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Website: <a href="https://www.cqa-cert.com">www.cqa-cert.com</a> Report Template Revision Date: 2021-11-03

Report Template Version: V05

# **Test Report**

**Report No.:** CQASZ20211102003E-01

Applicant: Shenzhen DO Intelligent Technology Co., Ltd

Address of Applicant: 11th Floor, 3# Building, Guole Tech Park, Lirong Road, Dalang, Longhua

District, Shenzhen, China

**Equipment Under Test (EUT):** 

Product: Smart Watch

Model No.: ID206
Test Model No.: ID206
Brand Name: IDO

**FCC ID**: 2AHFT7450

Standards: 47 CFR Part 15, Subpart C

**Date of Receipt:** 2021-11-19

**Date of Test:** 2021-11-19 to 2021-11-28

Date of Issue: 2021-12-8

Test Result: PASS\*

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

Tested By: \_\_\_\_\_lewis 2h0u

( Lewis Zhou )

Reviewed By:

(Rock Huang)

Approved By:

( Jack ai)





Report No.: CQASZ20211102003E-01

# 1 Version

## **Revision History Of Report**

Report No.	Version	Description	Issue Date
CQASZ20211102003E-01	Rev.01	Initial report	2021-12-8





# 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:	Shenzhen DO Intelligent Technology Co., Ltd
Address of Applicant:	11th Floor, 3# Building, Guole Tech Park, Lirong Road, Dalang, Longhua District, Shenzhen, China
Manufacturer:	Shenzhen DO Intelligent Technology Co., Ltd
Address of Manufacturer:	11th Floor, 3# Building, Guole Tech Park, Lirong Road, Dalang, Longhua District, Shenzhen, China
Factory:	Shenzhen DO Intelligent Technology Co., Ltd
Address of Factory:	11th Floor, 3# Building, Guole Tech Park, Lirong Road, Dalang, Longhua District, Shenzhen, China

## 4.2 General Description of EUT

Product Name:	Smart Watch
Model No.:	ID206
Test Model No.:	ID206
Trade Mark:	IDO
Software Version:	V105
Hardware Version:	V1.2
Operation Frequency:	2402MHz~2480MHz
Bluetooth Version:	BT5.0
Modulation Type:	GFSK
Transfer Rate:	1Mbps
Number of Channel:	40
Product Type:	☐ Mobile ☐ Portable ☐ Fix Location
Test Software of EUT:	NRFgo Studio
Antenna Type:	FPC antenna
Antenna Gain:	0.09 dBi
EUT Power Supply:	Li-ion battery: DC 3.8V 300mAh 1.14Wh, Charge by DC 5V 350mA
	for adapter

The only difference between the 2#,#3,#4,#5 prototype and the 1# prototype is the screen and flash, and other information is consistent with the 1# prototype.



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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

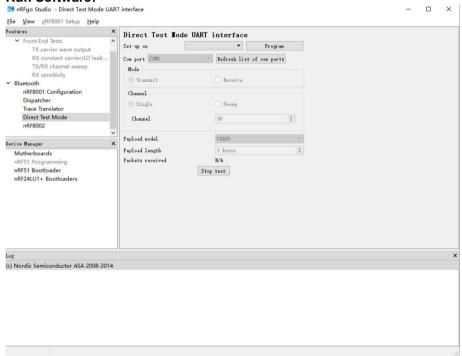


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## 4.3 Additional Instructions

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

#### Run Software:







## 4.4 Test Environment

Operating Environment	:
Radiated Emissions:	
Temperature:	25.3 °C
Humidity:	55 % RH
Atmospheric Pressure:	1009 mbar
Radio conducted item t	est (RF Conducted test room):
Temperature:	25.4 °C
Humidity:	53 % RH
Atmospheric Pressure:	1009 mbar
Test mode:	
Test Mode:	Use test software to set the lowest frequency, the middle frequency and the highest frequency keep transmitting of the EUT.  Note: In the process of transmitting of EUT, the duty cycle >98%.

## 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	/	/	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.** 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	Notes
1	Radiated Emission (Below 1GHz)	5.12dB	(1)
2	Radiated Emission (Above 1GHz)	4.60dB	(1)
3	Conducted Disturbance (0.15~30MHz)	3.34dB	(1)
4	Radio Frequency	3×10 <sup>-8</sup>	(1)
5	Duty cycle	0.6 %.	(1)
6	Occupied Bandwidth	1.1%	(1)
7	RF conducted power	0.86dB	(1)
8	RF power density	0.74	(1)
9	Conducted Spurious emissions	0.86dB	(1)
10	Temperature test	0.8℃	(1)
11	Humidity test	2.0%	(1)
12	Supply voltages	0.5 %.	(1)
13	Frequency Error	5.5 Hz	(1)

<sup>(1)</sup>This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.



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### 4.7 Test Location

#### 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

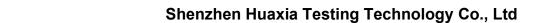
Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No.:522263

### 4.9 Deviation from Standards

None.

## 4.10 Other Information Requested by the Customer

None.





# 4.11Equipment 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
Dragonalifica	MITEO	AMF-6D-02001800-29-	COA 026	2024/0/40	2022/0/0
Preamplifier	MITEQ	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 FPC antenna. The best case gain of the antenna is 0.09 dBi.



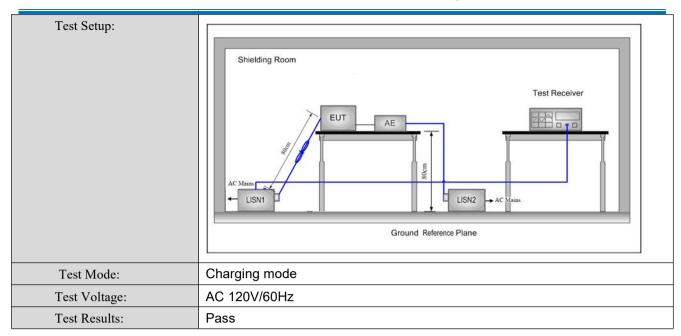
Report No.: CQASZ20211102003E-01

## 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 (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 disturb room.	bance voltage test was	s conducted in a shie	lded			
	room.  2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 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 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 LISN provided the rating of the LISN was not exceeded.						
	ground reference plane. All placed on the horizontal gr	=	rangement, the EUT v	vas			
	<ul> <li>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 from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.</li> <li>5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement.</li> </ul>						



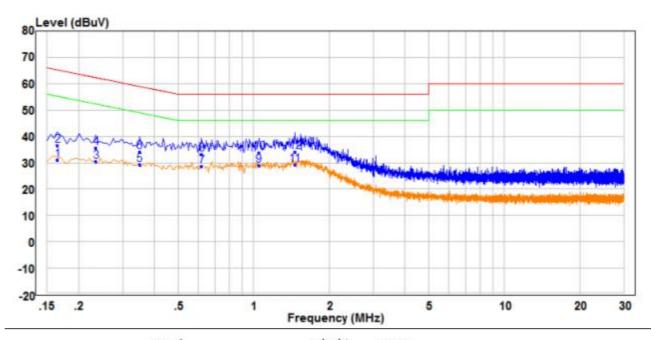
Report No.: CQASZ20211102003E-01



1#

#### **Measurement Data**

Live line:

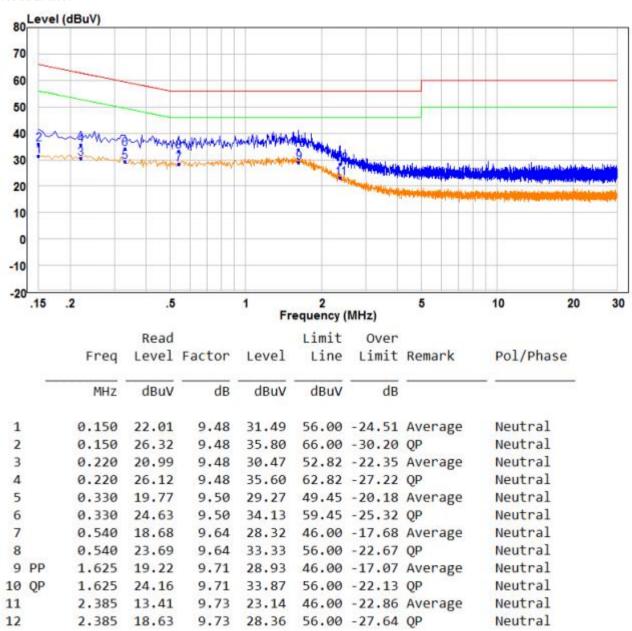


		Read			Limit	Over		
	Freq	Level	Factor	Level	Line	Limit	Remark	Pol/Phase
-	MHz	dBuV	dB	dBuV	dBuV	dB		
1	0.165	21.58	9.49	31.07	55.21	-24.14	Average	Line
2	0.165	26.97	9.49	36.46	65.21	-28.75	QP	Line
3	0.235	20.96	9.49	30.45	52.27	-21.82	Average	Line
4	0.235	26.10	9.49	35.59	62.27	-26.68	QP	Line
5	0.350	19.67	9.50	29.17	48.96	-19.79	Average	Line
5 6 7	0.350	24.66	9.50	34.16	58.96	-24.80	QP	Line
7	0.620	18.77	9.74	28.51	46.00	-17.49	Average	Line
8	0.620	23.55	9.74	33.29	56.00	-22.71	QP	Line
9	1.050	19.36	9.53	28.89	46.00	-17.11	Average	Line
10	1.050	24.24	9.53	33.77	56.00	-22.23	QP	Line
11 PP	1.460	19.82	9.52	29.34	46.00	-16.66	Average	Line
12 QP	1.460	24.72	9.52	34.24	56.00	-21.76	QP	Line

- 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:

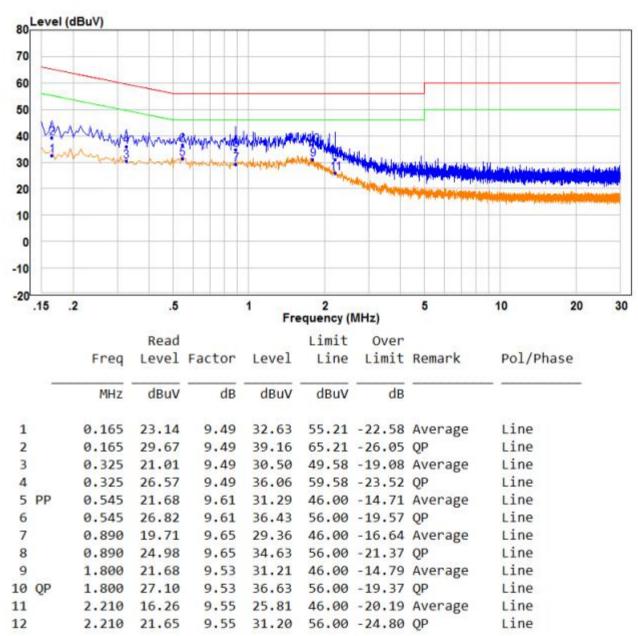


- 1. The following Quasi-Peak and Average measurements were performed on the EUT:
- 2. Final Test Level = Receiver Reading + LISN Factor + Cable Loss.
- 3. If the Peak value under Average limit, the Average value is not recorded in the report.

2#

#### **Measurement Data**

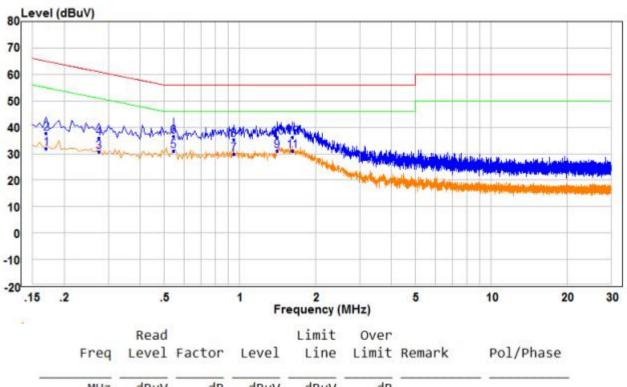
Live line:



- 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:



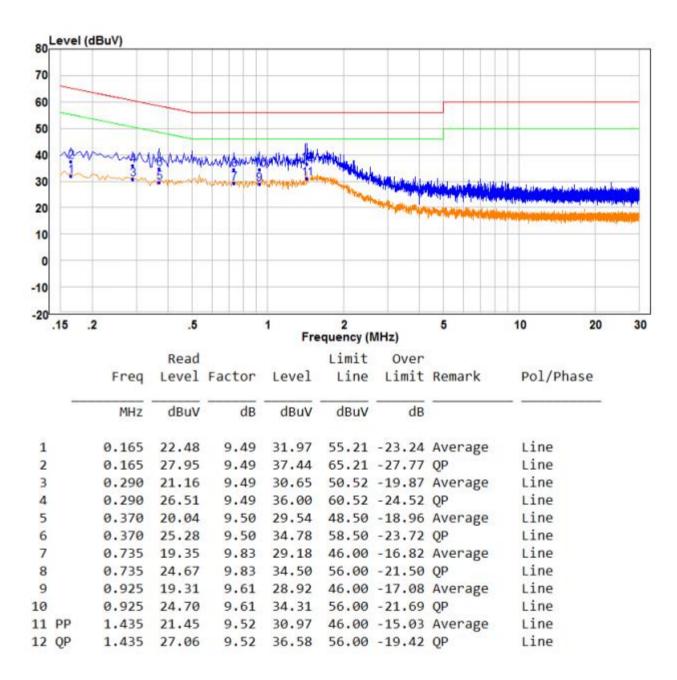
		Freq	Level	Factor	Level	Line	Limit	Remark	Pol/Phase
		MHZ	dBuV	dB	dBuV	dBuV	dB		
1		0.170	22.66	9.48	32.14	54.96	-22.82	Average	Neutral
2		0.170	28.18	9.48	37.66	64.96	-27.30	QP	Neutral
3		0.275	21.35	9.48	30.83	50.97	-20.14	Average	Neutral
4		0.275	26.56	9.48	36.04	60.97	-24.93	QP	Neutral
5		0.545	21.28	9.65	30.93	46.00	-15.07	Average	Neutral
6	QP	0.545	26.82	9.65	36.47	56.00	-19.53	QP	Neutral
7		0.945	20.24	9.75	29.99	46.00	-16.01	Average	Neutral
8		0.945	25.51	9.75	35.26	56.00	-20.74	QP	Neutral
9		1.405	21.30	9.72	31.02	46.00	-14.98	Average	Neutral
10		1.405	26.50	9.72	36.22	56.00	-19.78	QP	Neutral
11	PP	1.620	21.39	9.72	31.11	46.00	-14.89	Average	Neutral
12		1.620	26.45	9.72	36.17	56.00	-19.83	QP	Neutral

- 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.

3#

#### **Measurement Data**

Live line:

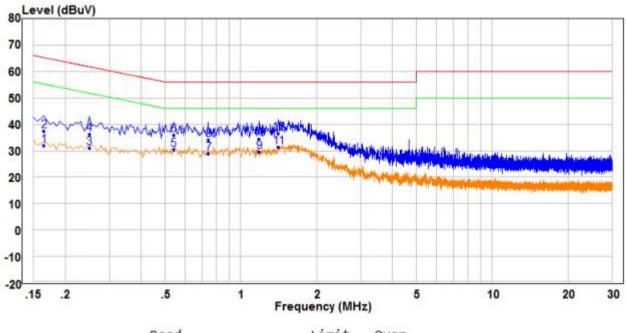


- 1. The following Quasi-Peak and Average measurements were performed on the EUT:
- 2. Final Test Level = Receiver Reading + LISN Factor + Cable Loss.
- 3. If the Peak value under Average limit, the Average value is not recorded in the report.





### Neutral line:



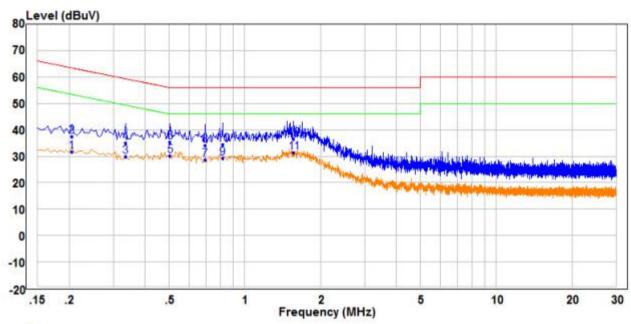
	Freq	Read Level	Factor	Level	Limit	Over	Remark	Pol/Phase
	MHZ	dBuV	dB	dBuV	dBuV	dB		
1	0.165	22.50	9.48	31.98	55.21	-23.23	Average	Neutral
2	0.165	27.86	9.48	37.34	65.21	-27.87	QP	Neutral
3	0.250	21.50	9.48	30.98	51.76	-20.78	Average	Neutral
4	0.250	26.91	9.48	36.39	61.76	-25.37	QP	Neutral
5	0.540	20.86	9.64	30.50	46.00	-15.50	Average	Neutral
6	0.540	26.24	9.64	35.88	56.00	-20.12	QP	Neutral
7	0.745	19.19	9.82	29.01	46.00	-16.99	Average	Neutral
8	0.745	24.29	9.82	34.11	56.00	-21.89	QP	Neutral
9	1.185	19.69	9.72	29.41	46.00	-16.59	Average	Neutral
10	1.185	24.72	9.72	34.44	56.00	-21.56	QP	Neutral
11 PP	1.410	21.60	9.72	31.32	46.00	-14.68	Average	Neutral
12 QP	1.410	26.87	9.72	36.59	56.00	-19.41	QP	Neutral

- 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.

#### 4#

#### **Measurement Data**

#### Live line:



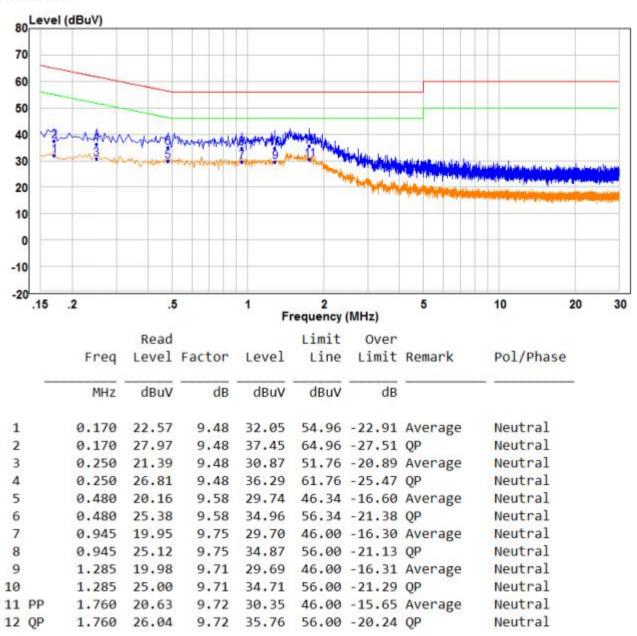
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
677	MHz	dBuV	dB	dBuV	dBuV	dB	-	
1	0.205	22.17	9.49	31.66	53.41	-21.75	Average	Line
2	0.205	28.12	9.49	37.61	63.41	-25.80	QP	Line
3	0.335	20.43	9.50	29.93	49.33	-19.40	Average	Line
4	0.335	25.57	9.50	35.07	59.33	-24.26	QP	Line
5	0.505	20.48	9.53	30.01	46.00	-15.99	Average	Line
6	0.505	25.78	9.53	35.31	56.00	-20.69	QP	Line
6 7 8	0.695	18.92	9.87	28.79	46.00	-17.21	Average	Line
8	0.695	24.30	9.87	34.17	56.00	-21.83	QP	Line
9	0.815	19.46	9.73	29.19	46.00	-16.81	Average	Line
10	0.815	24.61	9.73	34.34	56.00	-21.66	QP	Line
11 PP	1.565	21.75	9.53	31.28	46.00	-14.72	Average	Line
12 QP	1.565	26.96	9.53	36.49	56.00	-19.51	QP	Line

- 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:



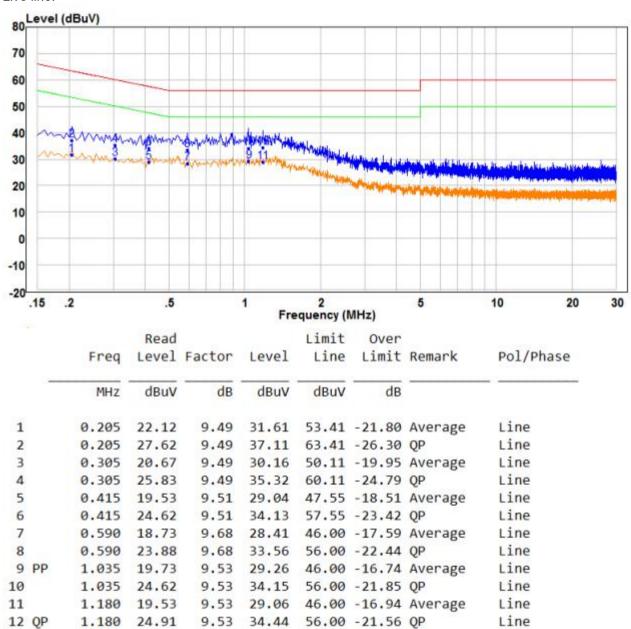
- 1. The following Quasi-Peak and Average measurements were performed on the EUT:
- 2. Final Test Level = Receiver Reading + LISN Factor + Cable Loss.
- 3. If the Peak value under Average limit, the Average value is not recorded in the report.



5#

#### **Measurement Data**

Live line:

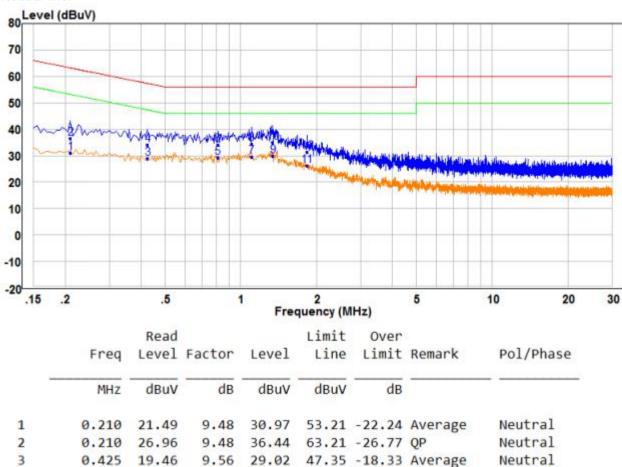


- 1. The following Quasi-Peak and Average measurements were performed on the EUT:
- 2. Final Test Level = Receiver Reading + LISN Factor + Cable Loss.
- 3. If the Peak value under Average limit, the Average value is not recorded in the report.





#### Neutral line:

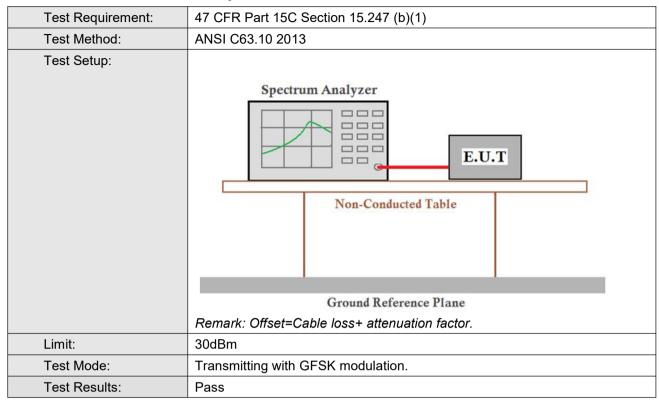


		MHZ	dBuV	dB	dBuV	dBuV	dB		
1		0.210	21.49	9.48	30.97	53.21	-22.24	Average	Neutral
2		0.210	26.96	9.48	36.44	63.21	-26.77	QP	Neutral
2		0.425	19.46	9.56	29.02	47.35	-18.33	Average	Neutral
4		0.425	24.54	9.56	34.10	57.35	-23.25	QP	Neutral
5		0.810	19.47	9.80	29.27	46.00	-16.73	Average	Neutral
6		0.810	24.30	9.80	34.10	56.00	-21.90	QP	Neutral
7		1.105	19.82	9.72	29.54	46.00	-16.46	Average	Neutral
8		1.105	24.66	9.72	34.38	56.00	-21.62	QP	Neutral
9	PP	1.340	20.16	9.72	29.88	46.00	-16.12	Average	Neutral
10	QP	1.340	25.39	9.72	35.11	56.00	-20.89	QP	Neutral
11		1.835	16.59	9.72	26.31	46.00	-19.69	Average	Neutral
12		1.835	21.57	9.72	31.29	56.00	-24.71	QP	Neutral
1010									

- 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**

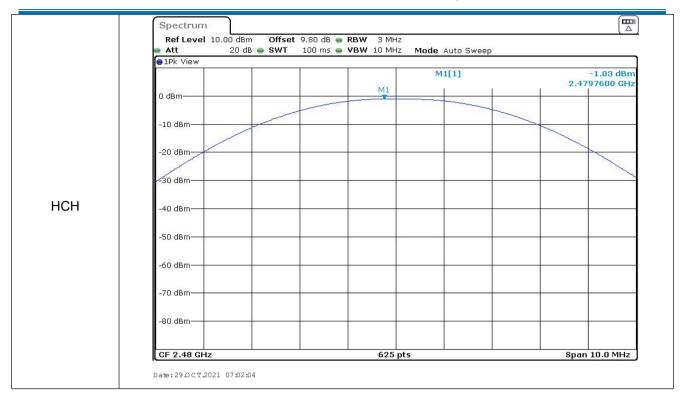
	GFSK mode							
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result					
Lowest	-1.39	30.00	Pass					
Middle	-0.79	30.00	Pass					
Highest	-1.03	30.00	Pass					





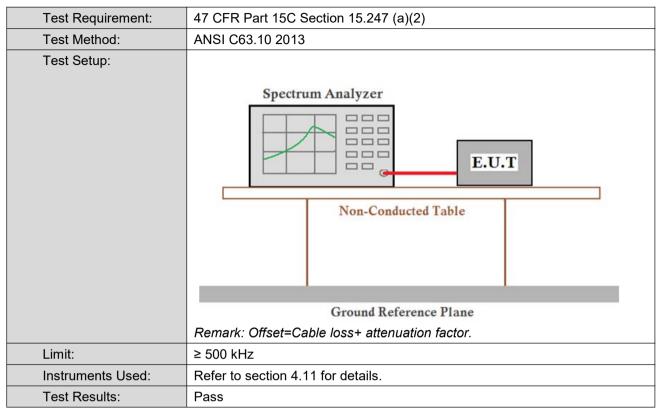


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## 5.4 6dB Occupy Bandwidth

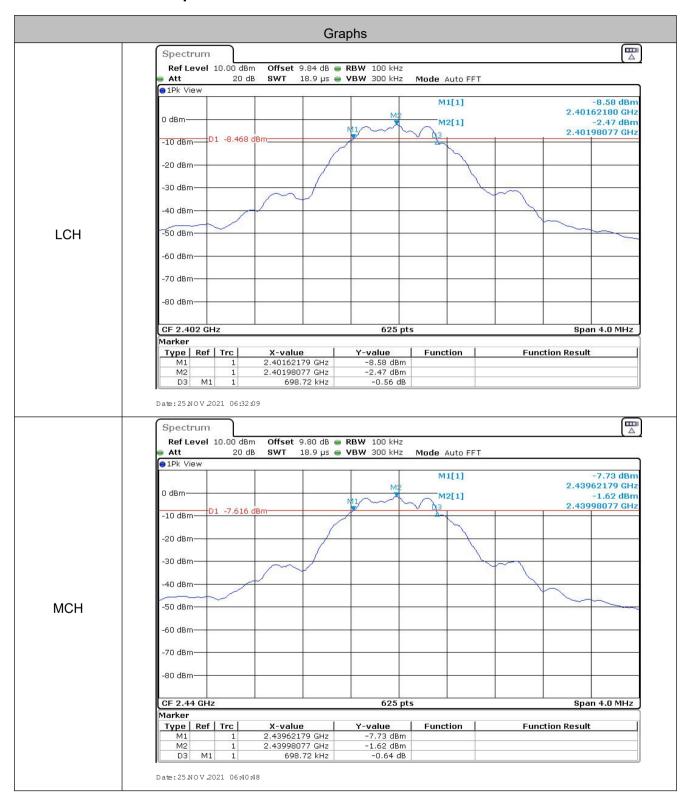


#### **Measurement Data**

	GFSK mode		
Test channel	6dB Occupy Bandwidth (MHz)	Limit (kHz)	Result
Lowest	0.699	≥500	Pass
Middle	0.699	≥500	Pass
Highest	0.705	≥500	Pass

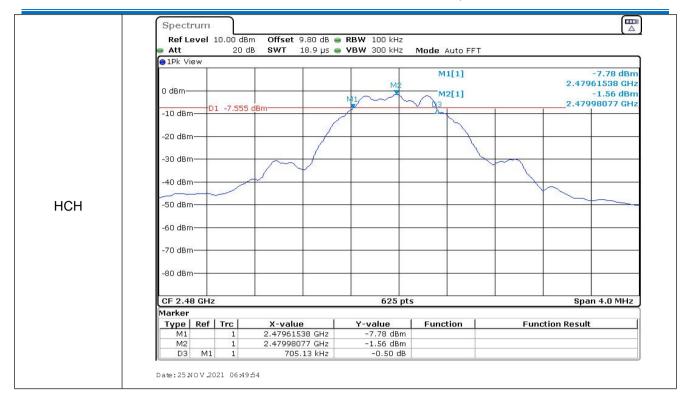


### 5.4.1 Test Graphs



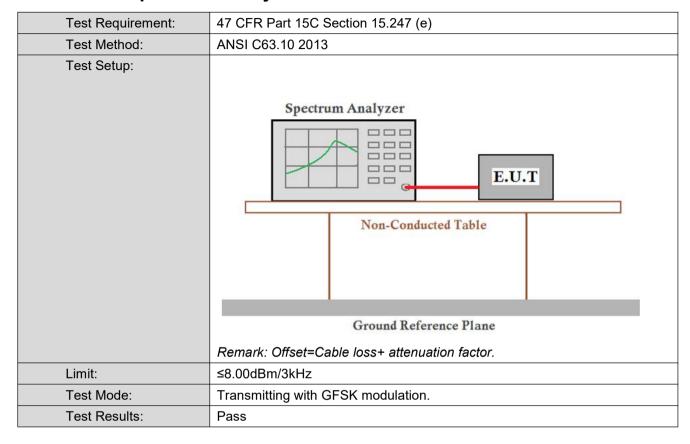


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## 5.5 Power Spectral Density

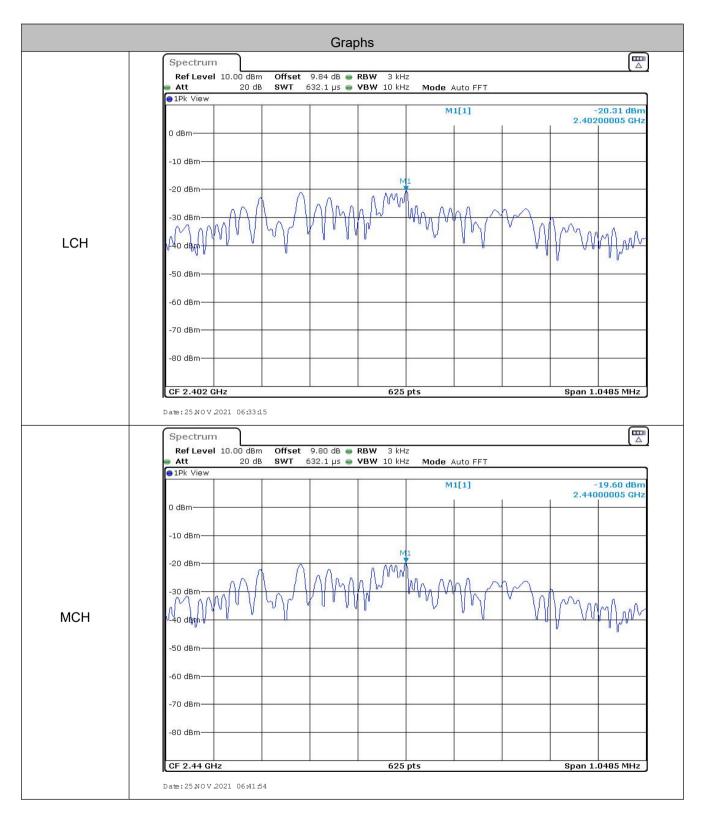


#### **Measurement Data**

	GFSK mode							
Test channel	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result					
Lowest	-20.310	≤8.00	Pass					
Middle	-19.600	≤8.00	Pass					
Highest	-19.660	≤8.00	Pass					

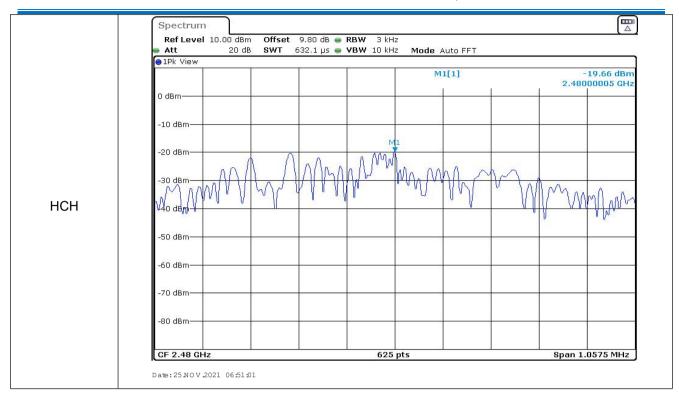


### Test plot as follows:





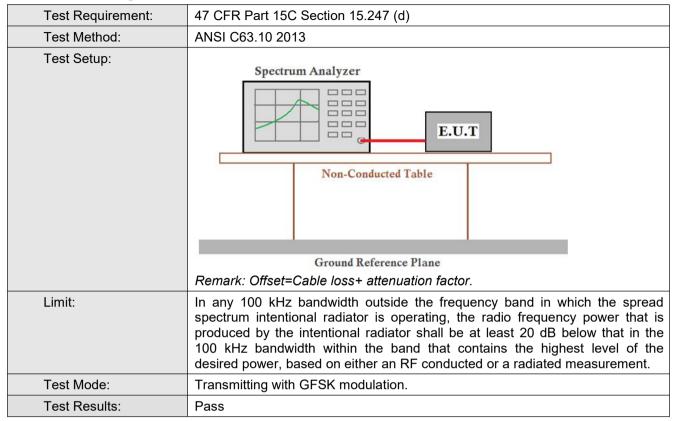
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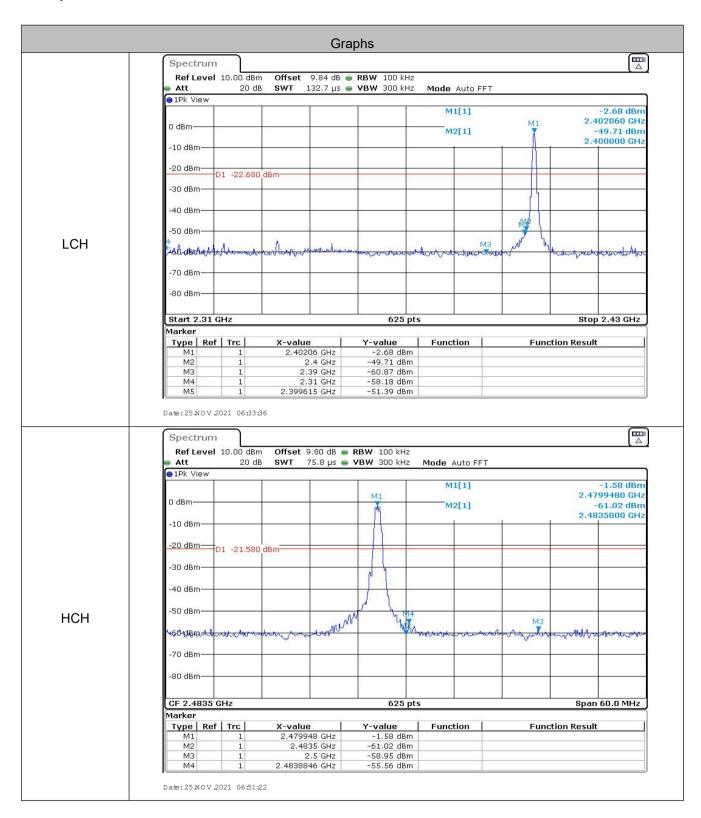
## 5.6 Band-edge for RF Conducted Emissions



GFSK mode				
Test				
channel	Frequency(MHz)	Emission Level(dBm)	Limit(dBm)	Result
Laveat	2400	40.740	00.00	Dese
Lowest	2400	-49.710	-22.68	Pass
Highest	2483.5	-61.020	-21.58	Pass



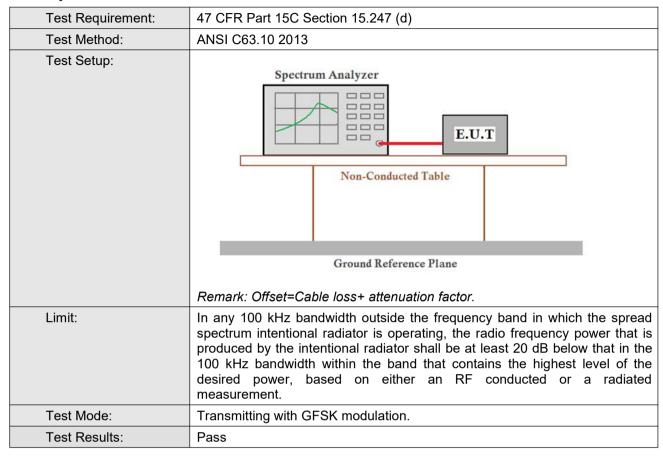
#### Test plot as follows:





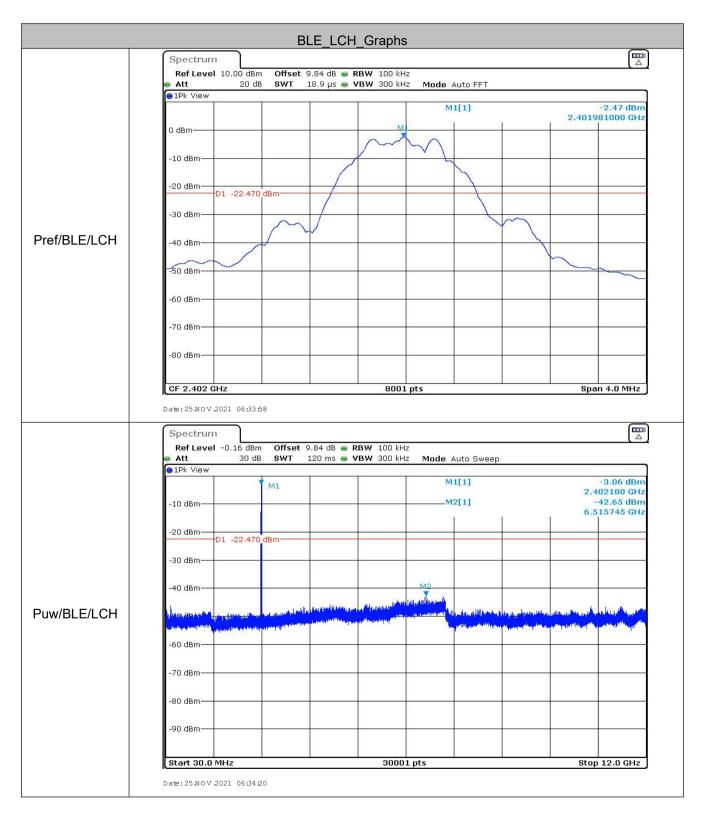


## 5.7 Spurious RF Conducted Emissions



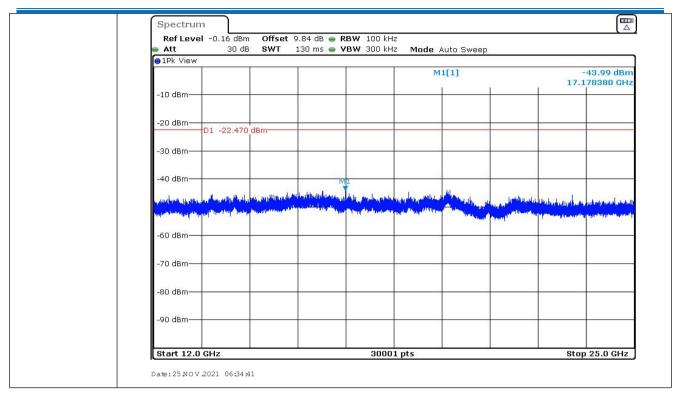


#### Test plot as follows:





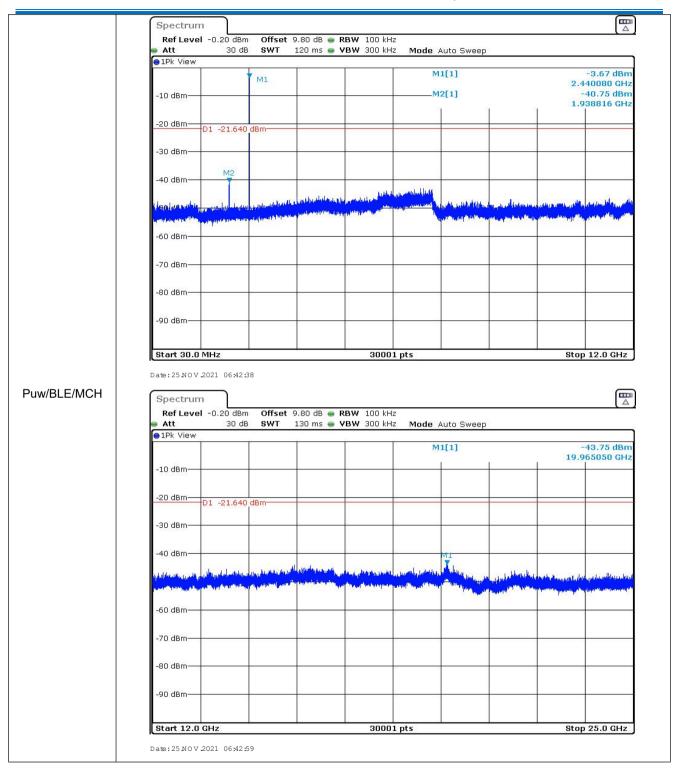
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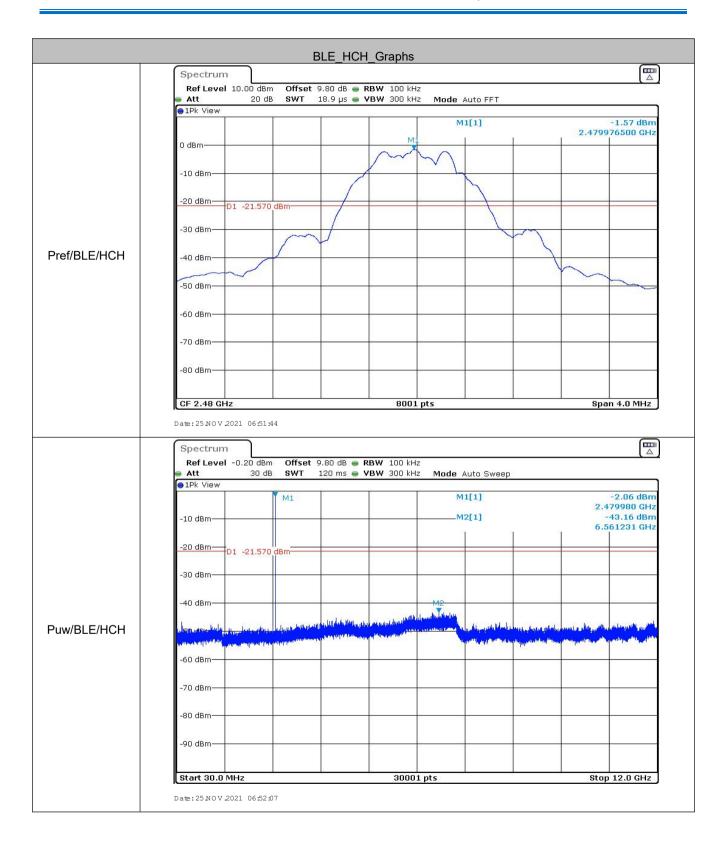


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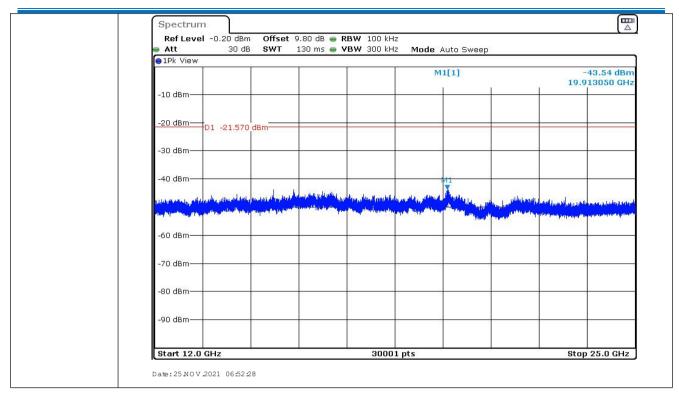






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#### Remark:

Pretest 9kHz to 25GHz, find the highest point when testing, so only the worst data were shown in the test report. Per FCC Part 15.33 (a) and 15.31 (o) ,The amplitude of spurious emissions from intentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.



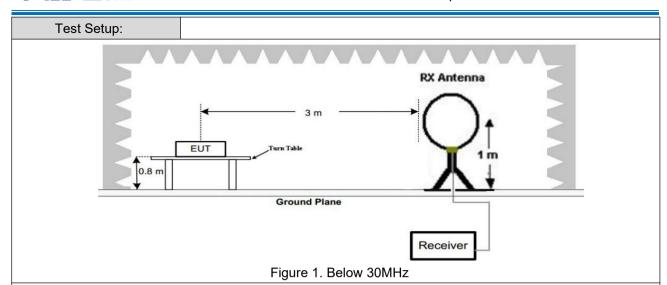
## 5.8 Radiated Spurious Emission & Restricted bands

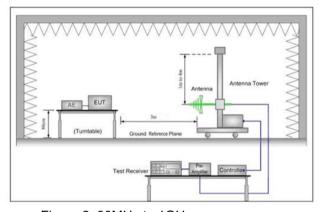
5.8.1 Spurious Emiss	ions							
Test Requirement:	47 CFR Part 15C Section 15.209 and 15.205							
Test Method:	ANSI C63.10 2013							
Test Site:	Measurement Distance	: 3m	n (Semi-Anecl	noic Cham	ber)			
Receiver Setup:	Frequency		Detector	RBW	VBW	Remark		
	0.009MHz-0.090MH	z	Peak	10kHz	z 30kHz	Peak		
	0.009MHz-0.090MHz		Average	10kHz	30kHz	Average		
	0.090MHz-0.110MH	z	Quasi-peak	10kHz	30kHz	Quasi-peak		
	0.110MHz-0.490MH	z	Peak	10kHz	30kHz	Peak		
	0.110MHz-0.490MH	z	Average	10kHz	30kHz	Average		
	0.490MHz -30MHz		Quasi-peak	10kHz	30kHz	Quasi-peak		
	30MHz-1GHz		Quasi-peak	100 kH	lz 300kHz	Quasi-peak		
	Al 4011-		Peak	1MHz	3MHz	Peak		
	Above 1GHz		Peak	1MHz	10Hz	Average		
Limit:	Frequency		eld strength crovolt/meter)	Limit (dBuV/m)	Remark	Measuremen distance (m)		
	0.009MHz-0.490MHz	2	400/F(kHz)	-	-	300		
	0.490MHz-1.705MHz	24	1000/F(kHz)	-	-	30		
	1.705MHz-30MHz		30	-	-	30		
	30MHz-88MHz		100	40.0	Quasi-peak	3		
	88MHz-216MHz		150	43.5	Quasi-peak	. 3		
	216MHz-960MHz		200	46.0	Quasi-peak	. 3		
	960MHz-1GHz 500		500	54.0	Quasi-peak	. 3		
	Above 1GHz 50		500	54.0	Average	3		
	Note: 15.35(b), 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. This peak limit applies to the total peak emission level radiated by the device.							



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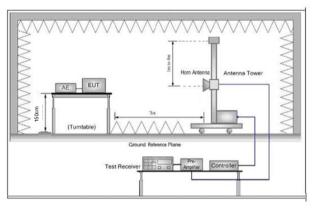


Figure 2. 30MHz to 1GHz

Figure 3. Above 1 GHz

#### Test Procedure:

- a. 1) Below 1G: The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
  - 2) Above 1G: The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.

Note: For the radiated emission test above 1GHz:

Place the measurement antenna 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.

- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. 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



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	measurement.
	<ul> <li>d. 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 (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.</li> <li>e. The test-receiver system was set to Peak Detect Function and Specified</li> </ul>
	Bandwidth with Maximum Hold Mode.
	f. 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.
	g. Test the EUT in the lowest channel (2402MHz),the middle channel (2440MHz),the Highest channel (2480MHz)
	h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
	i. Repeat above procedures until all frequencies measured was complete.
Exploratory Test Mode:	Transmitting with GFSK modulation. Transmitting mode.
Final Test Mode:	Through Pre-scan, find the 1Mbps of data type and GFSK modulation is the worst case.
	For below 1GHz part, through pre-scan, the worst case is the highest channel.
	Only the worst case is recorded in the report.
Test Results:	Pass

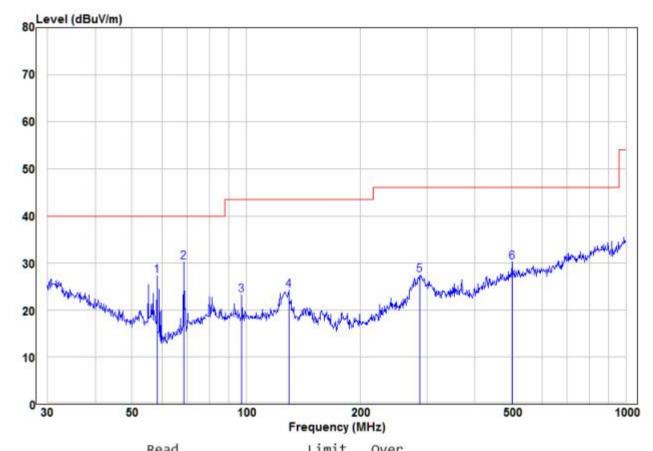




### Radiated Emission below 1GHz

1#

30MHz~1GHz, the worst case					
Test mode:	Transmitting mode	Vertical			

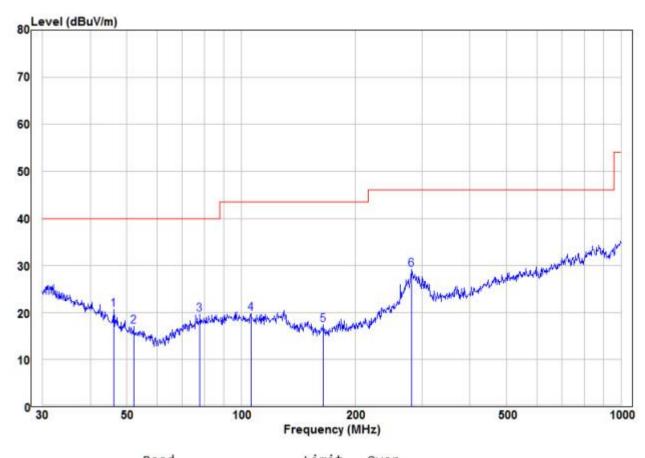


		Freq	Level	Factor	Level	Line	Limit	Remark	Pol/Phase
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1		58.20	21.57	5.76	27.33	40.00	-12.67	Peak	VERTICAL
2	pp	68.39	22.56	7.65	30.21	40.00	-9.79	Peak	VERTICAL
3		97.46	12.75	10.49	23.24	43.50	-20.26	Peak	VERTICAL
4		129.47	13.81	10.34	24.15	43.50	-19.35	Peak	VERTICAL
5		285.98	14.18	13.27	27.45	46.00	-18.55	Peak	VERTICAL
6		501.18	11.86	18.29	30.15	46.00	-15.85	Peak	VERTICAL





30MHz~1GHz, the worst case					
Test mode: Transmitting mode		Horizontal			



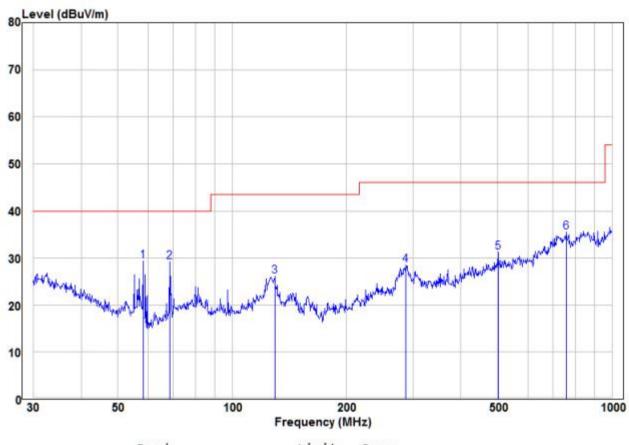
	Freq	Read Level	Factor	Level	Limit Line	Over	Remark	Pol/Phase
27.7	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	3 <del></del>	
1	46.18	10.71	9.89	20.60	40.00	-19.40	Peak	HORIZONTAL
2	52.03	9.45	7.68	17.13	40.00	-22.87	Peak	HORIZONTAL
3	77.87	10.19	9.44	19.63	40.00	-20.37	Peak	HORIZONTAL
4	106.01	9.40	10.36	19.76	43.50	-23.74	Peak	HORIZONTAL
5	164.91	9.74	7.71	17.45	43.50	-26.05	Peak	HORIZONTAL
6 pp	281.01	16.14	13.10	29.24	46.00	-16.76	Peak	HORIZONTAL





2#

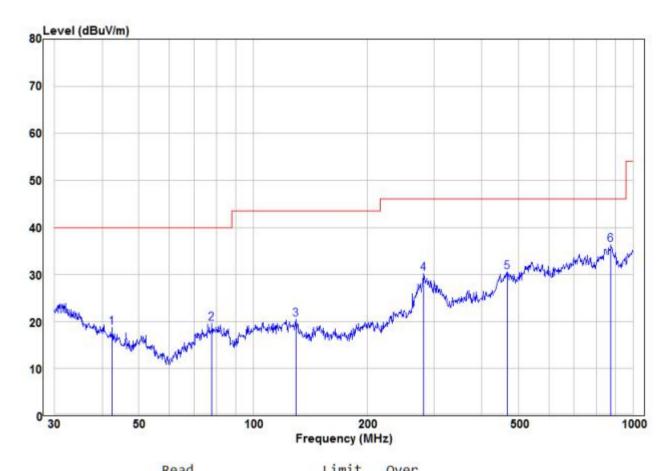
30MHz~1GHz, the worst case					
Test mode: Transmitting mode		Vertical			



	Freq	Read Level	Factor	Level	Limit Line	Over	Remark	Pol/Phase
-	MHZ	dBuV	dB/m	dBuV/m	dBuV/m	dB	-	
1	58.20	23.57	5.76	29.33	40.00	-10.67	Peak	VERTICAL
2	68.39	21.56	7.65	29.21	40.00	-10.79	Peak	VERTICAL
3	129.47	15.81	10.34	26.15	43.50	-17.35	Peak	VERTICAL
4	285.98	15.18	13.27	28.45	46.00	-17.55	Peak	VERTICAL
5	501.18	12.86	18.29	31.15	46.00	-14.85	Peak	VERTICAL
6 pp	758.04	13.50	21.99	35.49	46.00	-10.51	Peak	VERTICAL



30MHz~1GHz, the worst case					
Test mode:	Transmitting mode	Horizontal			

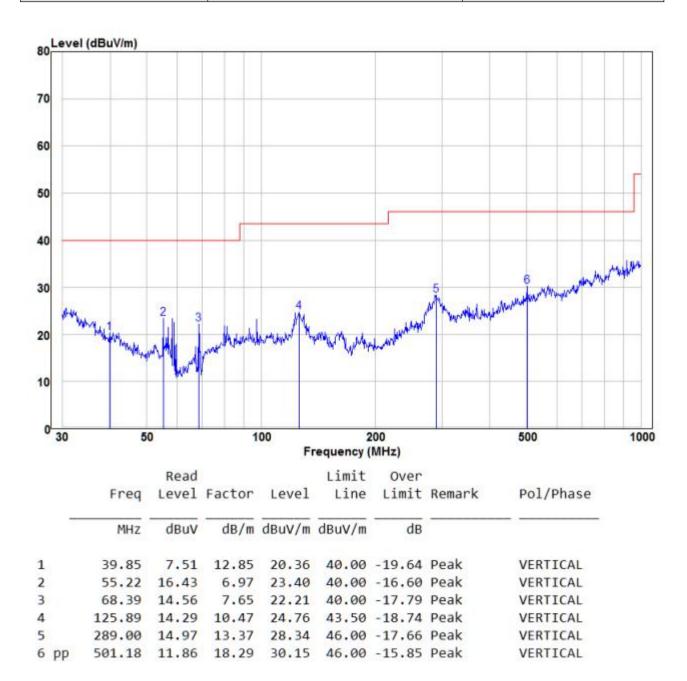


	Freq	Level	Factor	Level	Line	Limit	Remark	Pol/Phase
8.	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1	42.60	7.17	11.58	18.75	40.00	-21.25	Peak	HORIZONTAL
2	77.87	10.19	9.44	19.63	40.00	-20.37	Peak	HORIZONTAL
3	129.47	10.08	10.34	20.42	43.50	-23.08	Peak	HORIZONTAL
4	281.01	17.14	13.10	30.24	46.00	-15.76	Peak	HORIZONTAL
5	467.24	13.21	17.26	30.47	46.00	-15.53	Peak	HORIZONTAL
6 pp	875.25	12.34	23.95	36.29	46.00	-9.71	Peak	HORIZONTAL



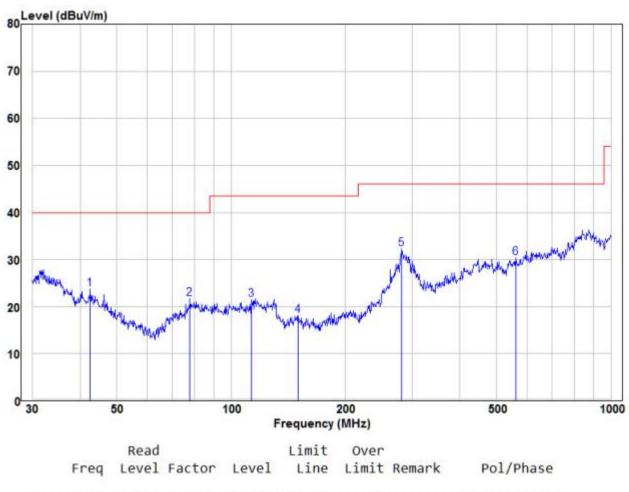
3#

30MHz~1GHz, the worst case				
Test mode:	Transmitting mode	Vertical		





30MHz~1GHz, the worst case					
Test mode:	Transmitting mode	Horizontal			

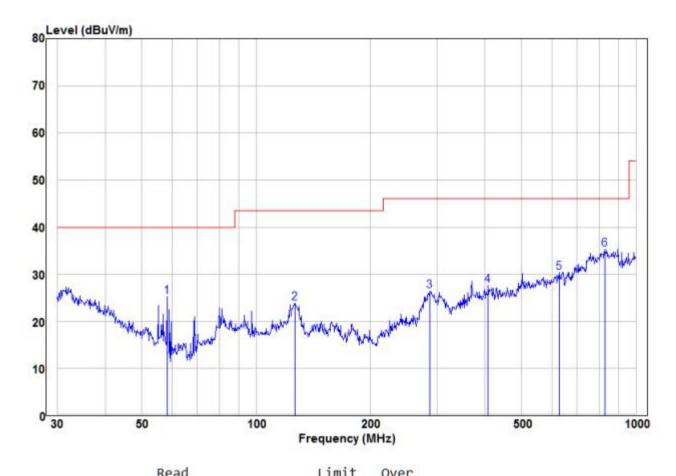


	Freq	Read Level	Factor	Level	Limit	Over	Remark	Pol/Phase
-	MHZ	dBuV	dB/m	dBuV/m	dBuV/m	dB	-	
1	42.60	12.17	11.58	23.75	40.00	-16.25	Peak	HORIZONTAL
2	77.87	12.19	9.44	21.63	40.00	-18.37	Peak	HORIZONTAL
3	112.92	11.21	10.33	21.54	43.50	-21.96	Peak	HORIZONTAL
4	150.01	9.57	8.47	18.04	43.50	-25.46	Peak	HORIZONTAL
5 pp	281.01	19.14	13.10	32.24	46.00	-13.76	Peak	HORIZONTAL
6	560.69	11.40	18.91	30.31	46.00	-15.69	Peak	HORIZONTAL



4#

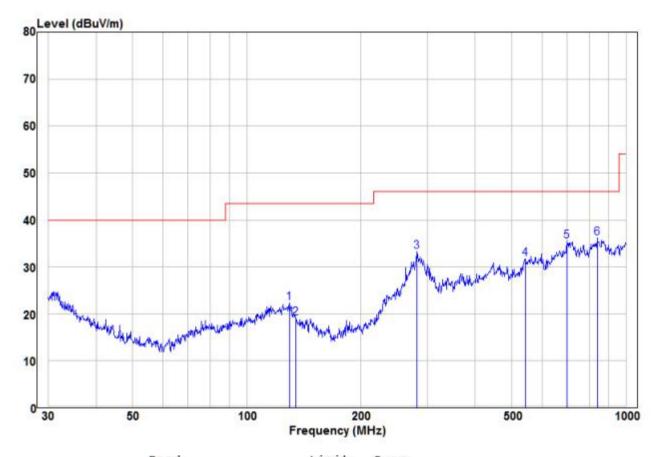
30MHz~1GHz, the worst case					
Test mode:	Transmitting mode	Vertical			



	Freq	Level	Factor	Level	Line	Limit	Remark	Pol/Phase
-	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	-	
1	58.20	19.57	5.76	25.33	40.00	-14.67	Peak	VERTICAL
2	126.77	13.50	10.44	23.94	43.50	-19.56	Peak	VERTICAL
3	285.98	13.18	13.27	26.45	46.00	-19.55	Peak	VERTICAL
4	407.51	12.28	15.39	27.67	46.00	-18.33	Peak	VERTICAL
5	627.27	11.13	19.28	30.41	46.00	-15.59	Peak	VERTICAL
6 pp	827.49	11.70	23.68	35.38	46.00	-10.62	Peak	VERTICAL



30MHz~1GHz, the worst case		
Test mode:	Transmitting mode	Horizontal



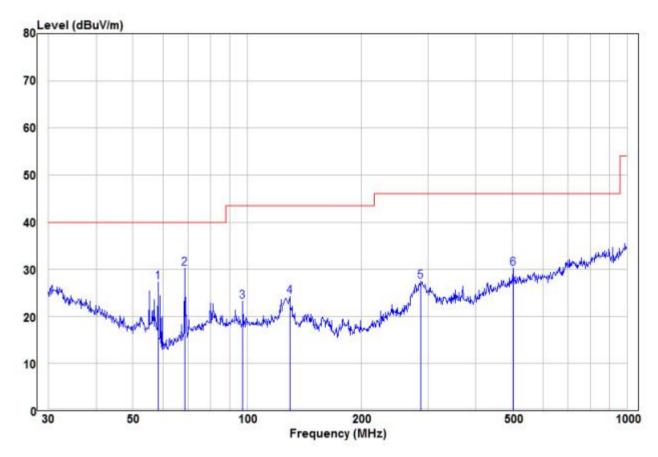
	Freq	Read	Factor	Level	Limit	Over	Remark	Pol/Phase
3	MHz	dBuV	dB/m	dBuV/m	dBuV/m	——dB		
1	129.47	12.08	10.34	22.42	43.50	-21.08	Peak	HORIZONTAL
2	135.03	9.91	9.17	19.08	43.50	-24.42	Peak	HORIZONTAL
3	281.01	20.14	13.10	33.24	46.00	-12.76	Peak	HORIZONTAL
4	541.37	12.94	18.71	31.65	46.00	-14.35	Peak	HORIZONTAL
5	699.30	14.47	21.08	35.55	46.00	-10.45	Peak	HORIZONTAL
6 pp	839.18	12.03	24.10	36.13	46.00	-9.87	Peak	HORIZONTAL





5#

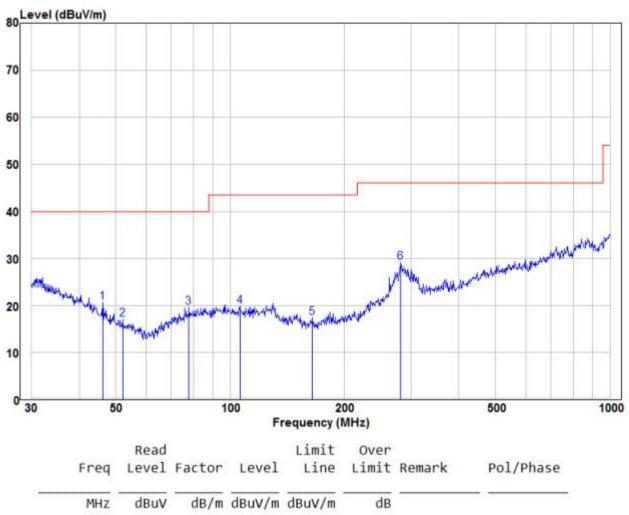
30MHz~1GHz, the worst case					
Test mode:	Transmitting mode	Vertical			



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
-	MHZ	dBuV	dB/m	dBuV/m	dBuV/m	dB	-	
1	58.20	21.57	5.76	27.33	40.00	-12.67	Peak	VERTICAL
2 pp	68.39	22.56	7.65	30.21	40.00	-9.79	Peak	VERTICAL
3	97.46	12.75	10.49	23.24	43.50	-20.26	Peak	VERTICAL
4	129.47	13.81	10.34	24.15	43.50	-19.35	Peak	VERTICAL
5	285.98	14.18	13.27	27.45	46.00	-18.55	Peak	VERTICAL
6	501.18	11.86	18.29	30.15	46.00	-15.85	Peak	VERTICAL



30MHz~1GHz, the worst case		
Test mode:	Transmitting mode	Horizontal



	Freq	Level	Factor	Level	Limit	Limit	Remark	Pol/Phase
1.00	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1	46.18	10.71	9.89	20.60	40.00	-19.40	Peak	HORIZONTAL
2	52.03	9.45	7.68	17.13	40.00	-22.87	Peak	HORIZONTAL
3	77.87	10.19	9.44	19.63	40.00	-20.37	Peak	HORIZONTAL
4	106.01	9.40	10.36	19.76	43.50	-23.74	Peak	HORIZONTAL
5	164.91	9.74	7.71	17.45	43.50	-26.05	Peak	HORIZONTAL
6 pp	281.01	16.14	13.10	29.24	46.00	-16.76	Peak	HORIZONTAL



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#### Transmitter Emission above 1GHz

Worse case mode:		GFSK(1Mbps	s)	Test chann	el:	Lowest	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)		H/V
2390	54.19	-9.2	44.99	74	-29.01	Peak	Н
2400	56.89	-9.39	47.50	74	-26.50	Peak	Н
4804	52.64	-4.33	48.31	74	-25.69	Peak	Н
7206	48.43	1.01	49.44	74	-24.56	Peak	Н
2390	53.49	-9.2	44.29	74	-29.71	Peak	V
2400	51.20	-9.39	41.81	74	-32.19	Peak	V
4804	54.43	-4.33	50.10	74	-23.90	Peak	V
7206	49.12	1.01	50.13	74	-23.87	Peak	V

Worse case mode:		GFSK(1Mbps)		Test chann	el:	Middle	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)		H/V
4880	52.12	-4.11	48.01	74	-25.99	peak	Н
7320	48.50	1.51	50.01	74	-23.99	peak	Н
4880	52.14	-4.11	48.03	74	-25.97	peak	V
7320	50.90	1.51	52.41	74	-21.59	peak	V

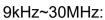
Worse case m	Worse case mode:		s)	Test chann	el:	Highest	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)		H/V
2483.5	56.01	-9.29	46.72	74	-27.28	Peak	Н
4960	53.07	-4.04	49.03	74	-24.97	Peak	Н
7440	50.52	1.57	52.09	74	-21.91	Peak	Н
2483.5	57.83	-9.29	48.54	74	-25.46	Peak	V
4960	49.84	-4.04	45.80	74	-28.20	Peak	V
7440	50.38	1.57	51.95	74	-22.05	Peak	V

#### Remark:

- 1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
  - Final Test Level =Receiver Reading + Antenna Factor + Cable Factor Preamplifier Factor
- 2) Scan from 9kHz to 25GHz, the disturbance above 10GHz and below 30MHz was very low. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. So, only the peak measurements were shown in the report.

## 6 Photographs - EUT Test Setup

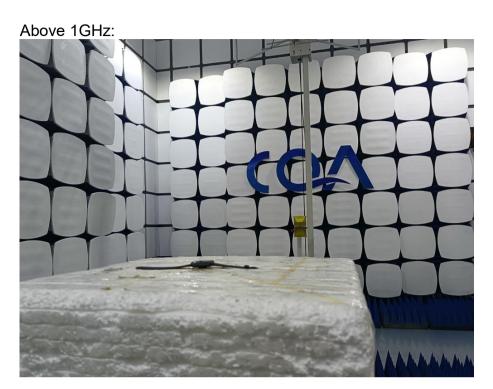
## 6.1 Radiated Spurious Emission





30MHz~1GHz:





# 6.2 Conducted Emissions Test Setup



# 7 Photographs - EUT Constructional Details









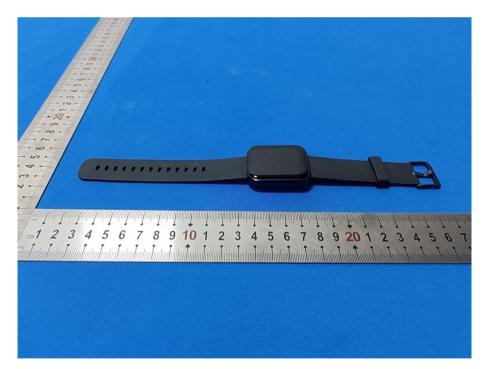








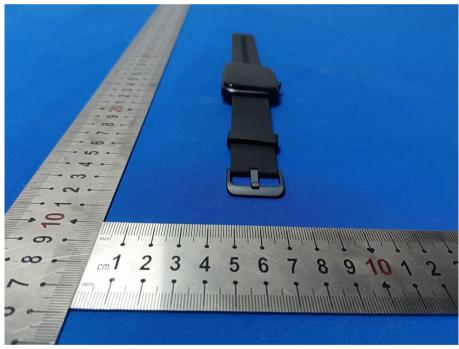








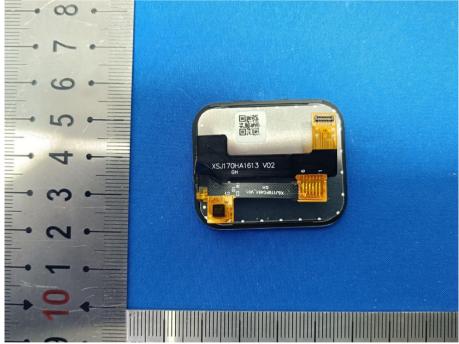
















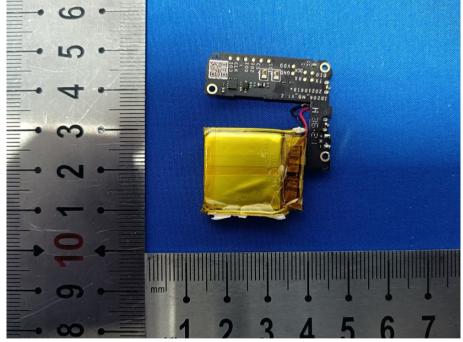






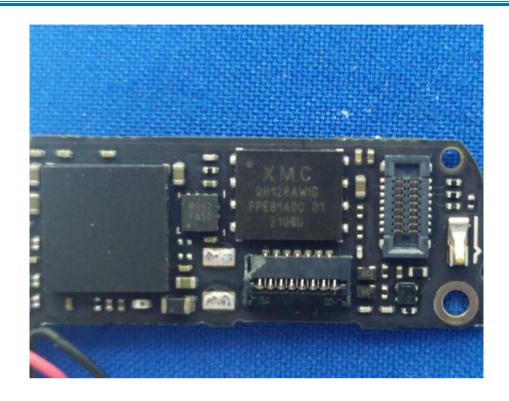










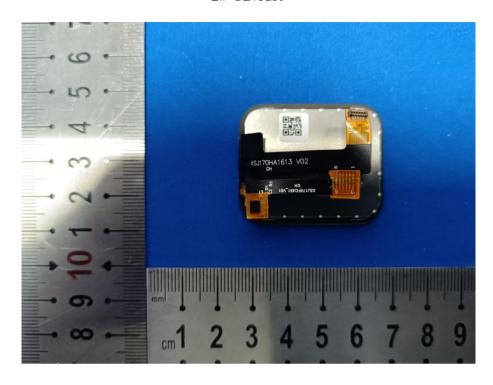


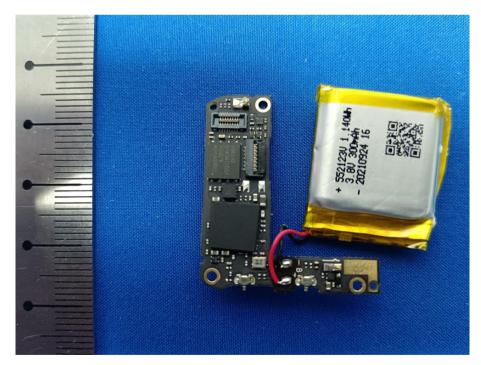






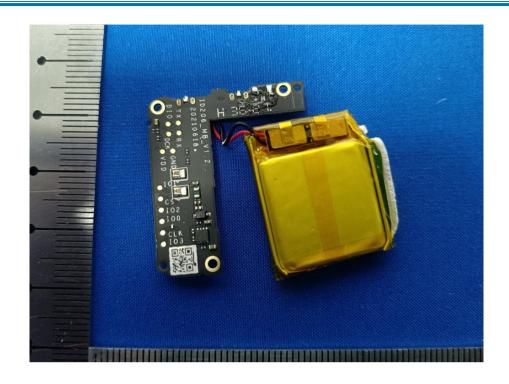
### 2# GD/XSJ

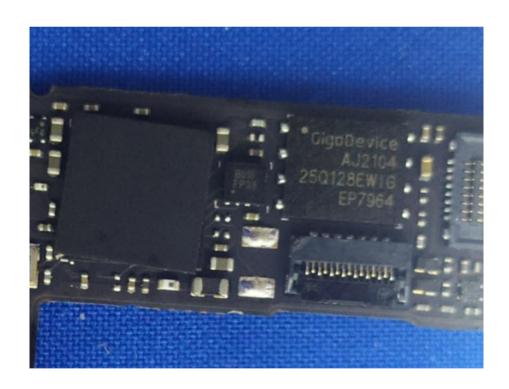








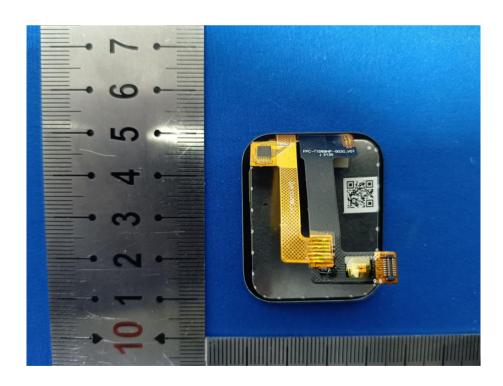




3# BP



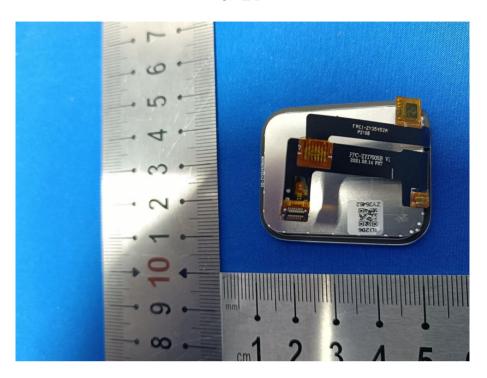
4# HP







5# ZY



\*\*\* End of Report \*\*\*