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

Test Report

Report No.: Applicant: Address of Applicant:	CQASZ20230100028E-02 Titan Company Limited Integrity, #193, Veerasandra, Electronics City P.O., Off Hosur Main Road, Bangalore, India
Equipment Under Test (E	UT):
Product:	Smart Watch
Model No.:	90166
Test Model No.:	90166
Brand Name:	TITAN
FCC ID:	2AK9F-90166
Standards:	47 CFR Part 15, Subpart C
Date of Receipt:	2023-01-05
Date of Test:	2023-01-05 to 2023-08-03
Date of Issue:	2023-08-03
Test Result:	PASS*

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

Tested By: ______ (Lewis Zhou) (Timo Lei) Reviewed By: 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
CQASZ20230100028E-02	Rev.01	Initial report	2023-08-03



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:	Titan Company Limited
Address of Applicant:	Integrity, #193, Veerasandra, Electronics City P.O., Off Hosur Main Road, Bangalore, India
Manufacturer:	Titan Company Limited
Address of Manufacturer:	Integrity, #193, Veerasandra, Electronics City P.O., Off Hosur Main Road, Bangalore, India
Factory:	Shenzhen DO Intelligent Technology Co., Ltd
Address of Factory:	1F, 2F, west of 3F, 4F, 1st Building and 10~11F, 3rd Building, Changyi Industrial Park, No.1 Lirong Road, Xinshi Community, Dalang Sub-district, Longhua District, Shenzhen City, Guangdong Province, P.R. China

4.2 General Description of EUT

Product Name:	Smart Watch
Model No.:	90166
Test Model No.:	90166
Trade Mark:	TITAN
Software Version:	V1.01.04
Hardware Version:	GT watch 01 V1.2
Operation Frequency:	2402MHz~2480MHz
Bluetooth Version:	V5.3
Modulation Type:	GFSK
Transfer Rate:	1Mbps, 2Mbps
Number of Channel:	40
Product Type:	□ Mobile
Test Software of EUT:	FCC_V2.24_20200921
Antenna Type:	PIFA antenna
Antenna Gain:	1.58 dBi
EUT Power Supply:	Li-ion battery: DC 3.85V 300mAh, Charge by DC 5V for adapter



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

Run Software:

CACTIONS BT FCC Tool	V2. 24	? ×
SOLUTION ATS3085 - COM	▼ 115200 ▼	BQB Mode
RF Channel 0 🗸	Hopping Mode Normal_R -	fixed 💌
Packet Type DH5 🔻	Payload Type PRBS	9 🔻
TX Gain Index 0 🔻	RX Gain Index <mark>0</mark>	-
Access Code Ox AbDdE34125888888	AGC Mode	
Continue TX Single Tone	Packet TX Packet RX Hoppi	ng TX



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	MI	/	1	CQA
2) Cable				

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



4.11 Equipment List

					1
Test Equipment	Manufacturer	Model No.	Instrument No.	Calibration Date	Calibration Due Date
EMI Test Receiver	R&S	ESR7	CQA-005	2022/9/9	2023/9/8
Spectrum analyzer	R&S	FSU26	CQA-038	2022/9/9	2023/9/8
		AMF-6D-02001800-29-			
Preamplifier	MITEQ	20P	CQA-036	2022/9/9	2023/9/8
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	2022/9/9	2023/9/8
Coaxial Cable (Below 1GHz)	CQA	N/A	C013	2022/9/9	2023/9/8
Antenna Connector	CQA	RFC-01	CQA-080	2022/9/9	2023/9/8
RF cable(9KHz~40GHz)	CQA	RF-01	CQA-079	2022/9/9	2023/9/8
Power divider	MIDWEST	PWD-2533-02-SMA-79	CQA-067	2022/9/9	2023/9/8
EMI Test Receiver	R&S	ESPI3	CQA-013	2022/9/9	2023/9/8
LISN	R&S	ENV216	CQA-003	2022/9/9	2023/9/8
Coaxial cable	CQA	N/A	CQA-C009	2022/9/9	2023/9/8

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

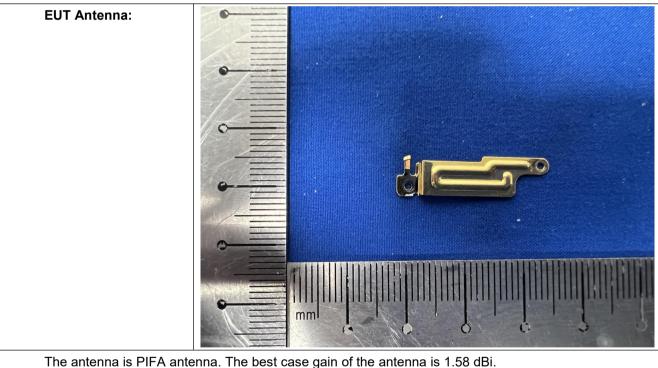
Standard requirement: 47 CFR Part 15C Section 15.203 /247(c)

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:

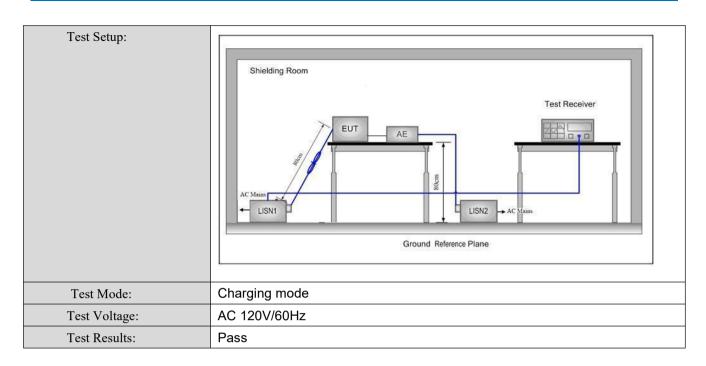
The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output 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.





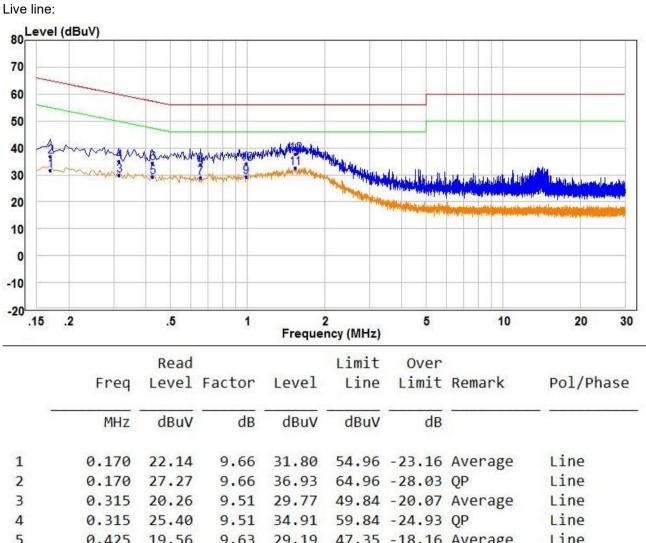
Test Requirement:	47 CFR Part 15C Section 15.207					
Test Method:	ANSI C63.10: 2013					
Test Frequency Range:	150kHz to 30MHz					
Limit:		Limit (d	lBuV)			
	Frequency range (MHz)	Quasi-peak	Average			
	0.15-0.5	66 to 56*	56 to 46*			
	0.5-5	56	46			
	5-30	60	50			
	* Decreases with the logarithm o	f the frequency.				
Test Procedure:	1) The mains terminal disturt room.	-				
	 2) The EUT was connected to Impedance Stabilization Na- impedance. The power call connected to a second LIS reference plane in the sam measured. A multiple sock power cables to a single LI exceeded. 3) The tabletop EUT was place ground reference plane. An placed on the horizontal gr 4) The test was performed wi of the EUT shall be 0.4 m for vertical ground reference plane. The LISN unit under test and bonded mounted on top of the group between the closest points the EUT and associated ed 5) In order to find the maximum equipment and all of the im ANSI C63.10: 2013 on con 	etwork) which provides oles of all other units of in 2, which was bonder are way as the LISN 1 for et outlet strip was used ISN provided the rating out of the strip was used and for floor-standing ar round reference plane, th a vertical ground reference plane was bonded to th 1 was placed 0.8 m fro to a ground reference and reference plane. The of the LISN 1 and the quipment was at least (im emission, the relative terface cables must be	a 50Ω/50µH + 5Ω linear f the EUT were d to the ground or the unit being d to connect multiple of the LISN was not c table 0.8m above the rangement, the EUT was erence plane. The rear d reference plane. The e horizontal ground om the boundary of the plane for LISNs his distance was EUT. All other units of 0.8 m from the LISN 2. re positions of			







Measurement Data



		Freq	Level	Factor	Level	Line	Limit	Remark	Pol/Phase
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.170	22.14	9.66	31.80	54.96	-23.16	Average	Line
2		0.170	27.27	9.66	36.93	64.96	-28.03	QP	Line
3		0.315	20.26	9.51	29.77	49.84	-20.07	Average	Line
4		0.315	25.40	9.51	34.91	59.84	-24.93	QP	Line
5		0.425	19.56	9.63	29.19	47.35	-18.16	Average	Line
6		0.425	24.74	9.63	34.37	57.35	-22.98	QP	Line
7		0.655	19.07	9.86	28.93	46.00	-17.07	Average	Line
8		0.655	23.96	9.86	33.82	56.00	-22.18	QP	Line
9		0.990	19.50	9.71	29.21	46.00	-16.79	Average	Line
10		0.990	24.46	9.71	34.17	56.00	-21.83	QP	Line
11 F	р	1.535	21.71	10.90	32.61	46.00	-13.39	Average	Line
12 (QΡ	1.535	26.77	10.90	37.67	56.00	-18.33	QP	Line

Remark:

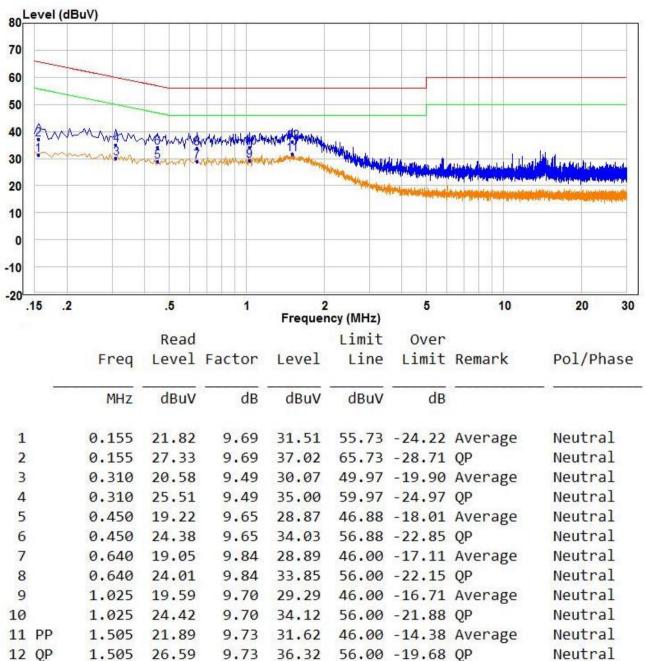
1. The following Quasi-Peak and Average measurements were performed on the EUT:

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:

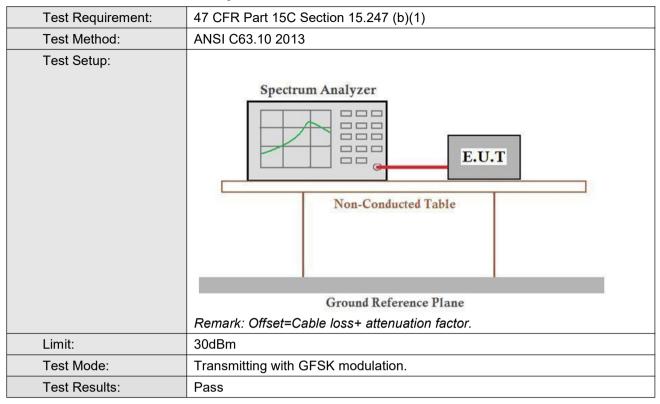
1. The following Quasi-Peak and Average measurements were performed on the EUT:

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.



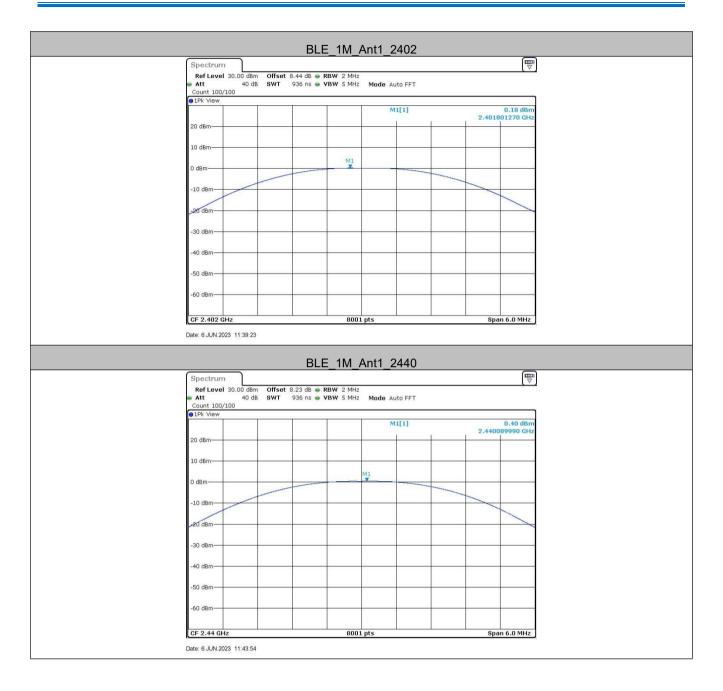
5.3 Conducted Peak Output Power



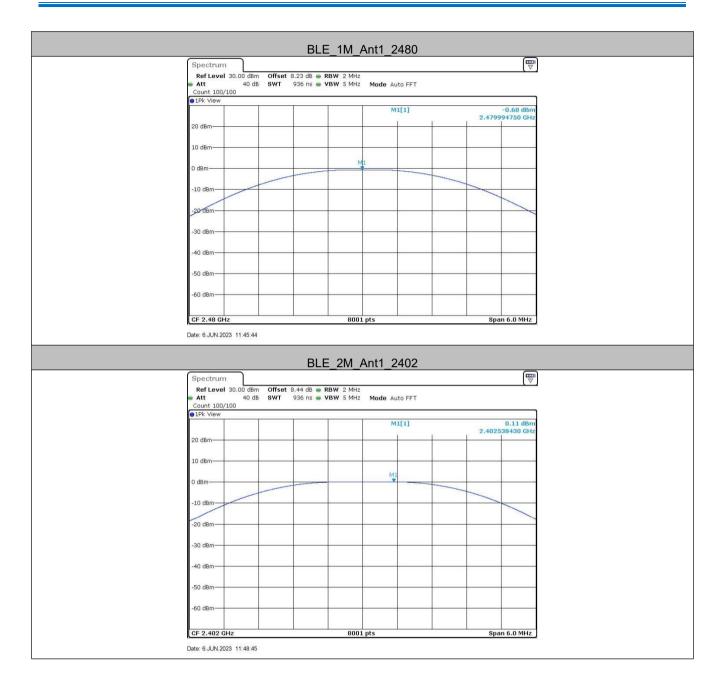
Measurement Data

GFSK mode (1Mbps)						
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result			
Lowest	0.18	30.00	Pass			
Middle	0.4	30.00	Pass			
Highest	-0.68	30.00	Pass			
	GFSK mode (21	Mbps)				
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result			
Lowest	0.11	30.00	Pass			
Middle	0.32	30.00	Pass			
Highest	-0.74	30.00	Pass			

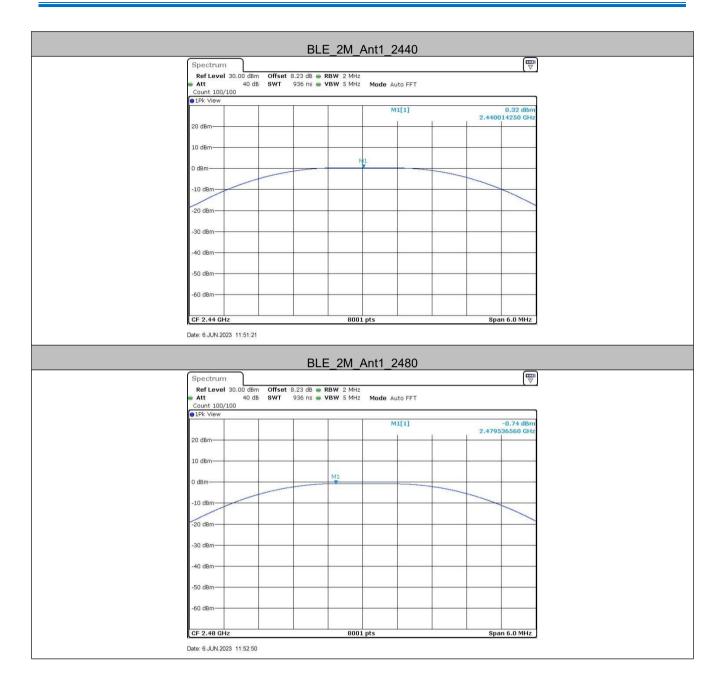






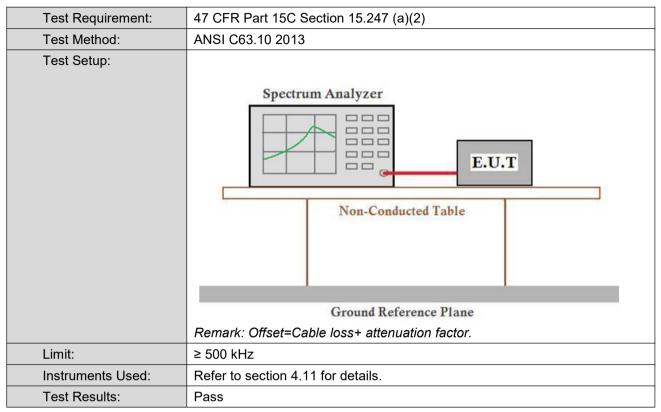








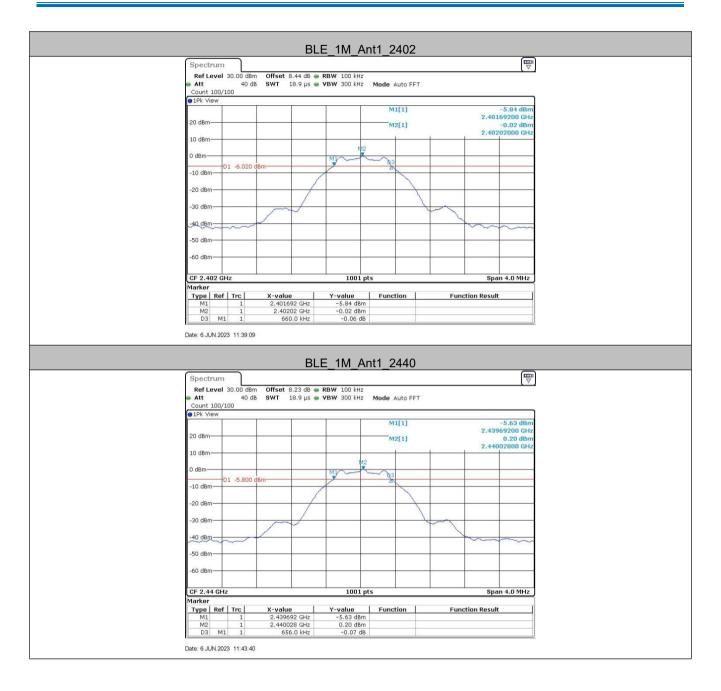
5.4 6dB Occupy Bandwidth



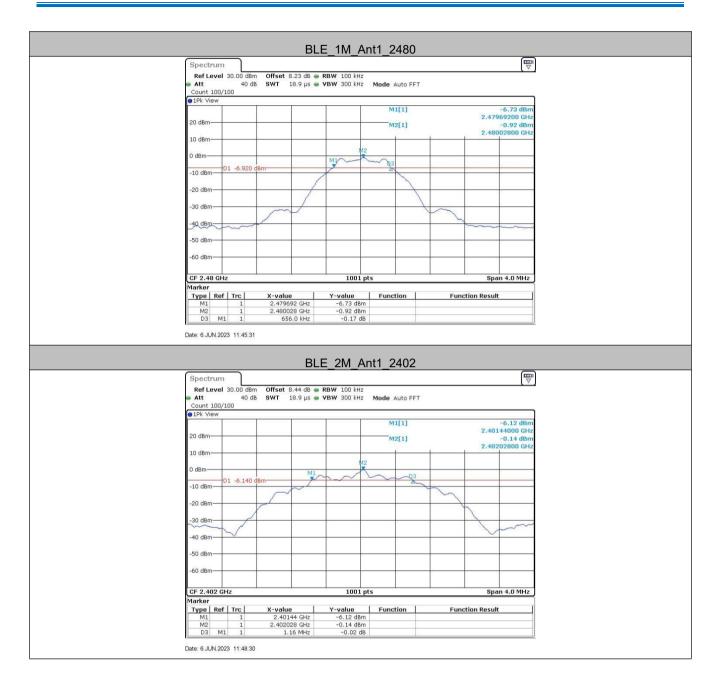
Measurement Data

TestMode	Antenna	Channel	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
		2402	0.66	2401.69	2402.35	0.5	PASS
BLE_1M	Ant1	2440	0.66	2439.69	2440.35	0.5	PASS
		2480	0.66	2479.69	2480.35	0.5	PASS
		2402	1.16	2401.44	2402.60	0.5	PASS
BLE_2M	Ant1	2440	1.16	2439.44	2440.60	0.5	PASS
		2480	1.16	2479.44	2480.60	0.5	PASS

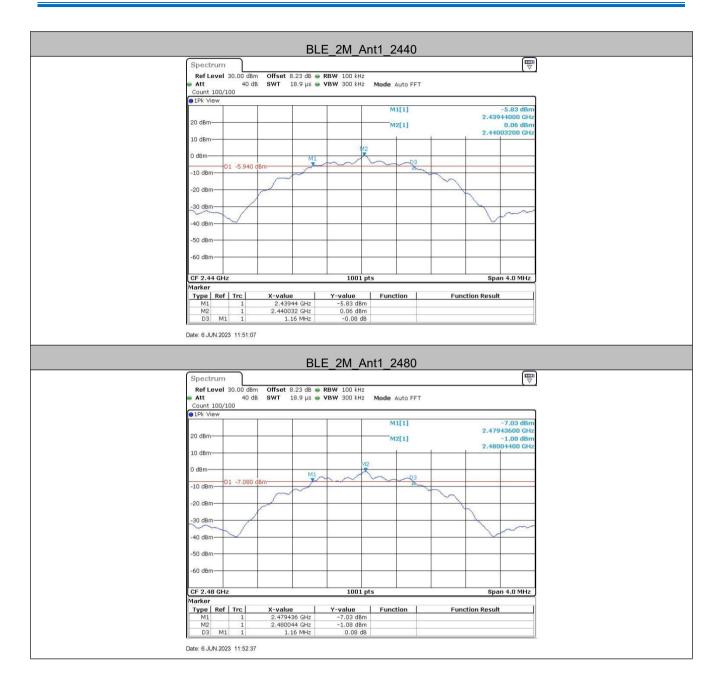






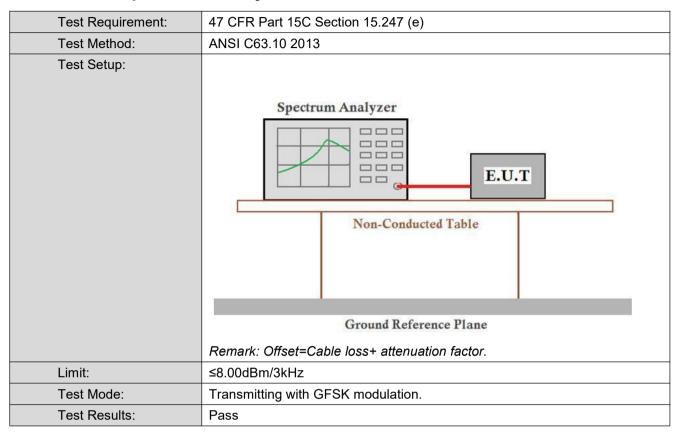








5.5 Power Spectral Density

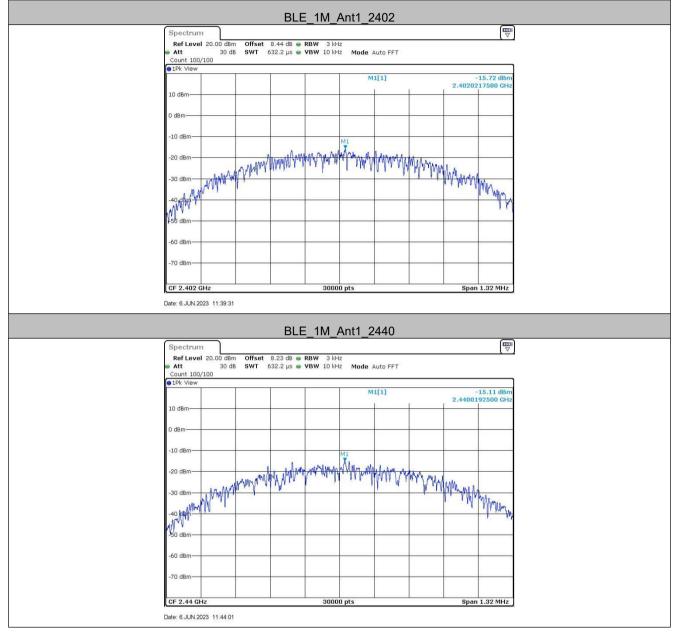


Measurement Data

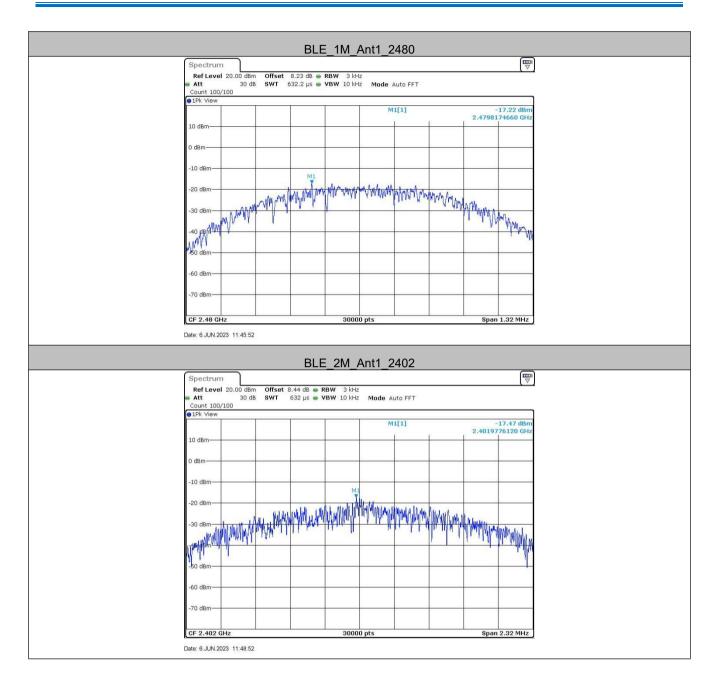
TestMode	Antenna	Channel	Result[dBm/3-100kHz]	Limit[dBm/3k Hz]	Verdict
		2402	-15.72	≤8	PASS
BLE_1M	Ant1	2440	-15.11	≤8	PASS
		2480	-17.22	≤8	PASS
		2402	-17.47	≤8	PASS
BLE_2M	Ant1	2440	-18.88	≤8	PASS
		2480	-18.22	≤8	PASS



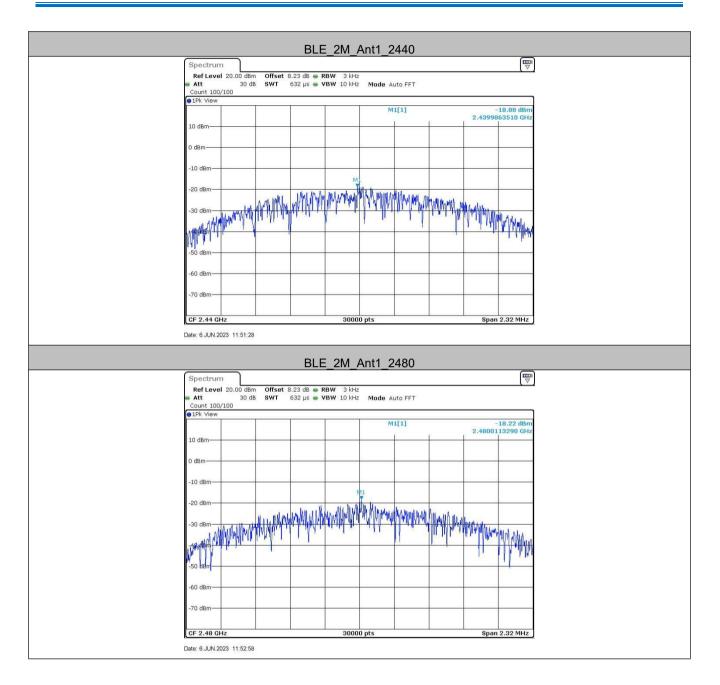
Test plot as follows:





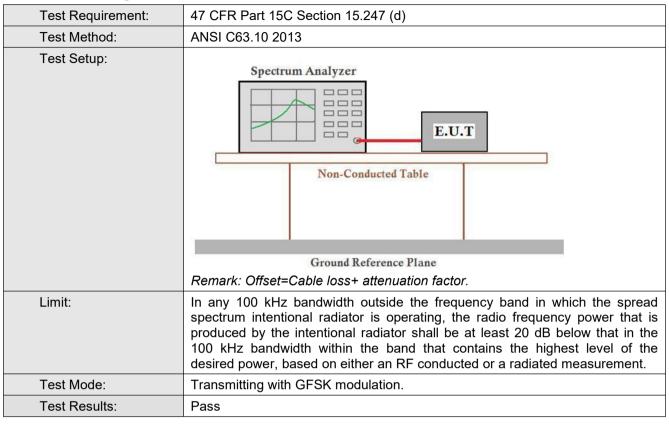








5.6 Band-edge for RF Conducted Emissions



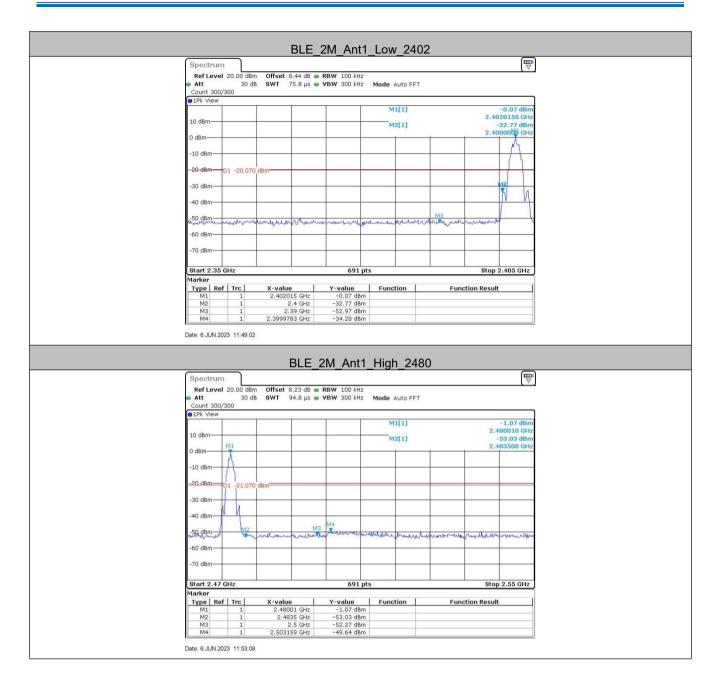
TestMode	ChName	Freq(MHz)	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
	Low	2402	0.08	-50.56	≤-19.92	PASS
BLE_1M	High	2480	-1.19	-48.45	≤-21.19	PASS
	Low	2402	-0.07	-34.28	≤-20.07	PASS
BLE_2M	High	2480	-1.07	-49.64	≤-21.07	PASS



Test plot as follows:

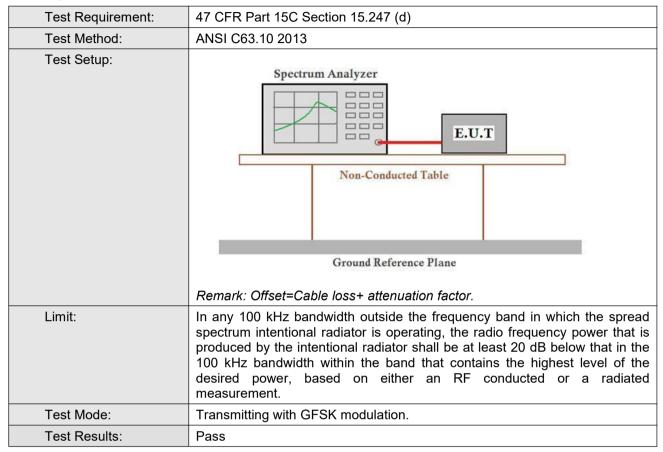








5.7 Spurious RF Conducted Emissions





Test plot as follows:

