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Report Template Version: V05 Report Template Revision Date: 2021-11-03

Test Report

Report No.:	CQASZ20220200198E-01
Applicant:	Avantronics Limited
Address of Applicant:	The 4th Floor, Yuepeng Building, No.1019 Jiabin Rd, Luohu District, Shenzhen
Equipment Under Test (E	UT):
Product:	Avantree Roadtrip
Model No.:	BTCK-12, BTCK-12-BLK, BTCK-12-BLU, BTCK-12-TTN, BTCK-12-GRY, BTCK-12P, BTCK-12S, BTCK-12B
Test Model No.:	BTCK-12
Brand Name:	Avantree
FCC ID:	WJ5-BTCK-12
Standards:	47 CFR Part 15, Subpart C
Date of Receipt:	2022-02-16
Date of Test:	2022-02-16 to 2022-03-01
Date of Issue:	2022-03-11
Test Result:	PASS*

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

lewis ZhOU (Lewis Zhou) Tested By: Huan] Reviewed By: (Rock Huang) PPROVE Approved By: (Jack Ai)

The test report is effective only with both signature and specialized stamp, The result(s) shown in this report refer only to the sample(s) tested. Without written approval of CQA, this report can't be reproduced except in full.



1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20220200198E-01	Rev.01	Initial report	2022-03-11



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)(3)	ANSI C63.10 2013	PASS
6dB Occupied Bandwidth	47 CFR Part 15, Subpart C Section 15.247 (a)(2)	ANSI C63.10 2013	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:	Avantronics Limited
Address of Applicant:	The 4th Floor, Yuepeng Building, No.1019 Jiabin Rd, Luohu District, Shenzhen
Manufacturer:	Avantronics Limited
Address of Manufacturer:	The 4th Floor, Yuepeng Building, No.1019 Jiabin Rd, Luohu District, Shenzhen
Factory:	Avantronics Limited
Address of Factory:	The 4th Floor, Yuepeng Building, No.1019 Jiabin Rd, Luohu District, Shenzhen

4.2 General Description of EUT

Product Name:	Avantree Roadtrip			
Model No.:	BTCK-12, BTCK-12-BLK, BTCK-12-BLU, BTCK-12-TTN, BTCK-12-GRY,			
	BTCK-12P, BTCK-12S, BTCK-12B			
Test Model No.:	BTCK-12			
Trade Mark:	Avantree			
Software Version:	CK1220211109V0			
Hardware Version:	PCB_CK12V5.3			
Operation Frequency:	2402MHz~2480MHz			
Bluetooth Version:	V5.0			
Modulation Type:	GFSK			
Transfer Rate:	1Mbps			
Number of Channel:	40			
Product Type:	□ Mobile			
Test Software of EUT:	BlueTest3			
Antenna Type:	Chip antenna			
Antenna Gain:	4.85dBi			
EUT Power Supply:	Li-ion battery: DC 3.7V 1120mAh, Charge by DC 5V for adapter			

Note:

Model No.: BTCK-12, BTCK-12-BLK, BTCK-12-BLU, BTCK-12-TTN, BTCK-12-GRY, BTCK-12P, BTCK-12S, BTCK-12B.

Only the model BTCK-12 was tested, the circuit design, layout, components used and internal wiring are all the same, except for the color difference.



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



4.3 Additional Instructions

EUT Test Software Settings:						
Mode:	 Special software is used. Through engineering command into engineering command: *#*#3646633# 	Special software is used.				
EUT Power level:	Class2 (Power level is built-in set para selected)	ameters and cannot be changed and				
Use test software to set the lo transmitting of the EUT.	owest frequency, the middle frequency and	d the highest frequency keep				
Mode						
	CH0 2402					
GFSK	GFSK CH19 2440					
	CH39	2480				

Run Software:

Test Commands ——		-Test Arguments		- i		
CW TX CONTINUOUS TX	^	Channel (0-78)	78		Cl.	se
PACKET TX PACKET RX OHS		Power (0-9)	9		Hel	p
RF TEST STOP		Туре	BREDR 1-PR9 💌]	Exec	ute
POWER TABLE GET POWER TABLE SET		Pattern bits (1- 22)	2		Res	at
ENABLE DUT MODE	~	Pattern (hex)	00000001			er
Test Results Save to file C:\Users\Administ		for f j pData\Local\QTIL\Blu)isplay :		C BER	
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Save to file C:\Vsers\Administ	rator\App r = 2402 ccessful r = 2441 ccessful r = 2480 ccessful r = 2480 ccessful ccessful r = 2480 ccessful ccessful ccessful ccess	pData\Local\QTIL\Blu PDHz MHz L MHz L MHz L MHz L OMHz L OMHz L OMHz			C BER	,
Save to file C:\Users\Administ	rator\App r = 2402 ccessful r = 2441 ccessful r = 2440 r = 2440 ccessful r = 2480 ccessful r = 2480 ccessful r = 2480 ccessful	pData\Looal\QTIL\Blu pData\Looal\QTIL\Blu 2MHz L MHz L MHz DMHz L DMHz L DMHz L			C BER	,



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	HUAWEI	HW-0502000C01	/	CQA
2) Cable				

Cable No.	Description	Manufacturer	Cable Type/Length	Supplied by	
/	/	/	1	/	



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.** quality 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.

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°C
11	Humidity test	2.0%
12	Supply voltages	0.5 %
13	Frequency Error	5.5 Hz

Hereafter the best measurement capability for CQA laboratory is reported:



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.

4.10Other Information Requested by the Customer

None.



4.11Equipment List

Test Equipment	Manufacturer	Model No.	Instrument No.	Calibration Date	Calibration Due Date
EMI Test Receiver	R&S	ESR7	CQA-005	2021/9/10	2022/9/9
Spectrum analyzer	R&S	FSU26	CQA-038	2021/9/10	2022/9/9
Preamplifier	MITEQ	AMF-6D-02001800-29- 20P	CQA-036	2021/9/10	2022/9/9
Loop antenna	Schwarzbeck	FMZB1516	CQA-060	2021/9/16	2024/9/15
Bilog Antenna	R&S	HL562	CQA-011	2021/9/16	2024/9/15
Horn Antenna	R&S	HF906	CQA-012	2021/9/16	2024/9/15
Horn Antenna	Schwarzbeck	BBHA 9170	CQA-088	2021/9/16	2024/9/15
Coaxial Cable (Above 1GHz)	CQA	N/A	C007	2021/9/10	2022/9/9
Coaxial Cable (Below 1GHz)	CQA	N/A	C013	2021/9/10	2022/9/9
Antenna Connector	CQA	RFC-01	CQA-080	2021/9/10	2022/9/9
RF cable(9KHz~40GHz)	CQA	RF-01	CQA-079	2021/9/10	2022/9/9
Power divider	MIDWEST	PWD-2533-02-SMA-79	CQA-067	2021/9/10	2022/9/9

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)

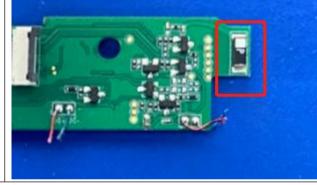
15.203 requirement:

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:



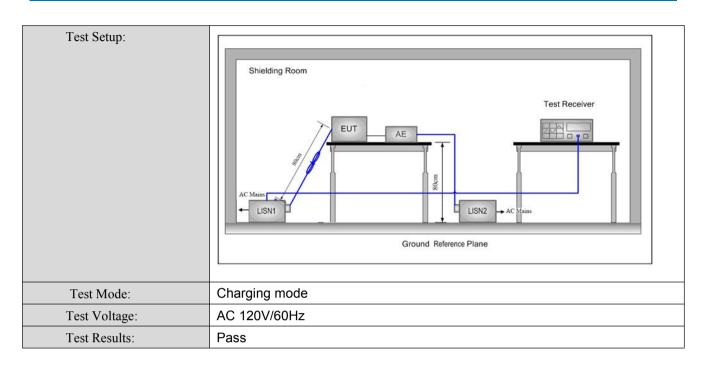
The antenna is Chip antenna. The best case gain of the antenna is 4.85 dBi.



5.2 Conducted Emissions

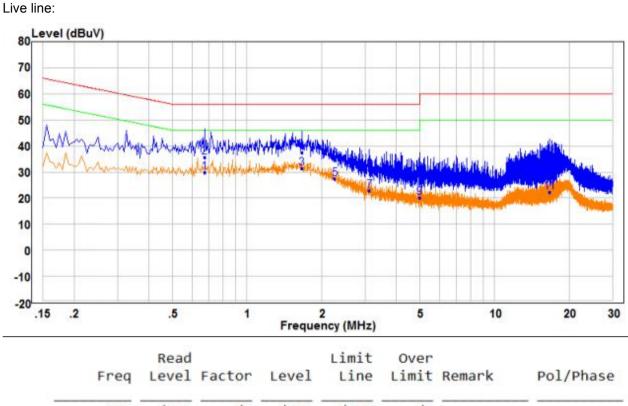
Test Requirement:	47 CFR Part 15C Section 15.207					
Test Method:	ANSI C63.10: 2013					
Test Frequency Range:	150kHz to 30MHz					
Limit:		Limit (d	lBuV)			
	Frequency range (MHz)	Quasi-peak	Average			
	0.15-0.5	66 to 56*	56 to 46*			
	0.5-5	56	46			
	5-30	60	50			
	* Decreases with the logarithm o	f the frequency.				
Test Procedure:	1) The mains terminal disturt room.	bance voltage test was	s conducted in a shielded			
	2) The EUT was connected to	AC power source thro	ough a LISN 1 (Line			
	Impedance Stabilization Network) which provides a $50\Omega/50\mu$ H + 5Ω linear					
	impedance. The power cables of all other units of the EUT were					
	connected to a second LISN 2, which was bonded to the ground					
	reference plane in the sam	•	•			
	measured. A multiple socket outlet strip was used to connect multiple					
	power cables to a single LISN provided the rating of the LISN was not exceeded.					
	3) The tabletop EUT was placed upon a non-metallic table 0.8m above the					
	ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,					
	4) The test was performed with a vertical ground reference plane. The rear					
	of the EUT shall be 0.4 m from the vertical ground reference plane. The					
	vertical ground reference plane was bonded to the horizontal ground					
	reference plane. The LISN	1 was placed 0.8 m fro	om the boundary of the			
	unit under test and bonded	I to a ground reference	plane for LISNs			
	mounted on top of the grou	und reference plane. Th	his distance was			
	between the closest points					
	the EUT and associated ed	• •				
	5) In order to find the maximu					
	equipment and all of the in		changed according to			
	ANSI C63.10: 2013 on con	ducted measurement.				







Measurement Data



		MHZ	dBuV	dB	dBuV	dBuV	dB		
1		0.675	19.84	9.88	29.72	46.00	-16.28	Average	Line
2		0.675	25.61	9.88	35.49	56.00	-20.51	QP	Line
3	PP	1.665	20.35	11.13	31.48	46.00	-14.52	Average	Line
4	QP	1.665	26.21	11.13	37.34	56.00	-18.66	QP	Line
5		2.260	16.14	11.39	27.53	46.00	-18.47	Average	Line
6		2.260	23.24	11.39	34.63	56.00	-21.37	QP	Line
7		3.130	12.30	10.70	23.00	46.00	-23.00	Average	Line
7 8 9		3.130	20.15	10.70	30.85	56.00	-25.15	QP	Line
9		4.995	10.48	9.74	20.22	46.00	-25.78	Average	Line
10		4.995	19.09	9.74	28.83	56.00	-27.17	QP	Line
11		16.665	12.42	9.77	22.19	50.00	-27.81	Average	Line
12		16.665	24.68	9.77	34.45	60.00	-25.55	QP	Line

Remark:

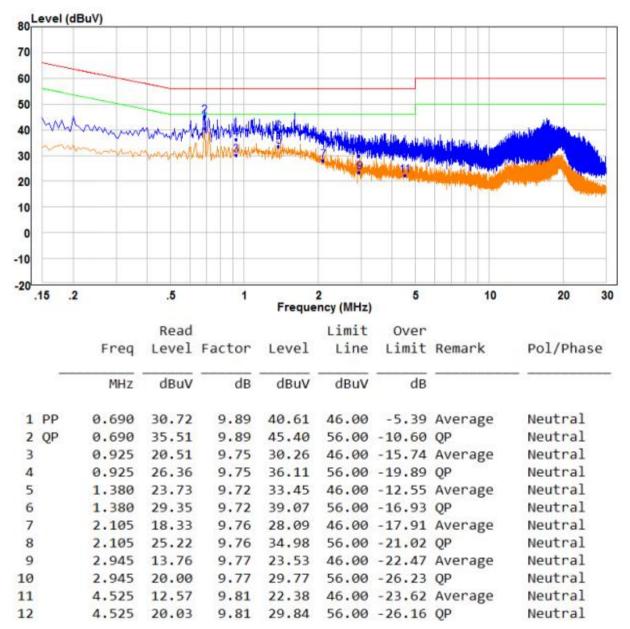
1. The following Quasi-Peak and Average measurements were performed on the EUT:

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:



Remark:

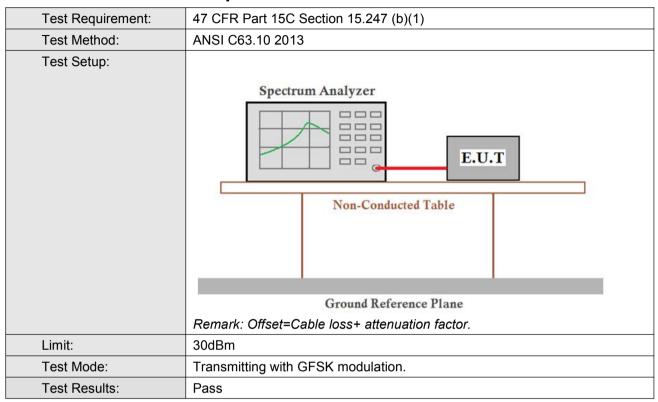
1. The following Quasi-Peak and Average measurements were performed on the EUT:

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



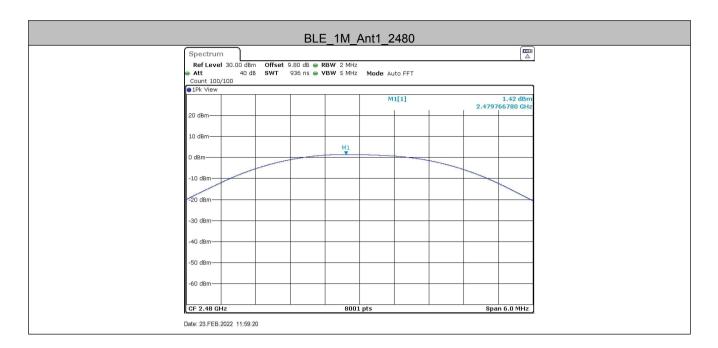
Measurement Data

	GFSK mode (1Mbps)						
Test channel Peak Output Power (dBm) Limit (dBm) Result							
	Lowest	0.35	30.00	Pass			
	Middle 0.73		30.00	Pass			
	Highest	1.42	30.00	Pass			



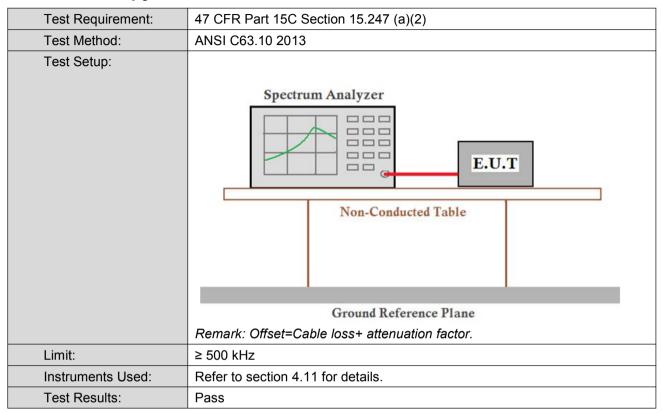








5.4 6dB Occupy Bandwidth



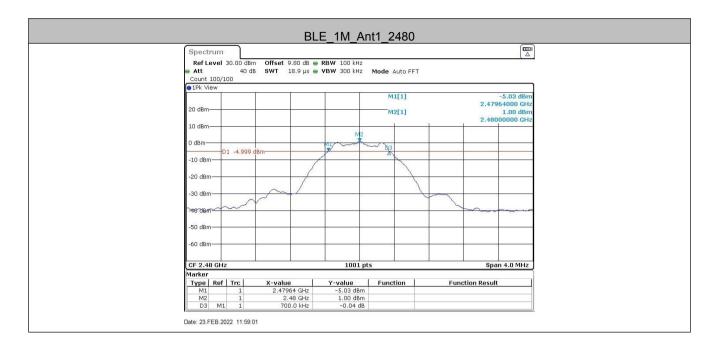
Measurement Data

GFSK mode (1Mbps)					
Test channel 6dB Occupy Bandwidth (MHz) Limit (kHz)					
Lowest	0.704	≥500	Pass		
Middle	0.704	≥500	Pass		
Highest	0.700	≥500	Pass		



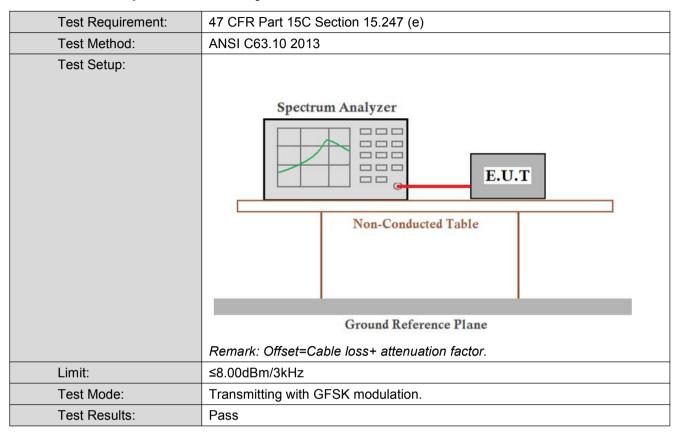








5.5 Power Spectral Density

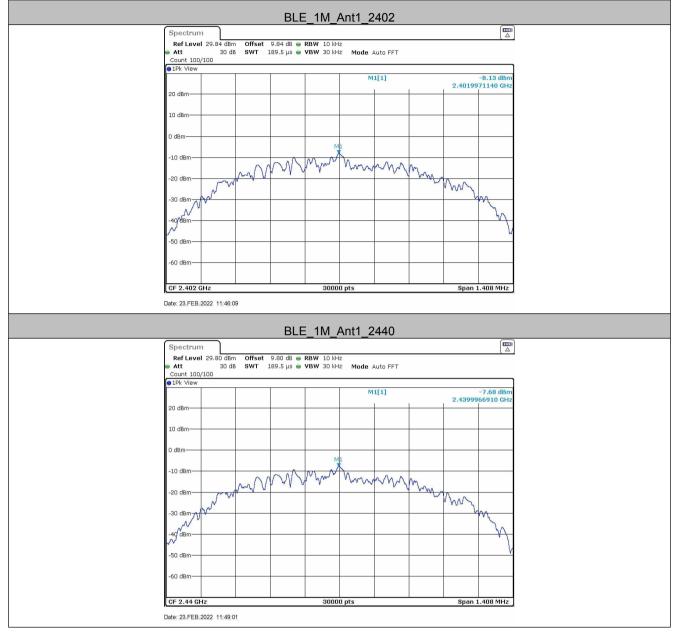


Measurement Data

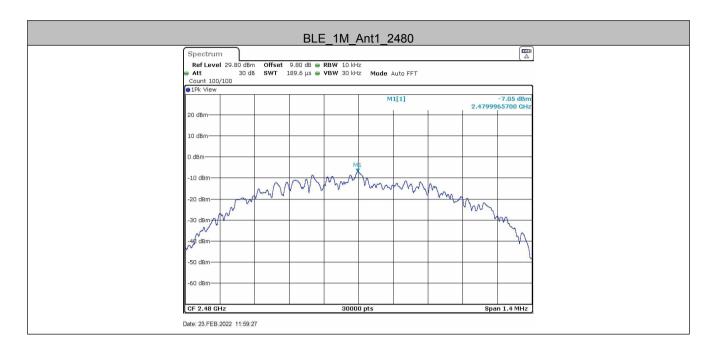
GFSK mode (1Mbps)						
Test channel	Limit (dBm/3kHz)	Result				
Lowest	-8.13	≤8.00	Pass			
Middle	-7.68	≤8.00	Pass			
Highest	-7.05	≤8.00	Pass			



Test plot as follows:

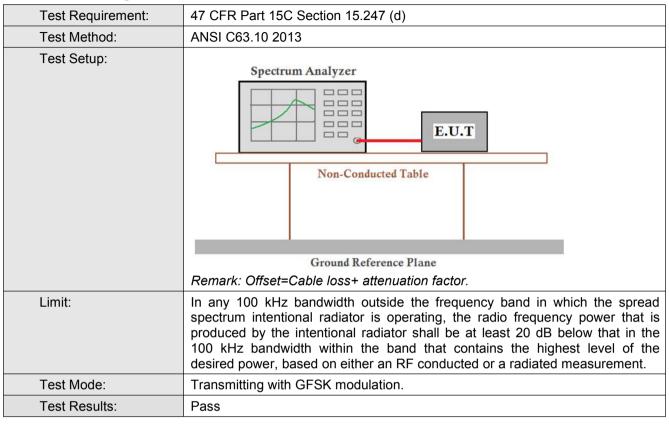








5.6 Band-edge for RF Conducted Emissions



TestMode	Antenna	ChName	Channel	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
		Low	2402	-0.01	-48.3	≤-20.01	PASS
BLE_1M	Ant1	High	2480	1.01	-46.74	≤-18.99	PASS

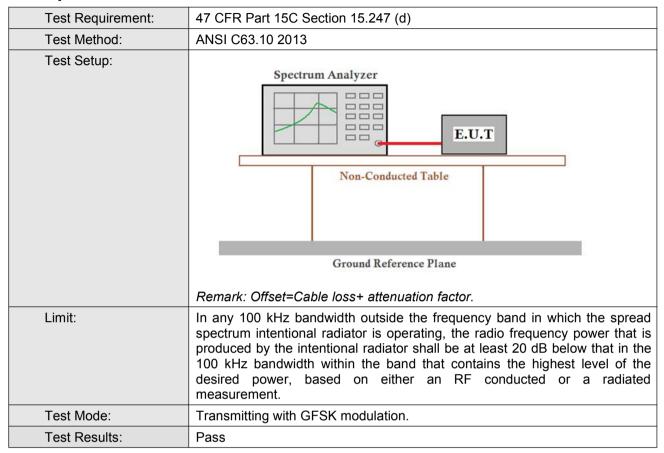


Test plot as follows:





5.7 Spurious RF Conducted Emissions





Test plot as follows:

