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Test Report

Report No.: CQASZ20240200315E-02
Applicant: THINKCAR TECH CO., LTD.

Address of Applicant: 2606, building 4, phase II, Tianan Yungu, Gangtou community, Bantian

Longgang District, Shenzhen

Equipment Under Test (EUT):

Product: Smart Diagnostic Tool

Model No.: TKT77

Test Model No.: TKT77

Brand Name: THINKCAR, XHINKCAR, MUCAR

FCC ID: 2AUARTKT77

Standards: 47 CFR Part 15, Subpart C

Date of Receipt: 2024-02-23

Date of Test: 2024-02-23 to 2024-03-14

Date of Issue: 2024-03-14
Test Result: PASS*

*In the configuration tested, the EUT complied with the standards specified above.

Tested By:

(Lewis Zhou)

Reviewed By:

(Timo Lei)

Approved By:

(Alex Wang)





Report No.: CQASZ20240200315E-02

1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20240200315E-02	Rev.01	Initial report	2024-03-14





2 Test Summary

Test Item	Test Requirement	Test method	Result
Antenna Requirement	47 CFR Part 15, Subpart C Section 15.203/15.247 (c)	ANSI C63.10 2013	PASS
AC Power Line Conducted Emission	47 CFR Part 15, Subpart C Section 15.207	ANSI C63.10 2013	PASS
Conducted Peak Output Power	47 CFR Part 15, Subpart C Section 15.247 (b)(1)	ANSI C63.10 2013	PASS
6dB Occupied Bandwidth	47 CFR Part 15, Subpart C Section 15.247 (a)(2) ANSI C63.10 20		PASS
Power Spectral Density	47 CFR Part 15, Subpart C Section 15.247 (e)	ANSI C63.10 2013	PASS
Band-edge for RF Conducted Emissions	47 CFR Part 15, Subpart C Section 15.247(d)	ANSI C63.10 2013	PASS
RF Conducted Spurious Emissions	47 CFR Part 15, Subpart C Section 15.247(d)	ANSI C63.10 2013	PASS
Radiated Spurious Emissions	47 CFR Part 15, Subpart C Section 15.205/15.209	ANSI C63.10 2013	PASS
Restricted bands around fundamental frequency (Radiated Emission)	47 CFR Part 15, Subpart C Section 15.205/15.209	ANSI C63.10 2013	PASS



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4 General Information

4.1 Client Information

Applicant:	THINKCAR TECH CO., LTD.
Address of Applicant:	2606, building 4, phase II, Tianan Yungu, Gangtou community, Bantian Longgang District, Shenzhen
Manufacturer:	THINKCAR TECH CO., LTD.
Address of Manufacturer:	2606, building 4, phase II, Tianan Yungu, Gangtou community, Bantian Longgang District, Shenzhen
Factory:	THINKCAR TECH CO., LTD.
Address of Factory:	2606, building 4, phase II, Tianan Yungu, Gangtou community, Bantian Longgang District, Shenzhen

4.2 General Description of EUT

4.2 Ocheral Descrip			
Product Name:	Smart Diagnostic Tool		
Model No.:	TKT77		
Test Model No.:	TKT77		
Trade Mark:	THINKCAR, XHINKCAR, MUCAR		
Software Version:	V1.0		
Hardware Version:	V1.0		
Operation Frequency:	2402MHz~2480MHz		
Bluetooth Version:	V5.0		
Modulation Type:	GFSK		
Transfer Rate:	1Mbps, 2Mbps		
Number of Channel:	40		
Product Type:	☐ Mobile ☐ Portable		
Test Software of EUT:	Android System		
Antenna Type:	FPC antenna		
Antenna Gain:	3.42dBi		
EUT Power Supply:	Li-ion battery: DC 3.8V 6000mAh, Charge by DC 5V for adapter		
Simultaneous Transmission	☐ Simultaneous TX is supported and evaluated in this report.		
	⊠ Simultaneous TX is not supported.		



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Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
0	2402MHz	10	2422MHz	20	2442MHz	30	2462MHz
1	2404MHz	11	2424MHz	21	2444MHz	31	2464MHz
2	2406MHz	12	2426MHz	22	2446MHz	32	2466MHz
3	2408MHz	13	2428MHz	23	2448MHz	33	2468MHz
4	2410MHz	14	2430MHz	24	2450MHz	34	2470MHz
5	2412MHz	15	2432MHz	25	2452MHz	35	2472MHz
6	2414MHz	16	2434MHz	26	2454MHz	36	2474MHz
7	2416MHz	17	2436MHz	27	2456MHz	37	2476MHz
8	2418MHz	18	2438MHz	28	2458MHz	38	2478MHz
9	2420MHz	19	2440MHz	29	2460MHz	39	2480MHz

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency
The lowest channel (CH0)	2402MHz
The middle channel (CH19)	2440MHz
The highest channel (CH39)	2480MHz

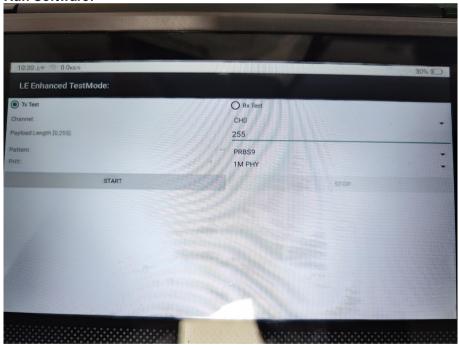


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4.3 Additional Instructions

EUT Test Software Settings:						
Mode:	⊠ Special software is used.	⊠ Special software is used.				
	☐ Through engineering command into the engineering mode. engineering command: *#*#3646633#*#*					
EUT Power level:	Class2 (Power level is built-in set parameters and cannot be changed and selected)					
Use test software to set the lowest frequency, the middle frequency and the highest frequency keep						
transmitting of the EUT.	1					
Mode	Mode Channel Frequency(MHz)					
	CH0 2402					
GFSK CH19 2440						
	CH39	2480				

Run Software:





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4.4 Test Environment

Operating Environment:	Operating Environment:			
Temperature:	24.5°C			
Humidity:	59% RH			
Atmospheric Pressure:	1009mbar			
Test Mode:	Use test software to set the lowest frequency, the middle frequency and the highest frequency keep transmitting of the EUT.			

4.5 Description of Support Units

The EUT has been tested with associated equipment below.

1) Support equipment

Description	Manufacturer	Model No.	Certification	Supplied by
Adapter	1	1	1	CQA
2) Cable				
Cable No.	Description	Manufacturer	Cable Type/Length	Supplied by
,		,	,	,





4.6 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 **Shenzhen Huaxia Testing Technology Co., Ltd.** guality 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.

Hereafter the best measurement capability for CQA laboratory is reported:

No.	Item	Uncertainty
1	Radiated Emission (Below 1GHz)	5.12dB
2	Radiated Emission (Above 1GHz)	4.60dB
3	Conducted Disturbance (0.15~30MHz)	3.34dB
4	Radio Frequency	3×10 ⁻⁸
5	Duty cycle	0.6 %
6	Occupied Bandwidth	1.1%
7	RF conducted power	0.86dB
8	RF power density	0.74
9	Conducted Spurious emissions	0.86dB
10	Temperature test	0.8℃
11	Humidity test	2.0%
12	Supply voltages	0.5 %
13	Frequency Error	5.5 Hz



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4.7 Test Location

All tests were performed at:

Shenzhen Huaxia Testing Technology Co., Ltd.

1F., Block A of Tongsheng Technology Building, Huahui Road, Dalang Street, Longhua District, Shenzhen, China

4.8 Test Facility

• A2LA (Certificate No. 4742.01)

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 4742.01.

• FCC Registration No.: 522263

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No.:522263

4.9 Deviation from Standards

None.

4.10 Other Information Requested by the Customer

None.





4.11 Equipment List

			1 4 4	0-1:14:	0-1:14:
Test Equipment	Manufacturer	Model No.	Instrument No.	Calibration Date	Calibration Due Date
EMI Test Receiver	R&S	ESR7	CQA-005	2023/09/08	2024/09/07
Spectrum analyzer	R&S	FSU26	CQA-038	2023/09/08	2024/09/07
Spectrum analyzer	R&S	FSU40	CQA-075	2023/09/08	2024/09/07
Preamplifier	MITEQ	AFS4-00010300-18- 10P-4	CQA-035	2023/09/08	2024/09/07
Preamplifier	MITEQ	AMF-6D-02001800- 29-20P	CQA-036	2023/09/08	2024/09/07
Preamplifier	EMCI	EMC184055SE	CQA-089	2023/09/08	2024/09/07
Loop antenna	Schwarzbeck	FMZB1516	CQA-060	2021/09/16	2024/09/15
Bilog Antenna	R&S	HL562	CQA-011	2021/09/16	2024/09/15
Horn Antenna	R&S	HF906	CQA-012	2021/09/16	2024/09/15
Horn Antenna	Schwarzbeck	BBHA 9170	CQA-088	2021/09/16	2024/09/15
Coaxial Cable (Above 1GHz)	CQA	N/A	C007	2023/09/08	2024/09/07
Coaxial Cable (Below 1GHz)	CQA	N/A	C013	2023/09/08	2024/09/07
RF cable(9KHz~40GHz)	CQA	RF-01	CQA-079	2023/09/08	2024/09/07
Antenna Connector	CQA	RFC-01	CQA-080	2023/09/08	2024/09/07
Power Sensor	KEYSIGHT	U2021XA	CQA-30	2023/09/08	2024/09/07
N1918A Power Analysis Manager Power Panel	Agilent	N1918A	CQA-074	2023/09/08	2024/09/07
Power meter	R&S	NRVD	CQA-029	2023/09/08	2024/09/07
Power divider	MIDWEST	PWD-2533-02-SMA- 79	CQA-067	2023/09/08	2024/09/07
EMI Test Receiver	R&S	ESR7	CQA-005	2023/09/08	2024/09/07
LISN	R&S	ENV216	CQA-003	2023/09/08	2024/09/07
Coaxial cable	CQA	N/A	CQA-C009	2023/09/08	2024/09/07
DC power	KEYSIGHT	E3631A	CQA-028	2023/09/08	2024/09/07

Note:

The temporary antenna connector is soldered on the pcb board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.





5 Test results and Measurement Data

5.1 Antenna Requirement

Standard requirement: 47 CFR Part 15C 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(b) (4) requirement:

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna:



The antenna is FPC antenna.

The connection/connection type between the antenna to the EUT's antenna port is: permanently attachment

This is either permanently attachment or a unique coupling that satisfies the requirement.

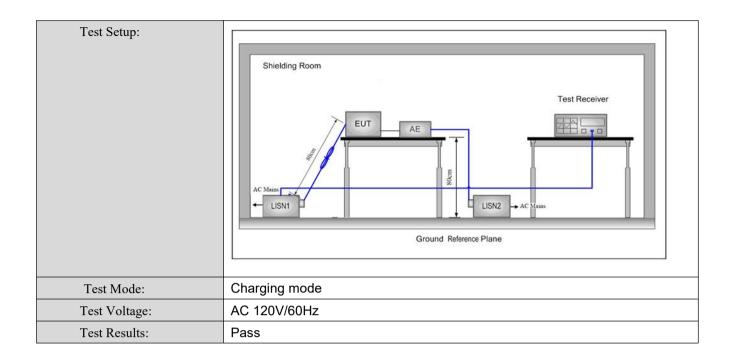


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5.2 Conducted Emissions

Test Requirement:	47 CFR Part 15C Section 15.207					
Test Method:	ANSI C63.10: 2013					
Test Frequency Range:	150kHz to 30MHz					
Limit:	E (MIL)	Limit (d	Limit (dBuV)			
	Frequency range (MHz)	Quasi-peak	Average			
	0.15-0.5	66 to 56*	56 to 46*			
	0.5-5	56	46			
	5-30	60	50			
	* Decreases with the logarithm o	f the frequency.		•		
Test Procedure:	The mains terminal disturl room.	oance voltage test was	s conducted in a shie	elded		
	2) The EUT was connected to AC power source through a LISN 1 (Line					
	Impedance Stabilization Network) which provides a $50\Omega/50\mu H + 5\Omega$ linear impedance. The power cables of all other units of the EUT were					
	connected to a second LIS					
	reference plane in the sam	n the same way as the LISN 1 for the unit being				
	measured. A multiple socket outlet strip was used to connect multiple					
	power cables to a single Li exceeded.	ISN provided the rating	of the LISN was not	•		
	3) The tabletop EUT was place	ced upon a non-metallio	c table 0.8m above th	he		
	ground reference plane. A	•	rangement, the EUT	was		
	placed on the horizontal gr	•				
	4) The test was performed wi	•	•			
	of the EUT shall be 0.4 m to vertical ground reference p	•	•	ie		
	reference plane. The LISN		•	he		
	unit under test and bonded	•	•			
	mounted on top of the ground reference plane. This distance was					
	EUT. All other units	of				
	the EUT and associated ed	• •		2.		
	5) In order to find the maximu		•			
	equipment and all of the in		changed according	to		
ANSI C63.10: 2013 on conducted measurement.						

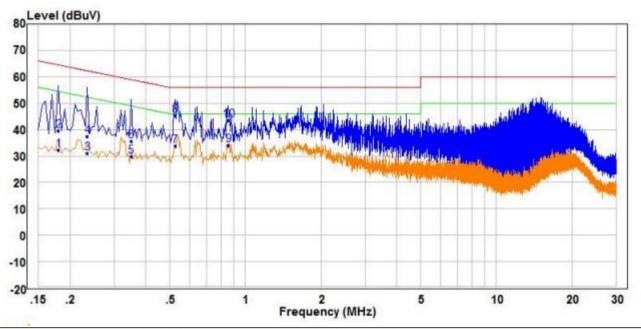






Measurement Data

Live line:



		Freq	Read Level	Factor	Level	Limit	Over	Remark	Pol/Phase
	-	MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.180	22.53	9.64	32.17	54.49	-22.32	Average	Line
2		0.180	30.06	9.64	39.70	64.49	-24.79	QP	Line
3		0.235	21.60	9.56	31.16	52.27	-21.11	Average	Line
4		0.235	27.81	9.56	37.37	62.27	-24.90	QP	Line
4 5 6		0.350	20.33	9.55	29.88	48.96	-19.08	Average	Line
6		0.350	26.19	9.55	35.74	58.96	-23.22	QP	Line
7		0.525	24.17	9.72	33.89	46.00	-12.11	Average	Line
8	PP	0.525	35.75	9.72	45.47	56.00	-10.53	QP	Line
9	AV	0.855	24.42	9.80	34.22	46.00	-11.78	Average	Line
10		0.855	33.60	9.80	43.40	56.00	-12.60	QP	Line
11		14.405	20.20	9.75	29.95	50.00	-20.05	Average	Line
12		14.405	32.96	9.75	42.71	60.00	-17.29	QP	Line

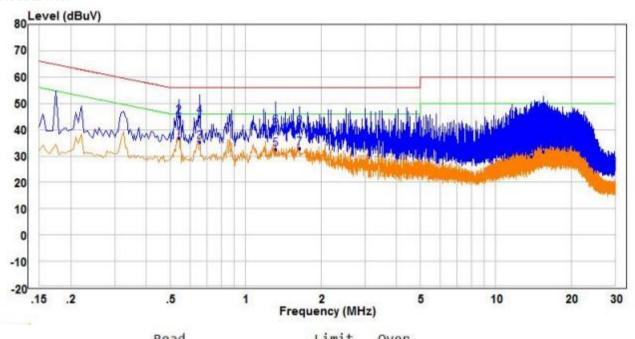
Remark:

- 1. The following Quasi-Peak and Average measurements were performed on the EUT:
- 2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.
- 3. If the Peak value under Average limit, the Average value is not recorded in the report.





Neutral line:



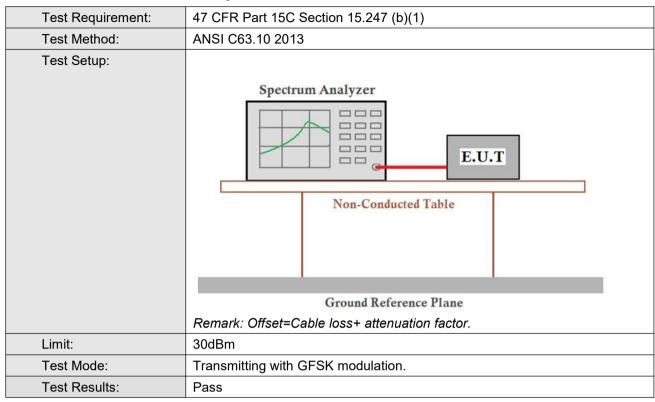
		Freq	Level	Factor	Level	Line	Limit	Remark	Pol/Phase
	-	MHZ	dBuV	dB	dBuV	dBuV	dB		
1	PP	0.540	27.24	9.74	36.98	46.00	-9.02	Average	Neutral
2		0.540	35.36	9.74	45.10	56.00	-10.90	QP	Neutral
3		0.655	25.48	9.86	35.34	46.00	-10.66	Average	Neutral
4	QP	0.655	35.24	9.86	45.10	56.00	-10.90	QP	Neutral
5		1.315	22.95	9.72	32.67	46.00	-13.33	Average	Neutral
6		1.315	31.56	9.72	41.28	56.00	-14.72	QP	Neutral
7		1.645	23.17	9.73	32.90	46.00	-13.10	Average	Neutral
8		1.645	31.31	9.73	41.04	56.00	-14.96	QP	Neutral
9		13.890	20.07	9.77	29.84	50.00	-20.16	Average	Neutral
10		13.890	32.78	9.77	42.55	60.00	-17.45	QP	Neutral
11		15.565	22.03	9.74	31.77	50.00	-18.23	Average	Neutral
12		15.565	33.50	9.74	43.24	60.00	-16.76	QP	Neutral

Remark:

- 1. The following Quasi-Peak and Average measurements were performed on the EUT:
- 2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.
- 3. If the Peak value under Average limit, the Average value is not recorded in the report.



5.3 Conducted Peak Output Power



Measurement Data

	GFSK mode (1Mbps)							
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result					
Lowest	-2.58	30.00	Pass					
Middle	-1.08	30.00	Pass					
Highest	-1.49	30.00	Pass					
	GFSK mode (2Mbps)							
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result					
Lowest	-2.71	30.00	Pass					
Middle	-1.12	30.00	Pass					
Highest	-1.43	30.00	Pass					





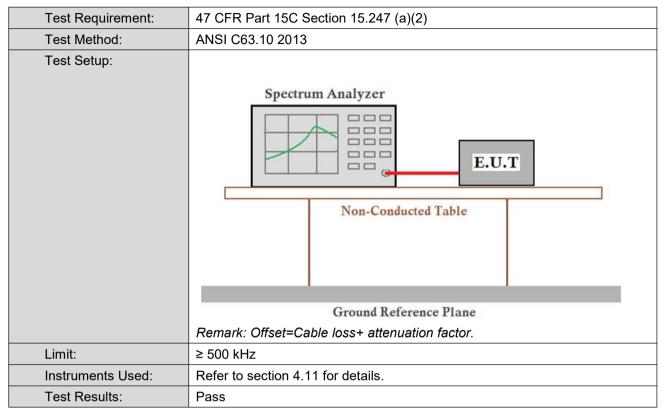








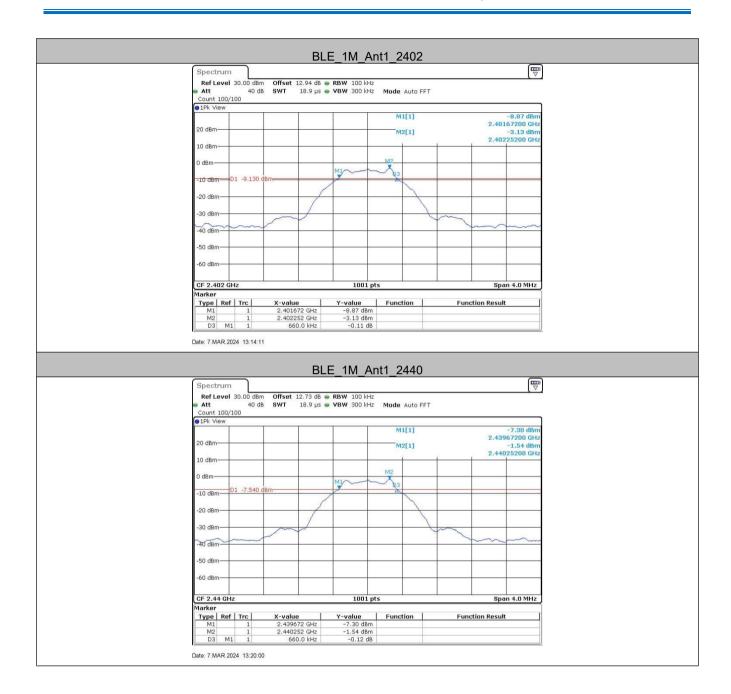
5.4 6dB Occupy Bandwidth



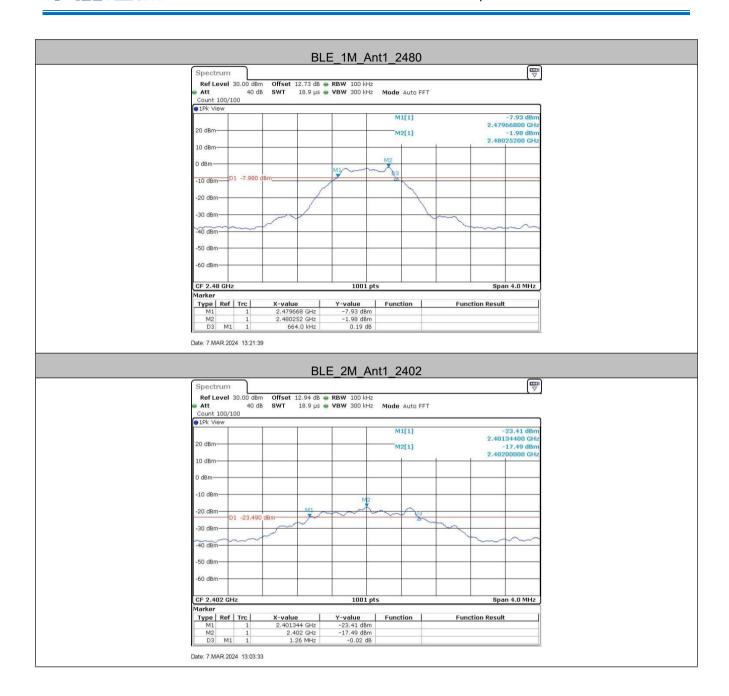
Measurement Data

GFSK mode (1Mbps)								
Test channel	6dB Occupy Bandwidth (MHz)	Limit (kHz)	Result					
Lowest	0.66	≥500	Pass					
Middle	0.66	≥500	Pass					
Highest	0.66	≥500	Pass					
	GFSK mode (2Mbps)							
Test channel	6dB Occupy Bandwidth (MHz)	Limit (kHz)	Result					
Lowest	1.26	≥500	Pass					
Middle	1.16	≥500	Pass					
Highest	1.16	≥500	Pass					

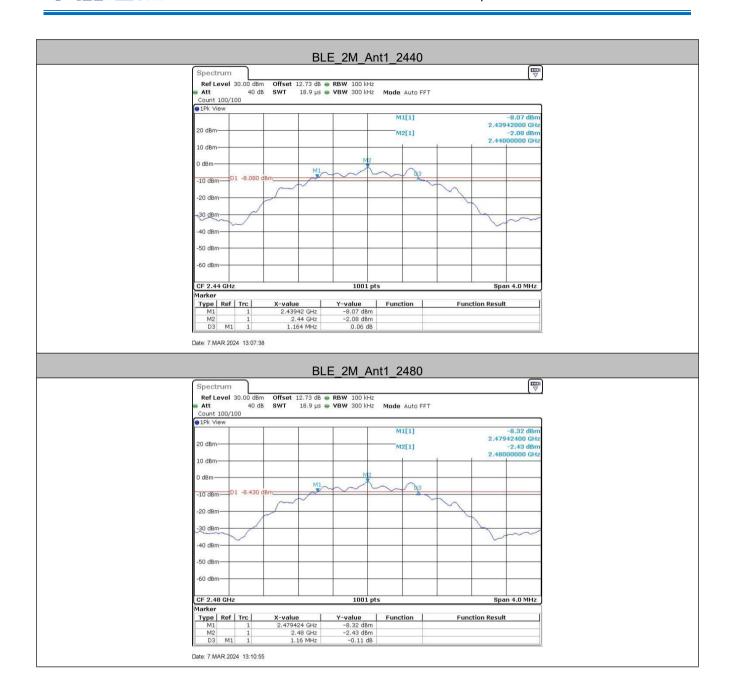






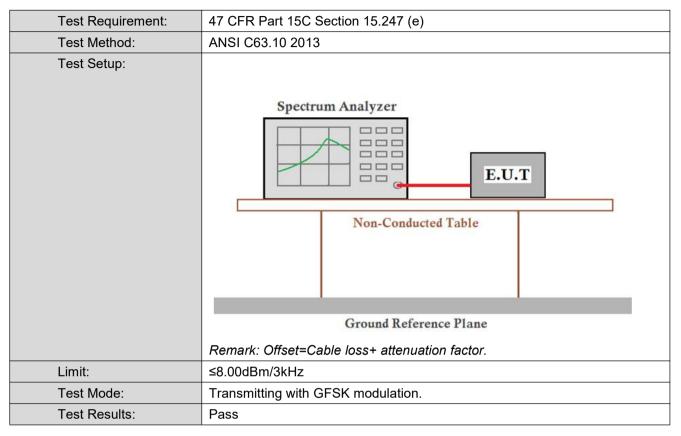








5.5 Power Spectral Density



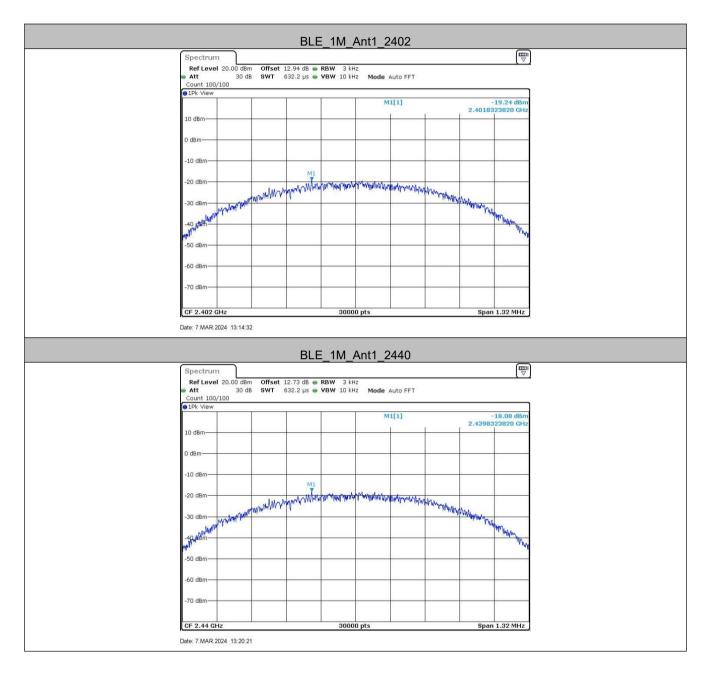
Measurement Data

acaromone Bata								
	GFSK mode (1Mbps)							
Test channel	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result					
Lowest	-19.24	≤8.00	Pass					
Middle	-18.08	≤8.00	Pass					
Highest	-18.54	≤8.00	Pass					
	GFSK mode (2Mbps)							
Test channel	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result					
Lowest	-21.87	≤8.00	Pass					
Middle	-20.25	≤8.00	Pass					
Highest	-20.63	≤8.00	Pass					

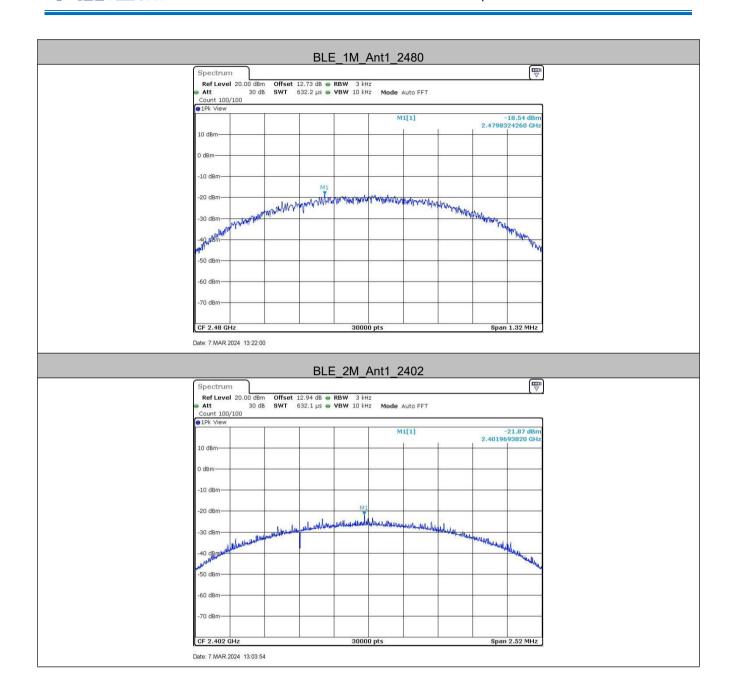




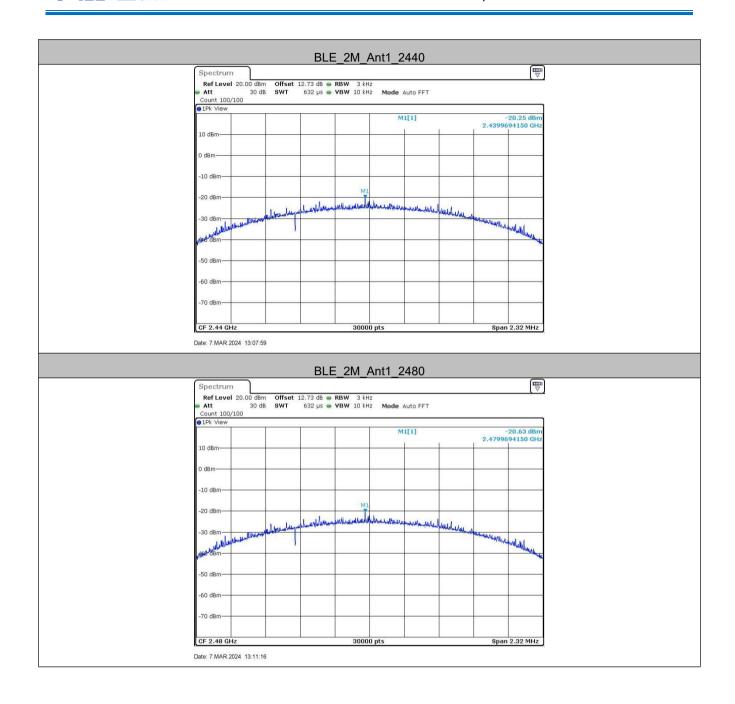
Test plot as follows:







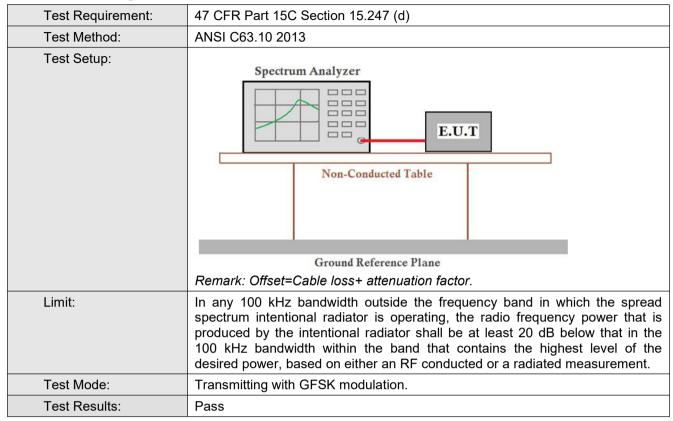






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5.6 Band-edge for RF Conducted Emissions

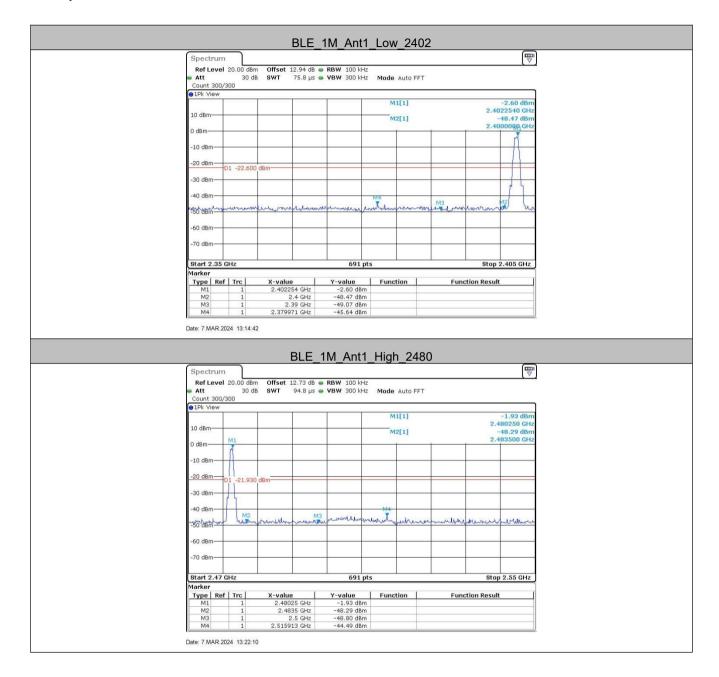


TestMode	ChName	Freq(MHz)	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
	Low	2402	-2.60	-45.64	≤-22.6	PASS
BLE_1M	High	2480	-1.93	-44.49	≤-21.93	PASS
	Low	2402	-3.90	-35.21	≤-23.9	PASS
BLE_2M	High	2480	-4.11	-43.29	≤-24.11	PASS



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Test plot as follows:



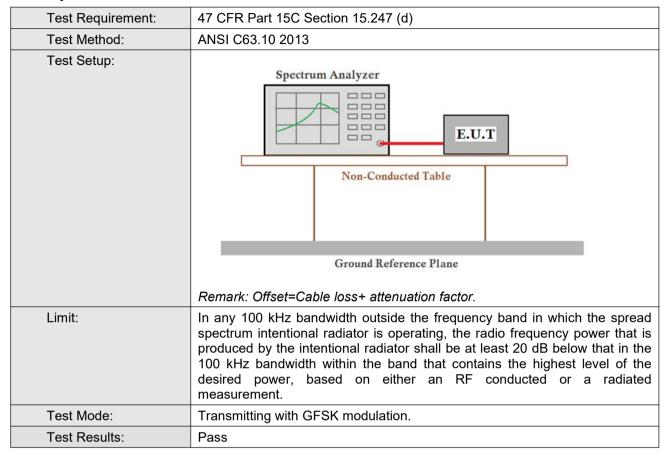








5.7 Spurious RF Conducted Emissions





Test plot as follows:

