating Environment:		
Condition	Conducted Emission	Radiated Emission
Temperature:	25.3 °C	24.0 °C
Humidity:	53 % RH	52 % RH
Test Mode:		
TM1:	Keep the EUT in 315M transmitting with modulation	
TM2:	Keep the EUT in 433M transmitting with modulation	
Remark:	Both modes cannot work simultaneously and have been tested, and the worse mode (TM1) is report only.	

The sample was placed (0.8m below 1GHz, 1.5m 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 (Y axis) are shown in Test Results of the following pages.

Per-test mode.

We have verified the construction and function in typical operation, The EUT was placed on three different polar directions; i.e. X axis, Y axis, Z axis. which was shown in this test report and defined as follows:

Axis	X	Y	Z
Field Strength(dBuV/m)	52.47	55.31	52.59

Final Test Mode:

According to ANSI C63.10 standards, the test results are both the “worst case” and “worst setup”:
Y axis (see the test setup photo)

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

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: *TPMS Service tool TBM0100 has passed FCC DoC test certification and meets the requirements of auxiliary device.*

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.*

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

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

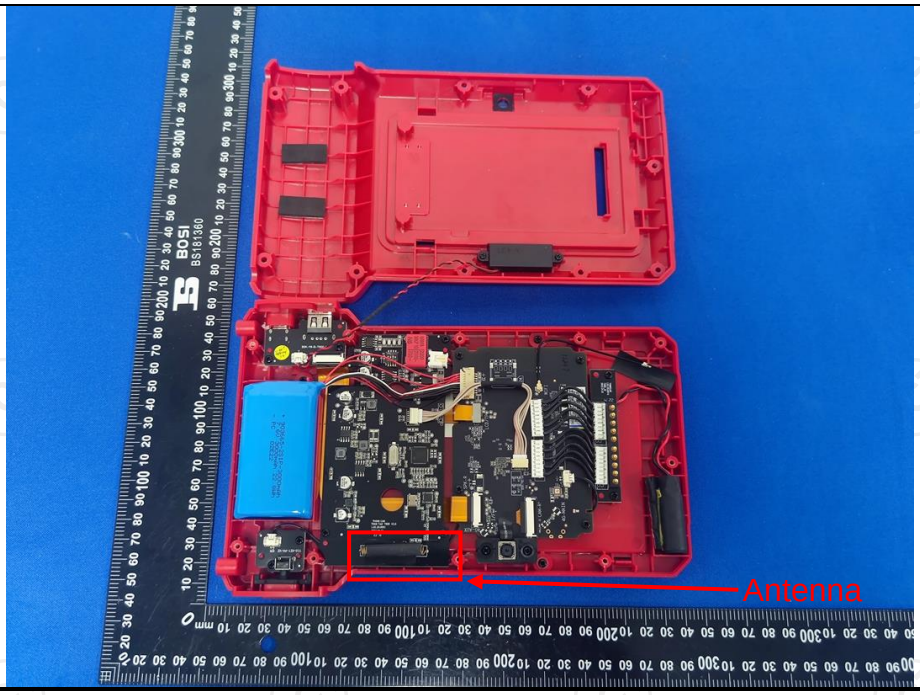
The reported uncertainty of measurement y ± U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

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
7	Temperature	± 0.1°C
8	Humidity	± 1.0%

5. Test Results and Measurement Data

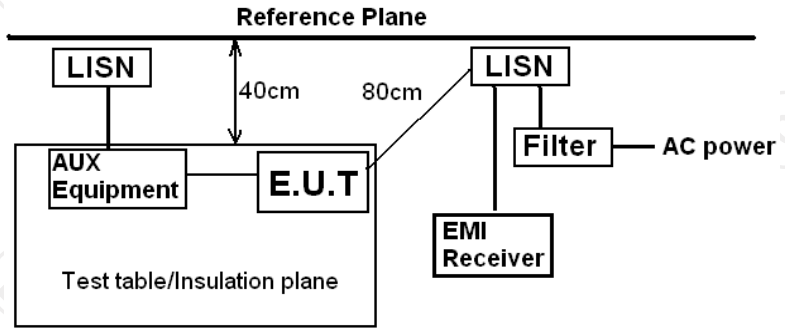
5.1. Antenna Requirement

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 antenna is internal antenna which permanently attached, and the best case gain of the antenna is 0dBi.	



5.2. Conducted Emission

5.2.1. Test Specification

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 C Section 15.207</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.4:2014</td></tr>
<tr><td>Frequency Range:</td><td>150 kHz to 30 MHz</td></tr>
<tr><td>Receiver setup:</td><td>RBW=9 kHz, VBW=30 kHz, Sweep time=auto</td></tr>
<tr><td>Limits:</td><td>
<table>
<tr><td rowspan="2">Frequency range (MHz)</td><td colspan="2">Limit (dBuV)</td></tr>
<tr><td>Quasi-peak</td><td>Average</td></tr>
<tr><td>0.15-0.5</td><td>66 to 56*</td><td>56 to 46*</td></tr>
<tr><td>0.5-5</td><td>56</td><td>46</td></tr>
<tr><td>5-30</td><td>60</td><td>50</td></tr>
</table>
</td></tr>
<tr><td>Test Setup:</td><td> 

Remark:
E.U.T: Equipment Under Test
LISN: Line Impedence Stabilization Network
Test table height=0.8m</td></tr>
<tr><td>Test Mode:</td><td>Charging + Transmitting Mode</td></tr>
<tr><td>Test Procedure:</td><td>1. The E.U.T and simulators are connected to the main power 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 C63.4: 2014 on conducted measurement.</td></tr>
<tr><td>Test Result:</td><td>PASS</td></tr>
</table>

5.2.2. Test Instruments

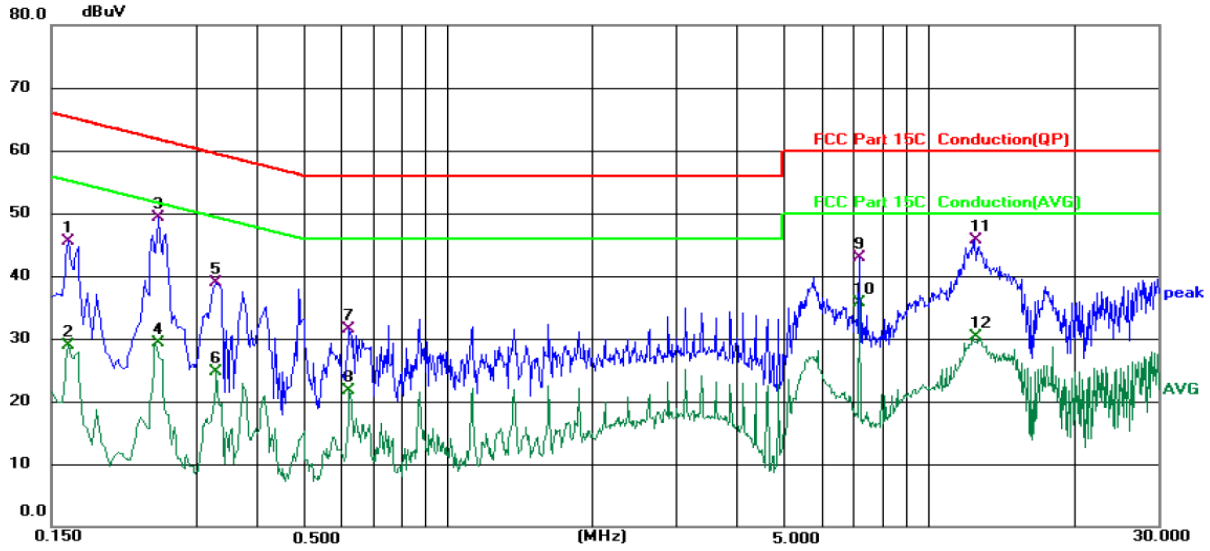
Conducted Emission Shielding Room Test Site (843)				
Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
EMI Test Receiver	R&S	ESCI3	100898	Jul. 03, 2023
Line Impedance Stabilisation Newtork(LISN)	Schwarzbeck	NSLK 8126	8126453	Feb. 20, 2024
Line-5	TCT	CE-05	N/A	Jul. 03, 2024
EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A

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

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: 25.3 (℃) | Humidity: 53 %

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		0.1620	35.05	10.53	45.58	65.36	-19.78	QP	
2		0.1620	18.46	10.53	28.99	55.36	-26.37	AVG	
3	*	0.2500	39.03	10.26	49.29	61.76	-12.47	QP	
4		0.2500	19.09	10.26	29.35	51.76	-22.41	AVG	
5		0.3300	28.68	10.22	38.90	59.45	-20.55	QP	
6		0.3300	14.58	10.22	24.80	49.45	-24.65	AVG	
7		0.6260	21.49	10.10	31.59	56.00	-24.41	QP	
8		0.6260	11.69	10.10	21.79	46.00	-24.21	AVG	
9		7.1900	32.75	10.16	42.91	60.00	-17.09	QP	
10		7.1900	25.57	10.16	35.73	50.00	-14.27	AVG	
11		12.4819	35.36	10.26	45.62	60.00	-14.38	QP	
12		12.4819	20.06	10.26	30.32	50.00	-19.68	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

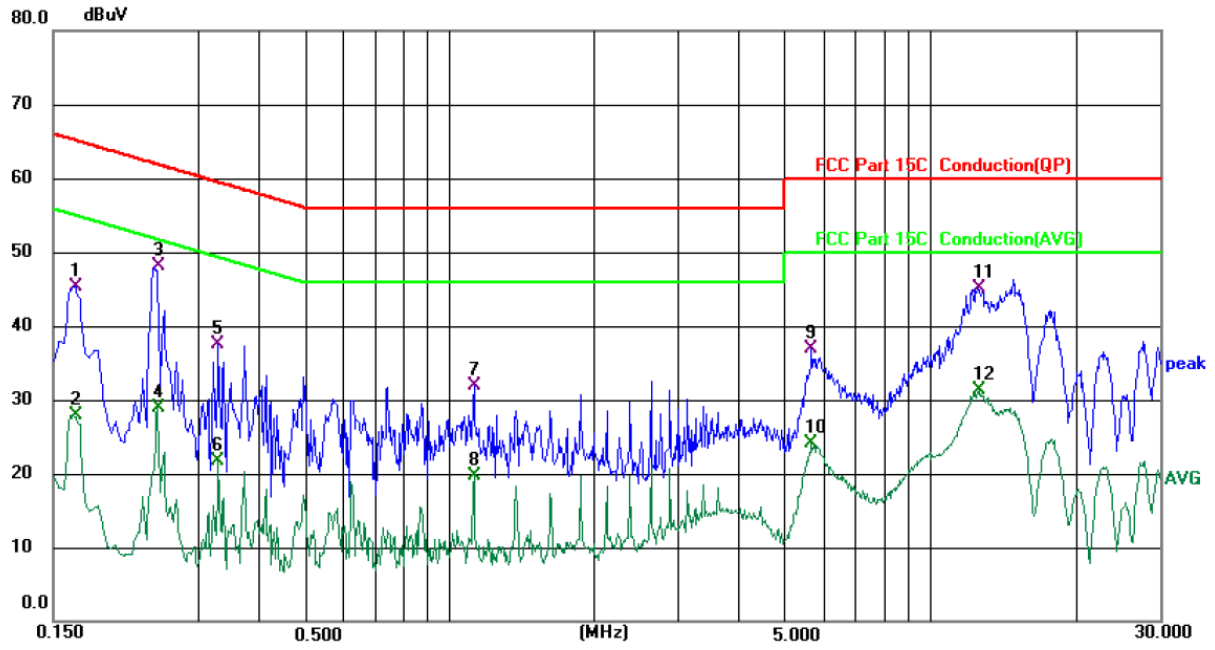
Margin (dB) = Measurement (dBμV) – Limits (dBμV)

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: 25.3 (℃) Humidity: 53 %

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	34.93	10.46	45.39	65.16	-19.77	QP	
2		0.1660	17.45	10.46	27.91	55.16	-27.25	AVG	
3	*	0.2460	37.76	10.27	48.03	61.89	-13.86	QP	
4		0.2460	18.59	10.27	28.86	51.89	-23.03	AVG	
5		0.3300	27.32	10.22	37.54	59.45	-21.91	QP	
6		0.3300	11.49	10.22	21.71	49.45	-27.74	AVG	
7		1.1260	21.85	10.11	31.96	56.00	-24.04	QP	
8		1.1260	9.69	10.11	19.80	46.00	-26.20	AVG	
9		5.6779	26.79	10.19	36.98	60.00	-23.02	QP	
10		5.6779	13.88	10.19	24.07	50.00	-25.93	AVG	
11		12.6700	34.67	10.36	45.03	60.00	-14.97	QP	
12		12.6700	20.95	10.36	31.31	50.00	-18.69	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.*

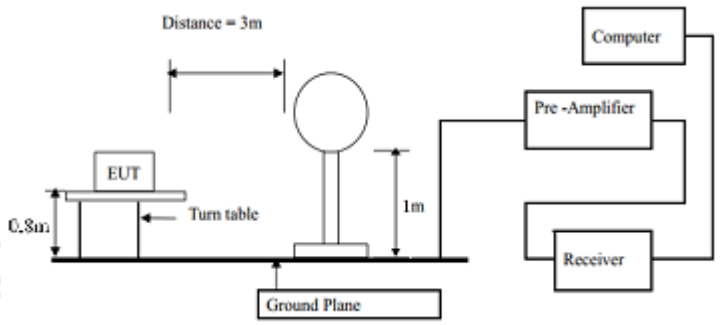
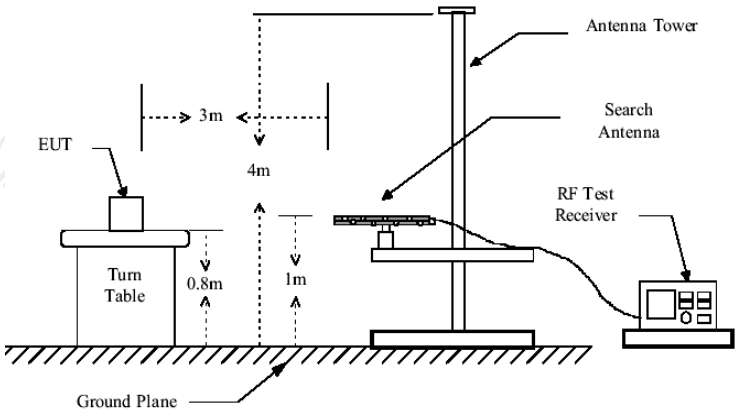
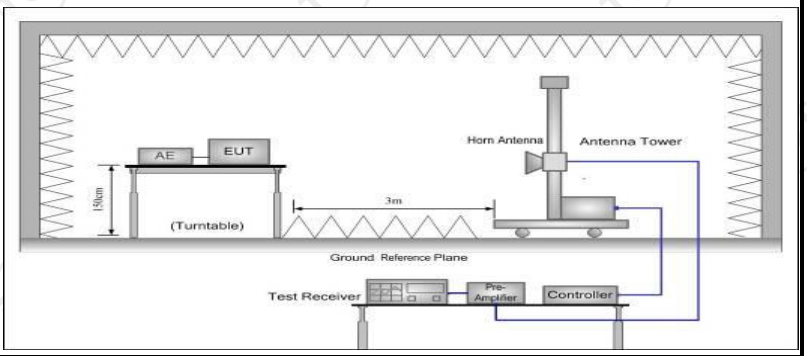
Hotline: 400-6611-140 Tel: 86-755-27673339 Fax: 86-755-27673332 http://www.tct-lab.com

5.3. Radiated Emission Measurement

5.3.1. Test Specification

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 C Section 15.231(a) and 15.209</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.4: 2014 and ANSI C63.10:2013</td></tr>
<tr><td>Frequency Range:</td><td>9 kHz to 5 GHz</td></tr>
<tr><td>Measurement Distance:</td><td>3 m</td></tr>
<tr><td>Antenna Polarization:</td><td>Horizontal & Vertical</td></tr>
<tr><td>Receiver Setup:</td><td>
<table>
<tr><td>Frequency</td><td>Detector</td><td>RBW</td><td>VBW</td><td>Remark</td></tr>
<tr><td>9kHz- 150kHz</td><td>Quasi-peak</td><td>200Hz</td><td>1kHz</td><td>Quasi-peak Value</td></tr>
<tr><td>150kHz-30MHz</td><td>Quasi-peak</td><td>9kHz</td><td>30kHz</td><td>Quasi-peak Value</td></tr>
<tr><td>30MHz-1GHz</td><td>Quasi-peak</td><td>120KHz</td><td>300KHz</td><td>Quasi-peak Value</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak Value</td></tr>
<tr><td>Peak</td><td>1MHz</td><td>10Hz</td><td>Average Value</td></tr>
</table>
</td></tr>
<tr><td>Test Procedure:</td><td>1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter camber in below 1GHz, 1.5m above the ground in above 1GHz. 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 antenna height 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. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</td></tr>
</table>

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

Test setup:	For radiated emissions below 30MHz  30MHz to 1GHz  Above 1GHz 
Test Mode:	Refer to Item 3.1
Test results:	PASS

5.3.2. Limit

Fundamental Frequency (MHz)	Filed Strength of Fundamental (microvolts/meter)	Filed Strength of Spurious Emission (microvolts/meter)
40.66-40.70	2250	225
70-130	1250	125
130-174	1250 to 3750*	125 to 375*
174-260	3750	375
260-470	3750 to 12500*	375 to 1250*
Above 470	12500	1250
Horn Antenna	Schwarzbeck	BBHA 9120D
*Linear interpolations		
[Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows: For the band 130-174 MHz, μV/m at 3 meters = 56.81818(F) - 6136.3636; for the band 260-470 MHz, μV/m at 3 meters = 41.6667(F) - 7083.3333. The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.		

For EUT

Fundamental Frequency (MHz)	Filed Strength of Fundamental (dBμV/m)	Filed Strength of Spurious Emission(dBμV/m)
315	75.62	55.62
433.92	80.83	60.83

Note:

1. *Intentional radiators operating under the provisions of this Section shall demonstrate compliance with the limits on the field strength of emissions, as shown in the above table, based on the average value of the measured emissions.*
2. *According to 15.35, on any frequency or frequencies below or equal to 1000 MHz, the limits Shown are based on measuring equipment employing a CISPR quasi-peak detector function and related measurement bandwidths, unless otherwise specified the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test.*
3. *According to 15.231(b), The limits on the field strength of the spurious emissions in the above table is based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in Section 15.209, whichever limit permits one higher field strength.*

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

Frequencies in restricted band are complied to limit on Paragraph 15.209

Frequency Range (MHz)	Distance (m)	Field strength (dB μ V/m)
0.009-0.490	3	20log 2400/F (kHz) + 80
0.490-1.705	3	20log 24000/F (kHz) + 40
1.705-30	3	20log 30 + 40
30-88	3	40.0
88-216	3	43.5
216-960	3	46.0
Above 960	3	54.0

Note:

1. *RF Voltage (dBuV) = 20 log RF Voltage (uV)*
2. *In the Above Table, the tighter limit applies at the band edges.*
3. *Distance refers to the distance in meters between the measuring instrument antenna and the EUT*
4. *The radiated emissions should be tested under 3-axes position (Lying, Side, and Stand), After pre-test. It was found that the worse radiated emission was get at the lying position.*
5. *If measurement is made at 3m distance, then F.S Limitation at 3m distance is adjusted by using the formula Ld1 = Ld2 * (d2/d1)*

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

5.3.3. Test Instruments

Radiated Emission Test Site (966)				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
EMI Test Receiver	R&S	ESIB7	100197	Jul. 03, 2023
Spectrum Analyzer	R&S	FSQ40	200061	Jul. 03, 2023
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	Jul. 03, 2023
Loop antenna	Schwarzbeck	FMZB1519B	00191	Jun. 11, 2023
Broadband Antenna	Schwarzbeck	VULB9163	340	Jul. 05, 2023
Horn Antenna	Schwarzbeck	BBHA 9120D	631	Jul. 05, 2023
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	/	/

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

5.3.4. Test Data

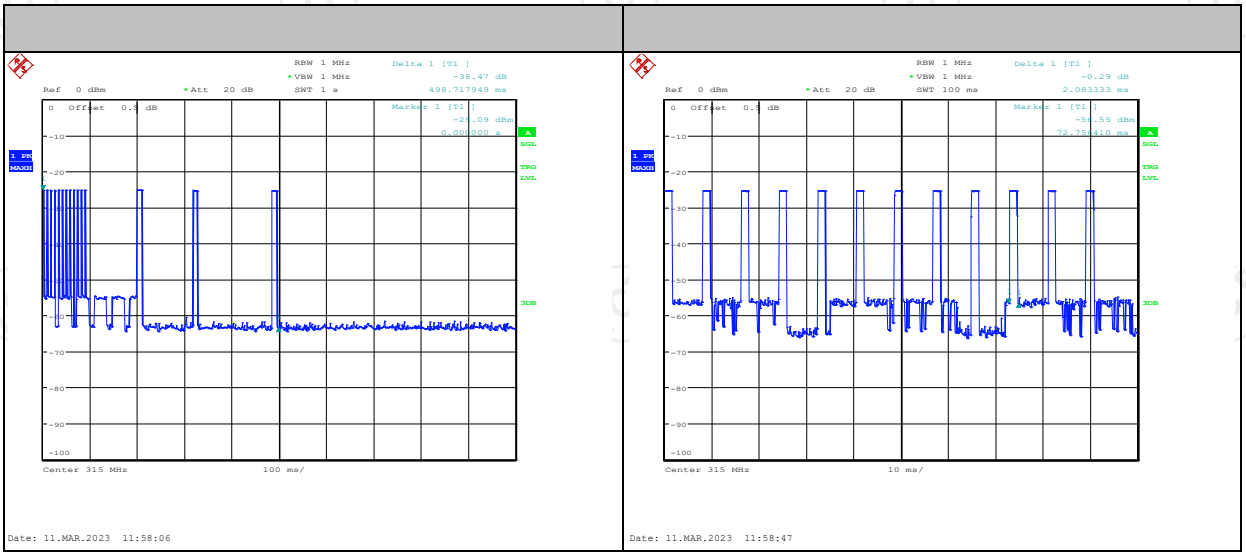
Duty Cycle Test Data:

315MHz:

Total time (ms)	Effective time (ms)	Duty Cycle	AV Factor(dB)
100	22.88	0.23	-12.81

Note:

*Effective time= 2.08*11=22.88ms*
Duty Cycle= Effective time/ Total time= 0.23
AV Factor = 20 log(Duty Cycle)= -12.81

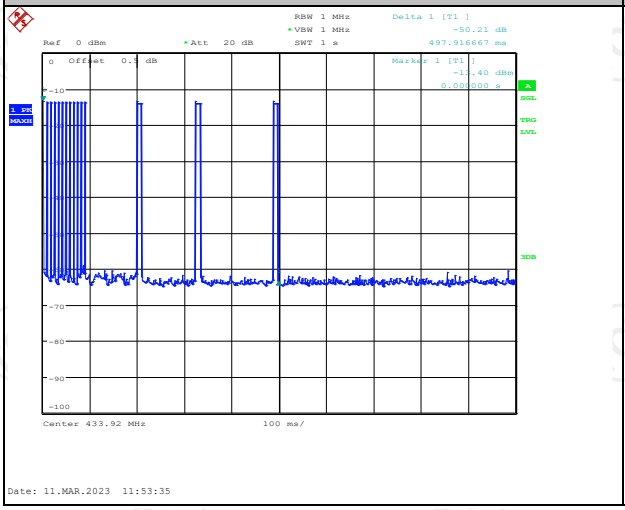


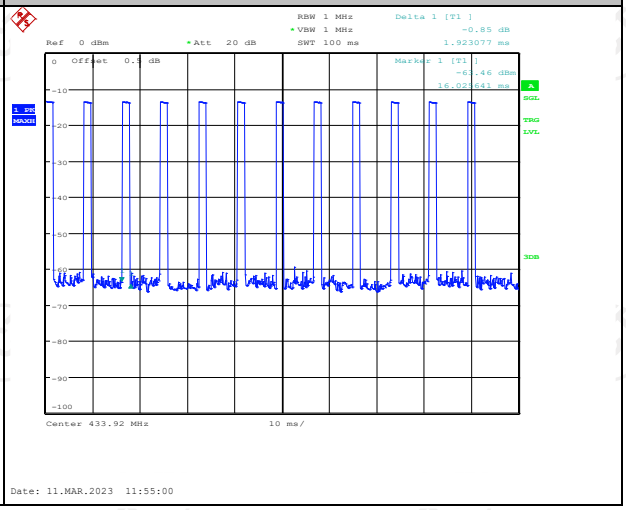
433.92MHz:

Total time(ms)	Effective time(ms)	Duty Cycle	AV Factor(dB)
100	21.12	0.21	-13.51

Note:

*Effective time= 1.92*11=21.12ms*
Duty Cycle= Effective time/ Total time= 0.21
AV Factor = 20 log(Duty Cycle)= -13.51





Field Strength of Fundamental

Frequency (MHz)	Emission PK (dBuV/m)	Horizontal /Vertical	Limits PK (dBuV/m)	Margin (dB)
315	70.09	H	95.62	-25.53
315	56.92	V	95.62	-38.70
433.92	75.47	H	100.83	-25.36
433.92	69.06	V	100.83	-31.77

Frequency (MHz)	Emission PK (dBuV/m)	AV Factor(dB)	Horizontal /Vertical	Emission AVG (dBuV/m)	Limits AV (dBuV/m)	Margin (dB)
315	70.09	-12.81	H	57.28	75.62	-18.34
315	56.92	-12.81	V	44.11	75.62	-31.51
433.92	75.47	-13.51	H	61.96	80.83	-18.87
433.92	69.06	-13.51	V	55.55	80.83	-25.28

Harmonics and Spurious Emissions

Frequency Range (9 kHz-30MHz)

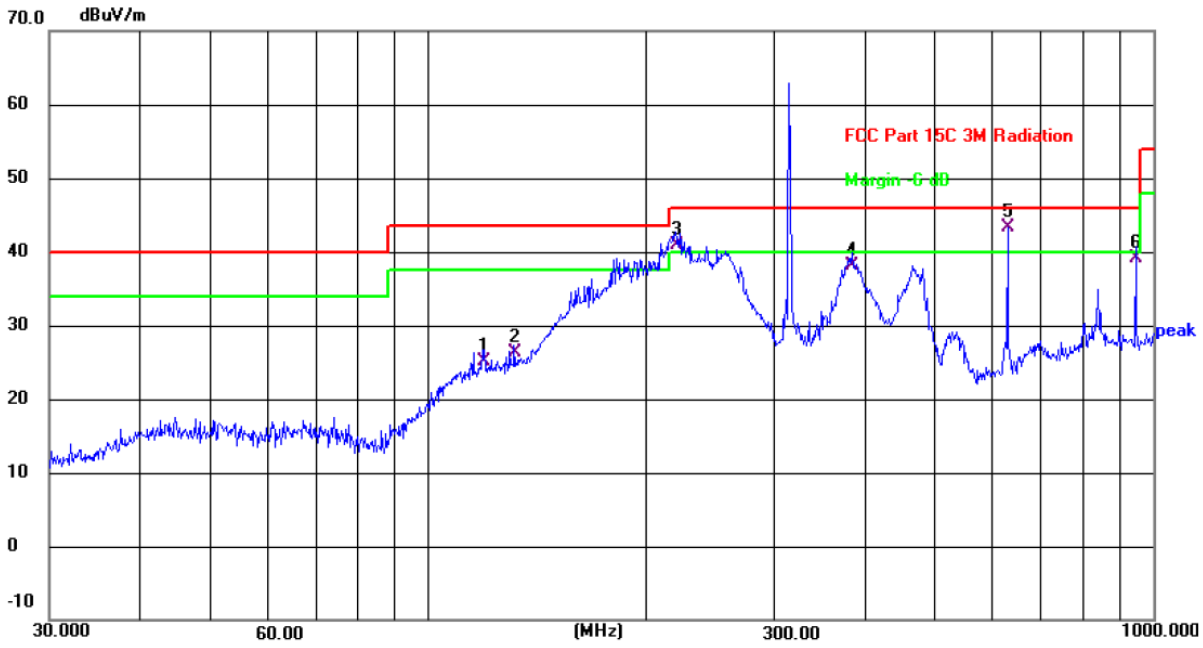
Frequency (MHz)	Level@3m (dBμV/m)	Limit@3m (dBμV/m)
--	--	--
--	--	--
--	--	--
--	--	--

Note: *1. Emission Level=Reading+ Cable loss-Antenna factor-Amp factor*

2. The emission levels are 20 dB below the limit value, which are not reported. It is deemed to comply with the requirement

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

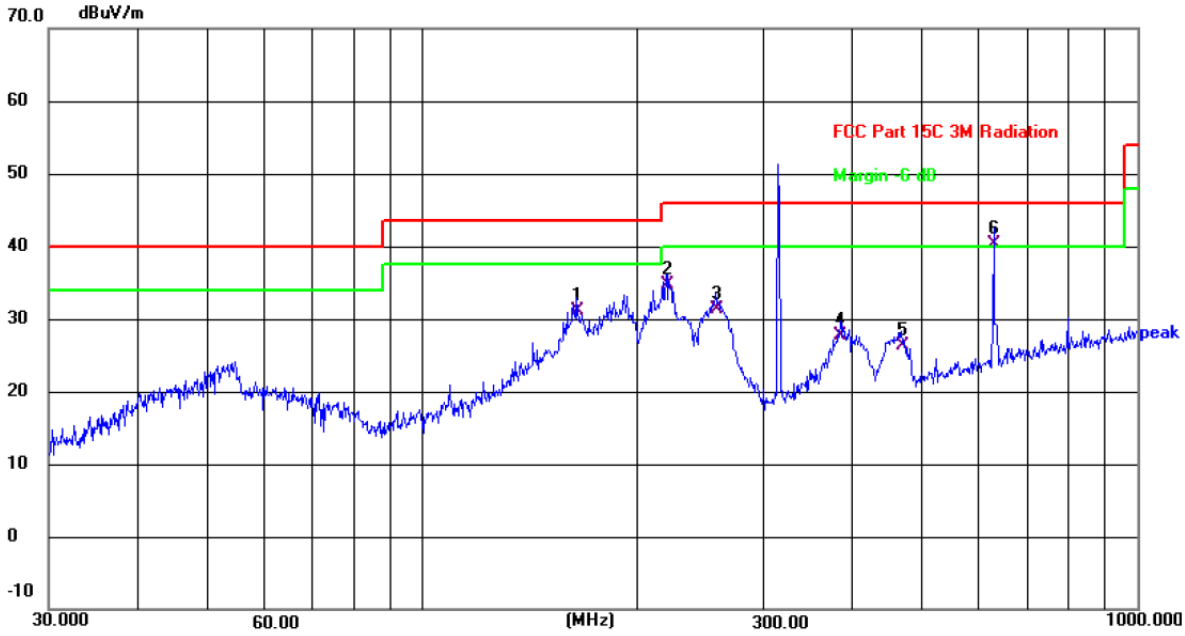
Below 1GHz



Site: #3 3m Anechoic Chamber Polarization: *Horizontal* Temperature: 24(℃) Humidity: 52 %

Limit: FCC Part 15C 3M Radiation Power:DC 7.6 V

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	119.2268	40.05	-14.93	25.12	43.50	-18.38	QP	P	
2	131.7577	42.85	-16.48	26.37	43.50	-17.13	QP	P	
3 !	219.0753	55.15	-14.32	40.83	46.00	-5.17	QP	P	
4	383.9318	48.37	-10.21	38.16	46.00	-7.84	QP	P	
5 *	630.5818	48.13	-4.81	43.32	46.00	-2.68	QP	P	
6	945.4400	40.41	-1.36	39.05	46.00	-6.95	QP	P	



Site: #3 3m Anechoic Chamber Polarization: *Vertical* Temperature: 24(℃) Humidity: 52 %

Limit: FCC Part 15C 3M Radiation Power:DC 7.6 V

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	164.9075	47.23	-16.15	31.08	43.50	-12.42	QP	P	
2	219.0753	49.07	-14.32	34.75	46.00	-11.25	QP	P	
3	257.4222	44.33	-13.07	31.26	46.00	-14.74	QP	P	
4	384.6055	37.98	-10.20	27.78	46.00	-18.22	QP	P	
5	468.0549	34.82	-8.43	26.39	46.00	-19.61	QP	P	
6 *	630.5818	45.17	-4.81	40.36	46.00	-5.64	QP	P	

Above 1GHz （PK value）

Frequency PK Value (MHz)	Read Level PK (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level PK (dBuV/m)	Limit Line PK (dBuV/m)	Over Limit (dB)	Polarization
1370.00	37.18	25.66	4.59	33.39	34.04	74.00	-39.96	Vertical
2355.00	37.08	27.69	5.34	34.05	36.06	74.00	-37.94	Vertical
3415.00	36.49	28.67	6.80	32.85	39.11	74.00	-34.89	Vertical
4150.00	33.16	30.06	8.01	32.01	39.22	74.00	-34.78	Vertical
4695.00	33.33	31.65	8.51	32.03	41.46	74.00	-32.54	Vertical
5645.00	30.20	32.36	9.72	32.35	39.93	74.00	-34.07	Vertical
1430.00	35.74	25.42	4.64	33.47	32.33	74.00	-41.67	Horizontal
2410.00	35.83	27.57	5.40	33.99	34.81	74.00	-39.19	Horizontal
3395.00	37.35	28.60	6.76	32.87	39.84	74.00	-34.16	Horizontal
4115.00	29.84	29.95	7.97	32.05	35.71	74.00	-38.29	Horizontal
4635.00	30.94	31.57	8.46	32.01	38.96	74.00	-35.04	Horizontal
5590.00	28.38	32.22	9.63	32.38	37.85	74.00	-36.15	Horizontal

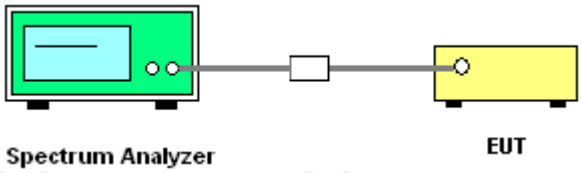
Note:

1. *Emission Level=Peak Reading + Correction Factor; Correction Factor= Antenna Factor + Cable loss – Pre-amplifier*
2. *Margin (dB) = Emission Level (dBμV/m)- 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.*

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

5.4. Manually Activated Transmitter

5.4.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.231(a)(1)
Test Method:	ANSI C63.10: 2013
Limit:	According to 15.231(a), A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.
Test Procedure:	1. According to the follow Test-setup, keep the relative position between the artificial antenna and the EUT. 2. Set to the maximum power setting and enable the EUT transmit continuously. 3. Use the following spectrum analyzer settings. VBW = 1MHz, VBW≥RBW; Span = 0; Sweep Time > T(on)+5S; Detector function = peak; 4. Measure and record the results in the test report.
Test setup:	
Test Mode:	Refer to Item 3.1
Test results:	PASS

5.4.2. Test Instruments

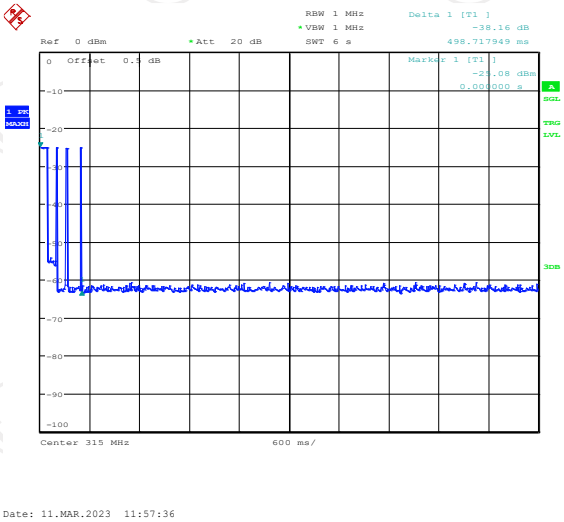
RF Test Room				
Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Spectrum Analyzer	R&S	FSU	200054	Jul. 04, 2023

5.4.3. Test data

Test Channel (MHz)	Manually Activated Transmitter (s)	Limit (s)	Conclusion
315	0.50	5	PASS
433.92	0.50	5	PASS

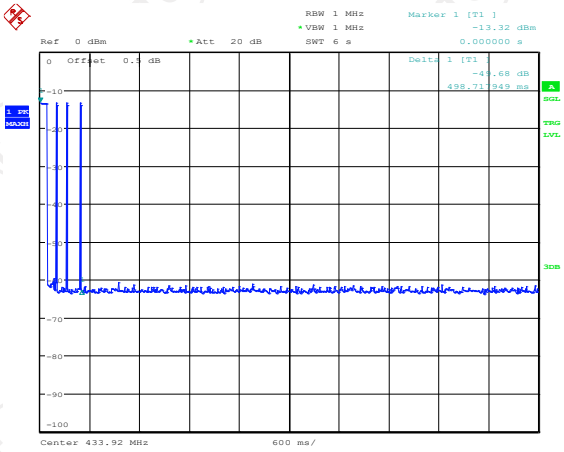
Test plots as follows:

315MHz



Date: 11.MAR.2023 11:57:36

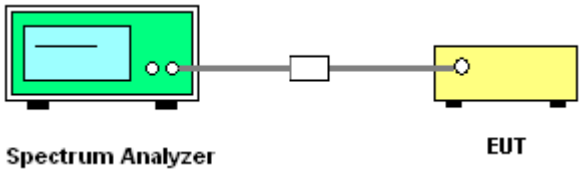
433.92MHz



Date: 11.MAR.2023 11:55:42

5.5. Occupied Bandwidth

5.5.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.231C
Test Method:	ANSI C63.10: 2013
Limit:	According to 15.231(c), The bandwidth of the emission shall be no wider than 0.25% of the centre frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the centre frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.
Test Procedure:	1. According to the follow Test-setup, keep the relative position between the artificial antenna and the EUT. 2. Set to the maximum power setting and enable the EUT transmit continuously. 3. Use the following spectrum analyzer settings for 20dB Bandwidth measurement. Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel; RBW≥ 1% of the 20 dB bandwidth; VBW≥RBW; Sweep = auto; Detector function = peak; Trace = max hold. 4. Measure and record the results in the test report.
Test setup:	
Test Mode:	Refer to Item 3.1
Test results:	PASS

5.5.2. Test Instruments

RF Test Room				
Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Spectrum Analyzer	R&S	FSU	200054	Jul. 04, 2023

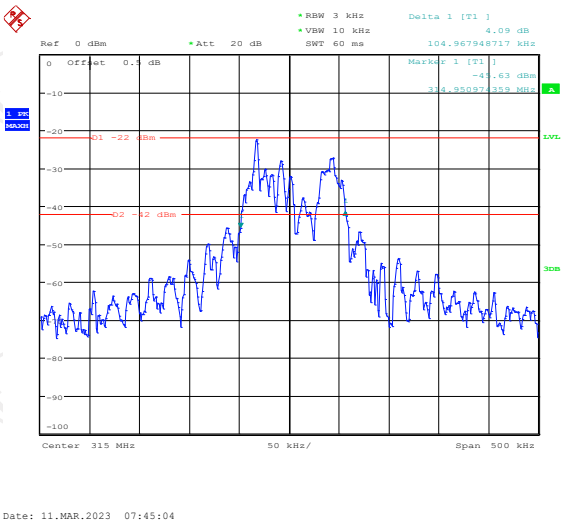
5.5.3. Test data

Test Channel (MHz)	20dB Occupy Bandwidth (kHz)	Limit (kHz)	Conclusion
315	104.97	787.50	PASS
433.92	208.33	1084.80	PASS

Note: *Limit = 315MHz *0.25% = 787.50 kHz, Limit = 433.92MHz *0.25% = 1084.80 kHz*

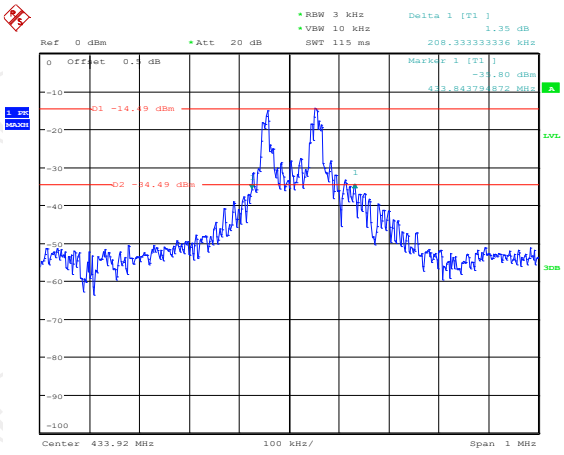
Test plots as follows:

315MHz



Date: 11.MAR.2023 07:45:04

433.92MHz



Date: 11.MAR.2023 07:57:07

Appendix A: Photographs of Test Setup

Refer to the test report No. TCT220712E018

Appendix B: Photographs of EUT

Refer to the test report No. TCT220712E018

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

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