FCC RADIO TEST REPORT

FCC ID: 2BCA3G-231-D

Sample : Multimode wireless mouse

Trade Mark : Indena, Whalices 52

Main Model : G-231-D

Additional Model : Please see the table in page 7.

Report No. : UNIA25110706ER-61

Prepared for

Shenzhen Leader-Union Technology Co., Ltd.

3F, No.90, Alley 5, Hekan Village, Ban Tian, LongGang District, Shenzhen, China

Prepared by

Shenzhen United Testing Technology Co., Ltd.

D101&D401, No. 107, Kaicheng High-Tech Park, Taoyuan Community, Dalang Sub-District, Longhua District, Shenzhen, Guangdong, China

TEST RESULT CERTIFICATION

Applicant.....: Shenzhen Leader-Union Technology Co., Ltd.

Address.....: 3F, No.90, Alley 5, Hekan Village, Ban Tian, LongGang District, Shenzhen, China

Manufacturer .....: Dongguan Indena Electronic Technology Co., Ltd

Address.....: Building 2, No.118-3, Gaoyu North Road, Tangxia Town, Dongguan City, Guangdong Province, China

Product description

Product.....: Multimode wireless mouse

Trade Mark.....: Indena, Whalices 52

Model Name.....: G-231-D, Additional model see the table in page 7.

Test Methods .....: FCC Rules and Regulations Part 15 Subpart C Section 15.249, ANSI C63.10: 2020

This device described above has been tested by Shenzhen United Testing Technology Co., Ltd., and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Date of Test

Date (s) of performance of tests ..... : Nov. 11, 2025 ~ Nov. 13, 2025

Date of Issue ..... : Nov. 14, 2025

Test Result ..... : Pass

Edited by: Abe Yang

Reviewed by: Kelly Cheng

Approved by: Liuze

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1 TEST SUMMARY

1.1 TEST PROCEDURES AND RESULTS

Item	FCC Rules	Description of test	Result
1	FCC Part 15.207	Conducted Emission	Pass
2	FCC Part 15.209/15.249	Radiated Emission	Pass
3	FCC Part 15.249/15.205	Band Edge	Pass
4	FCC Part 15.215	20dB Bandwidth	Pass
5	FCC Part 15.203	Antenna Requirement	Pass

Note:

“N/A” denotes test is not applicable in this Test Report.

1.2 TEST FACILITY

Test Firm : Shenzhen United Testing Technology Co., Ltd.

Address : D101&D401, No. 107, Kaicheng High-Tech Park, Taoyuan Community, Dalang Sub-District, Longhua District, Shenzhen, Guangdong, China

The testing quality ability of our laboratory meet with "Quality Law of People's Republic of China" Clause 19.The testing quality system of our laboratory meets with ISO/IEC-17025 requirements. This approval result is accepted by MRA of APLAC.

Our test facility is recognized, certified, or accredited by the following organizations:

A2LA Certificate Number: 4747.01
The EMC Laboratory has been accredited by A2LA, and in compliance with ISO/IEC 17025:2017 General Requirements for testing Laboratories.

FCC Registration Number: 674885
The EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications commission.

IC Registration Number: 31584
The EMC Laboratory has been registered and fully described in a report filed with the (IC) Industry Canada.

1.3 MEASUREMENT UNCERTAINTY

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

A. Conducted Measurement:

Test Site	Method	Measurement Frequency Range	U, (dB)	NOTE
UNI	ANSI	9kHz ~ 150kHz	2.96	
		150kHz ~ 30MHz	2.44	

B. Radiated Measurement:

Test Site	Method	Measurement Frequency Range	U, (dB)	NOTE
UNI	ANSI	9kHz ~ 30MHz	2.50	
		30MHz ~ 1000MHz	4.80	
		Above 1000MHz	4.13	

C. RF Conducted Method:

Item	**Measurement Uncertainty**
Uncertainty of total RF power, conducted	U_c = ±0.8 dB
Uncertainty of RF power density, conducted	U_c = ±2.6 dB
Uncertainty of spurious emissions, conducted	U_c = ±2 %
Uncertainty of Occupied Channel Bandwidth	U_c = ±2 %

1.4 ENVIRONMENTAL CONDITIONS

During the measurement the environmental conditions were within the listed ranges:

	NORMAL CONDITIONS	EXTREME CONDITIONS
Temperature range (℃)	15 - 35	-20 - 50
Relative humidty range	20 % - 75 %	20 % - 75 %
Pressure range (kPa)	86 - 106	86 - 106
Note: The Extreme Temperature and Extreme Voltages declared by the manufacturer.		

2 GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Product:	Multimode wireless mouse
Trade Mark:	Indena, Whalices 52
Main Model:	G-231-D
Additional Model:	G-231-D, G-235-D, WH2316D, WH265D, WH221D, WH259D, WH266D, WH258D, WH267D, WH235D, WH222D, WH269D, WH263D, WH221D, WH226D, WH237D, WH227D, WH232D, WH229D, WH262D, WH537D, WH550D, WH526D, WH529D, WH261D, WH260D, WH106D
Model Difference:	All model's the function, software and electric circuit are the same, only with a product color and model named different. Test sample model: G-231-D.
FCC ID:	2BCA3G-231-D
Operation Frequency:	2402MHz~2480MHz
Number of Channels:	40CH
Field Strength of Fundamental:	97.73dBuV/m(Peak)@3m
Modulation Type:	GFSK
Antenna Type:	PCB Antenna
Antenna Gain:	-1.66dBi
Battery:	DC 3.7V, 350mAh
Adapter:	N/A
Power Source:	DC 5V by adapter or DC 3.7V by battery

2.2 CARRIER FREQUENCY OF CHANNELS

Channel List							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	10	2422	20	2442	30	2462
01	2404	11	2424	21	2444	31	2464
02	2406	12	2426	22	2446	32	2466
03	2408	13	2428	23	2448	33	2468
04	2410	14	2430	24	2450	34	2470
05	2412	15	2432	25	2452	35	2472
06	2414	16	2434	26	2454	36	2474
07	2416	17	2436	27	2456	37	2476
08	2418	18	2438	28	2458	38	2478
09	2420	19	2440	29	2460	39	2480

2.3 DESCRIPTION OF TEST MODES

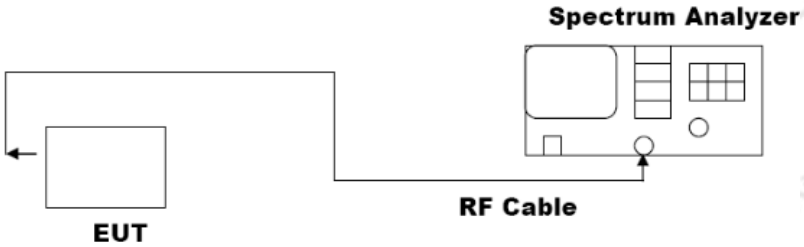
No.	Test Mode Description
1	Low channel TX: 2402MHz
2	Middle channel TX: 2440MHz
3	High channel TX: 2480MHz
Note: 1. For Radiated Emission, 3axis were chosen for testing for each applicable mode. 2. For Conducted Test method, at emporary antenna connector is provided by the manufacture.	

2.4 TEST SETUP

Operation of EUT during Conducted testing:

Operation of EUT during Radiation testing:

Operation of EUT during RF Conducted testing:



2.5 EQUIPMENT USED IN TESTED SYSTEM

Item	Equipment	Model/Type No.	Cable Length(m)	Note
1	Multimode wireless mouse	G-231-D	--	EUT

Note:1. The support equipment was authorized by Declaration of Confirmation.

2. All the above equipment/cables were placed in worse case positions to maximize emission signals during emission test.

2.6 MEASUREMENT INSTRUMENTS LIST

Item	Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
Conduction Emissions Measurement					
1	Conducted Emission Test Software	EZ-EMC	Ver.CCS-3A1-CE	N/A	N/A
2	AMN	Schwarzbeck	NNLK8121	8121370	2026.03.25
3	AAN	TESEQ	T8-Cat6	38888	2026.03.25
4	Pulse Limiter	CYBRTEK	EM5010	E115010056	2026.03.25
5	EMI Test Receiver	Rohde&Schwarz	ESCI	101210	2026.03.25
Radiated Emissions Measurement					
1	Radiated Emission Test Software	EZ-EMC	Ver.CCS-03A1	N/A	N/A
2	Horn Antenna	Sunol	DRH-118	A101415	2027.03.27
3	Broadband Hybrid Antenna	Sunol	JB1	A090215	2027.03.27
4	PREAMP	HP	8449B	3008A00160	2026.03.29
5	PREAMP	HP	8447D	2944A07999	2026.03.25
6	EMI TEST RECEIVER	Rohde&Schwarz	ESR3	101891	2026.03.25
7	VECTOR Signal Generator	Rohde&Schwarz	SMU200A	101521	2026.03.25
8	Signal Generator	Agilent	E4421B	MY4335105	2026.03.25
9	MXA Signal Analyzer	Agilent	N9020A	MY50510140	2026.03.25
10	MXA Signal Analyzer	Keysight	N9020A	MY51110104	2026.03.25
11	RF Power sensor	DARE	RPR3006W	15I00041SNO88	2026.03.26
12	RF Power sensor	DARE	RPR3006W	15I00041SNO89	2026.03.26
13	RF power divider	Anritsu	K241B	992289	2026.03.26
14	Wideband radio communication tester	Rohde&Schwarz	CMW500	154987	2026.03.25
15	Active Loop Antenna	Com-Power	AL-130R	10160009	2026.05.26
16	Broadband Hybrid Antennas	Schwarzbeck	VULB9163	VULB9163#958	2026.03.25
17	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1680	2026.03.25
18	Horn Antenna	A-INFOMW	LB-180400-KF	J211060660	2026.03.25
19	Microwave Broadband Preamplifier	Schwarzbeck	BBV 9721	100472	2026.03.26
20	Signal Generator	Agilent	N5183A	MY47420153	2026.03.27
21	Spctrum Analyzer	Rohde&Schwarz	FSP 40	100501	2026.03.27
22	Power Meter	KEYSIGHT	N1911A	MY50520168	2026.03.27
23	Frequency Meter	VICTOR	VC2000	997406086	2026.03.27
24	DC Power Source	HYELEC	HY5020E	055161818	2026.03.27
25	Low-noise Amplifier	WSC	DLNA-9K-1000	WCSLNA240816A	2026.03.25
26	Spctrum Analyzer	Rohde&Schwarz	FSV40-N	101798	2026.06.25
27	MTS 8310	MW	Copyright MWRFtest 2017	V2.0.0.0	N/A

3 CONDUCTED EMISSION

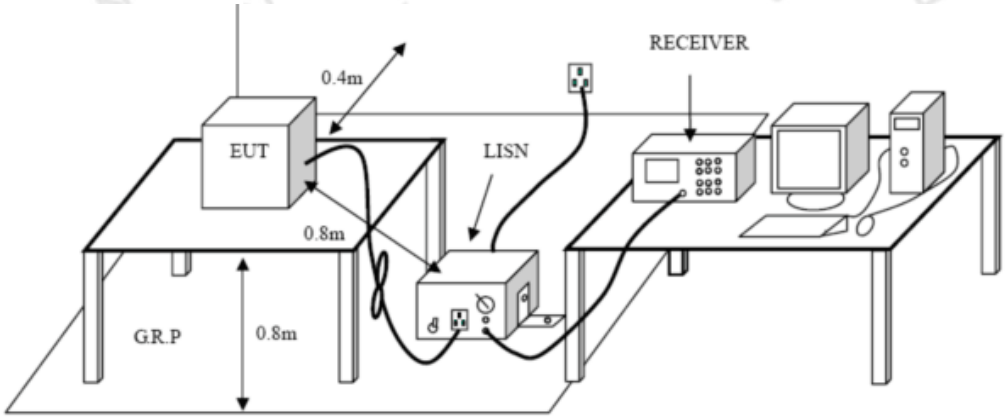
3.1 TEST LIMIT

For unintentional device, according to § 15.207(a) Line Conducted Emission Limits is as following

Frequency (MHz)	Maximum RF Line Voltage (dBμV)			
	CLASS A		CLASS B	
	Q.P.	Ave.	Q.P.	Ave.
0.15~0.50	79	66	66~56*	56~46*
0.50~5.00	73	60	56	46
5.00~30.0	73	60	60	50

* Decreasing linearly with the logarithm of the frequency.
For intentional device, according to §15.207(a) Line Conducted Emission Limit is same as above table.

3.2 TEST SETUP



3.3 TEST PROCEDURE

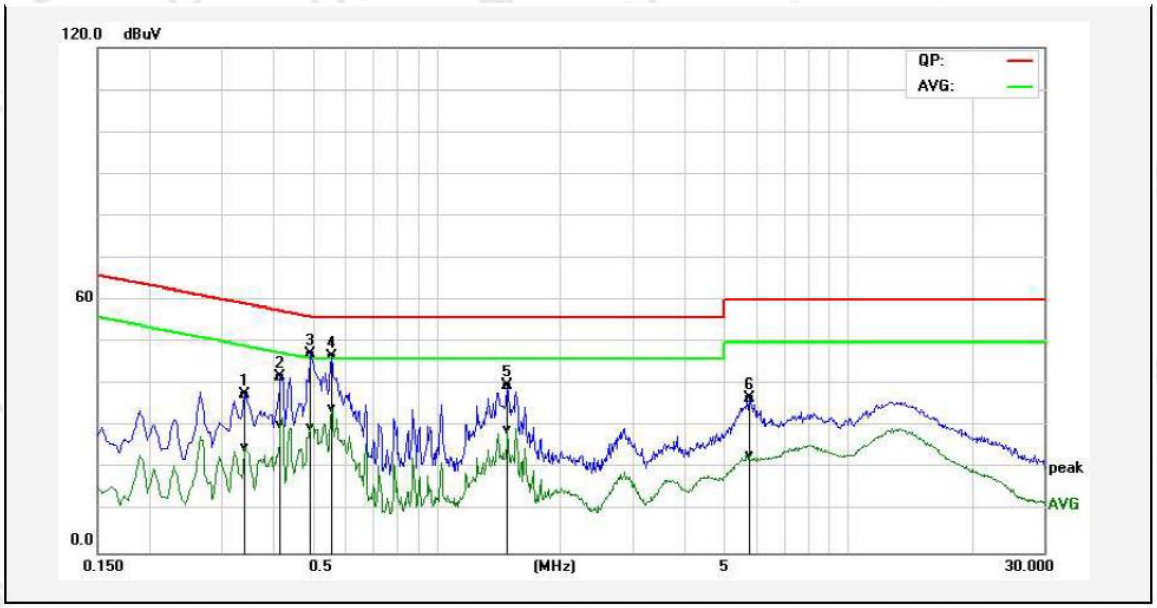
1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is placed on a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10.
2. Support equipment, if needed, was placed as per ANSI C63.10.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
4. If a EUT received DC power from the USB Port of adapter, the adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5. All support equipments received AC power from a second LISN, if any.
6. The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.

3.4 TEST RESULT

PASS

Remark:
1. All modes were tested at AC 120V and 240V, only the worst result of AC 120V was reported.
2. All modes were test at Low, Middle, and High channel, only the worst result of BLE GFSK Low Channel was reported.

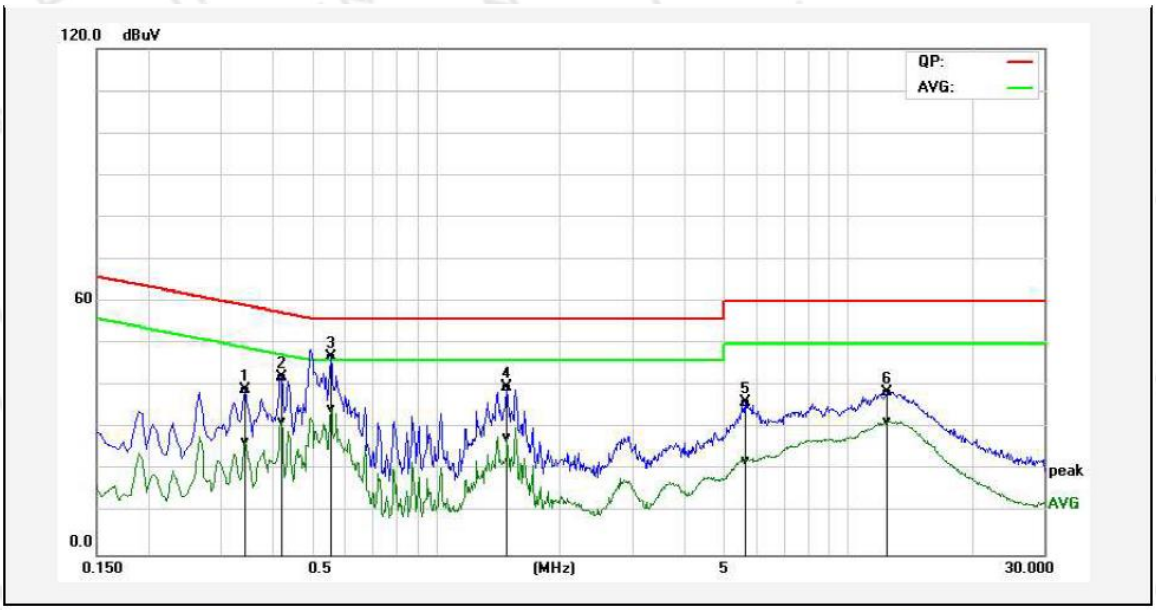
Temperature:	24℃	Relative Humidity:	48%
Test Date:	Nov. 11, 2025	Pressure:	1010hPa
Test Voltage:	AC 120V, 60Hz	Phase:	Line
Test Mode:	Transmitting mode of BLE GFSK 2402MHz		



No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1P	0.3420	26.94	14.31	10.77	37.71	25.08	59.15	49.15	-21.44	-24.07	Pass
2P	0.4180	31.09	19.69	10.86	41.95	30.55	57.49	47.49	-15.54	-16.94	Pass
3*	0.4940	36.27	19.04	10.87	47.14	29.91	56.10	46.10	-8.96	-16.19	Pass
4P	0.5580	35.86	23.42	10.87	46.73	34.29	56.00	46.00	-9.27	-11.71	Pass
5P	1.4900	28.76	18.16	11.09	39.85	29.25	56.00	46.00	-16.15	-16.75	Pass
6P	5.7660	24.63	11.36	12.01	36.64	23.37	60.00	50.00	-23.36	-26.63	Pass

Remark: Factor = Insertion Loss + Cable Loss, Result = Reading + Factor, Margin = Result – Limit.

Temperature:	24℃	Relative Humidity:	48%
Test Date:	Nov. 11, 2025	Pressure:	1010hPa
Test Voltage:	AC 120V, 60Hz	Phase:	Neutral
Test Mode:	Transmitting mode of BLE GFSK 2402MHz		



No.	Frequency (MHz)	QuasiPeak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	QuasiPeak result (dBuV)	Average result (dBuV)	QuasiPeak limit (dBuV)	Average limit (dBuV)	QuasiPeak margin (dB)	Average margin (dB)	Remark
1P	0.3460	28.24	16.01	10.78	39.02	26.79	59.06	49.06	-20.04	-22.27	Pass
2P	0.4220	31.21	20.92	10.86	42.07	31.78	57.41	47.41	-15.34	-15.63	Pass
3*	0.5580	36.10	23.75	10.87	46.97	34.62	56.00	46.00	-9.03	-11.38	Pass
4P	1.4900	28.62	16.79	11.09	39.71	27.88	56.00	46.00	-16.29	-18.12	Pass
5P	5.6460	24.09	10.50	11.99	36.08	22.49	60.00	50.00	-23.92	-27.51	Pass
6P	12.4740	23.62	16.74	14.85	38.47	31.59	60.00	50.00	-21.53	-18.41	Pass

Remark: Factor = Insertion Loss + Cable Loss, Result = Reading + Factor, Margin = Result – Limit.

4 RADIATED EMISSION

4.1 TEST LIMIT

For unintentional device, according to § 15.209(a), except for Class B digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values：

Frequency	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
0.009MHz-0.490MHz	2400/F (kHz)	-	Quasi-peak	300
0.490MHz-1.705MHz	24000/F (kHz)	-	Quasi-peak	30
1.705MHz-30MHz	30	-	Quasi-peak	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	54.0	Quasi-peak	3
Above 1GHz	500	54.0	Average	3
		74.0	Peak	3

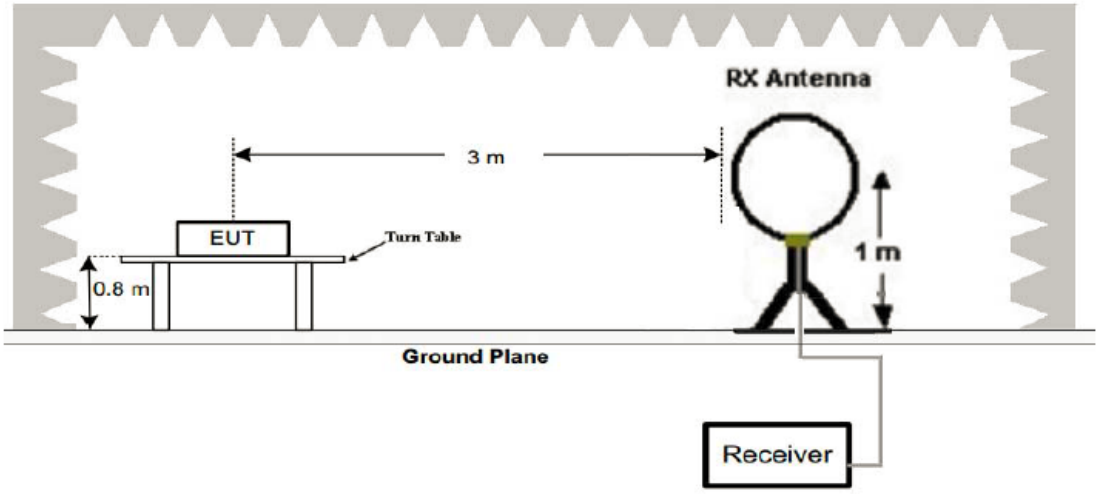
For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the above table.

Limit: (Field strength of the fundamental signal)

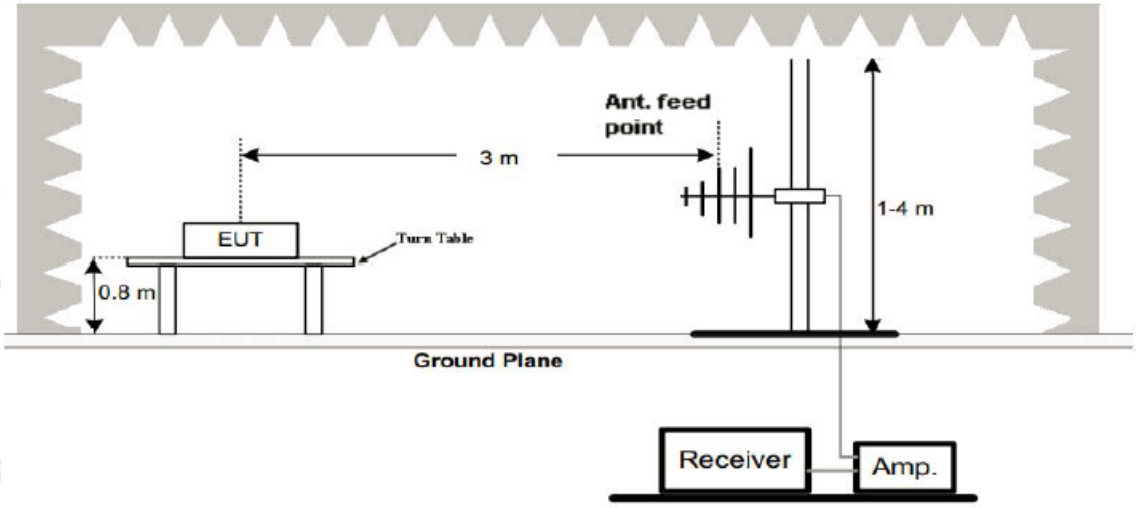
Frequency	Limit (dBuV/m @3m)	Remark
2400MHz-2483.5MHz	94.0	Average Value
	114.0	Peak Value

4.2 TEST SETUP

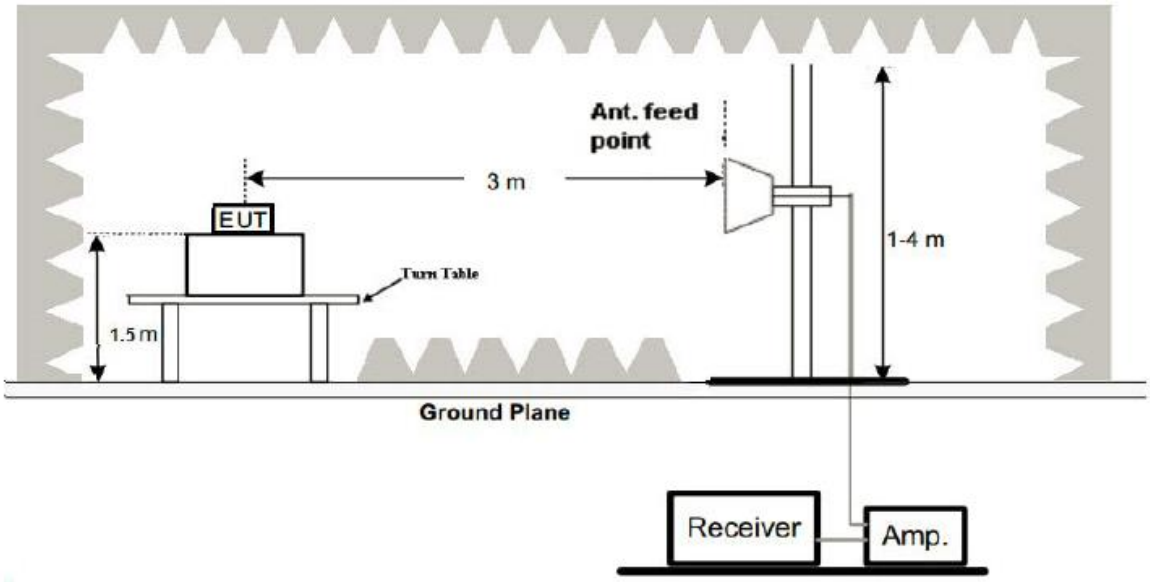
1. Radiated Emission Test-Up Frequency Below 30MHz



2. Radiated Emission Test-Up Frequency 30MHz~1GHz



3. Radiated Emission Test-Up Frequency Above 1GHz



4.3 TEST PROCEDURE

1. Below 1GHz measurement the EUT is placed on turntable which is 0.8m above ground plane. And above 1GHz measurement EUT was placed on low permittivity and low tangent turn table which is 1.5m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The test frequency range from 9kHz to 25GHz per FCC PART 15.33(a).

Note: For battery operated equipment, the equipment tests shall be performed using a new battery.

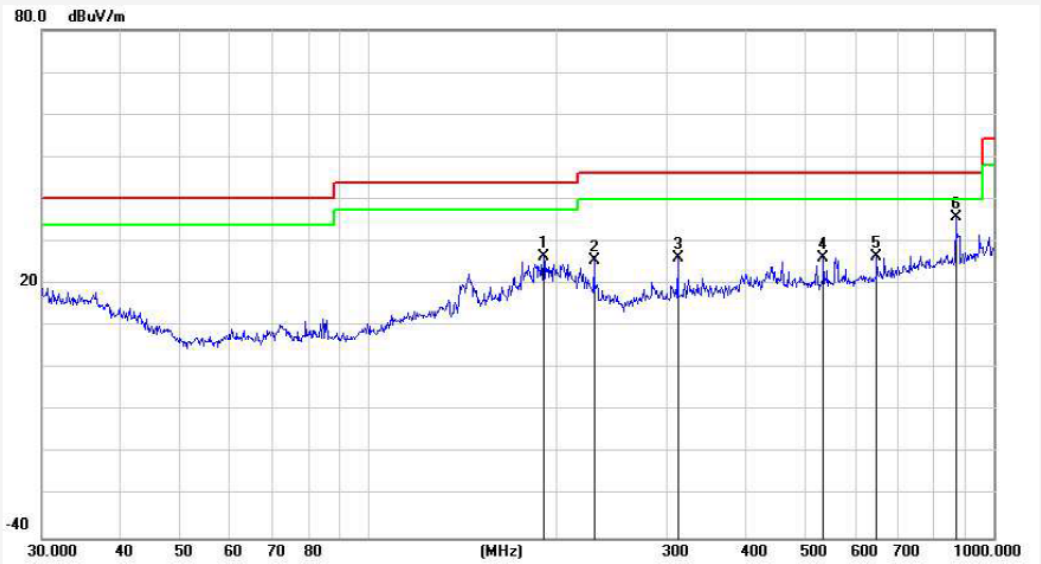
4.4 TEST RESULT

PASS

Remark:
1. All modes were test at Low, Middle, and High channel, only the worst result of GFSK Low Channel was reported for below 1GHz test.
2. By preliminary testing and verifying three axis (X, Y and Z) position of EUT transmitted status, it was found that “X axis” position was the worst, and test data recorded in this report.
3. Radiated emission test from 9kHz to 10th harmonic of fundamental was verified, and no emission found except system noise floor in 9kHz to 30MHz and not recorded in this report.

Below 1GHz Test Results:

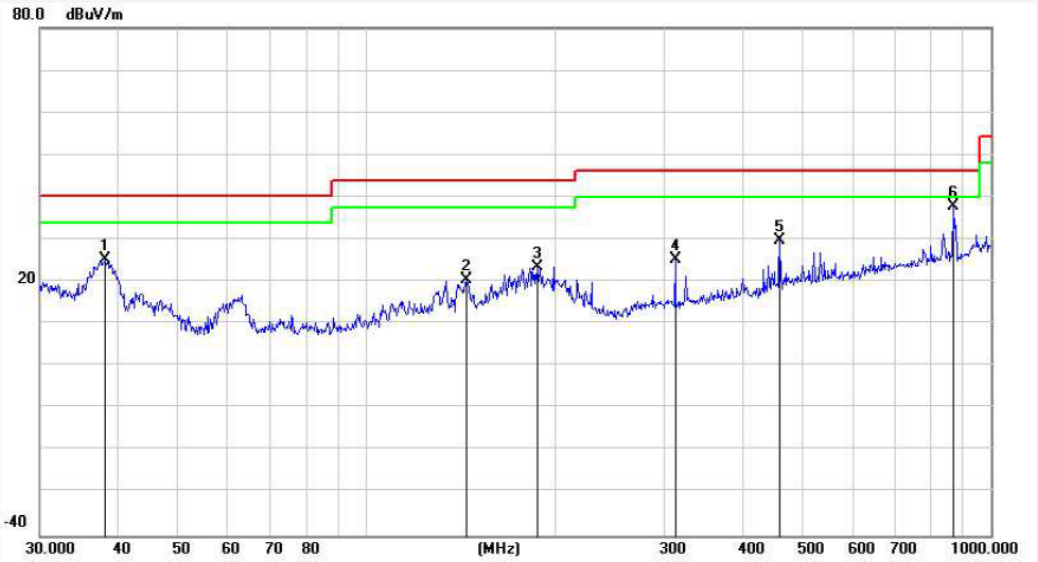
Temperature:	24℃	Relative Humidity:	48%
Test Date:	Nov. 11, 2025	Pressure:	1010hPa
Test Voltage:	AC 120V, 60Hz	Phase:	Horizontal
Test Mode:	Transmitting mode of BLE GFSK 2402MHz		



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1	190.4050	41.72	-15.26	26.46	43.50	-17.04	183	100	QP
2	229.2931	40.81	-15.37	25.44	46.00	-20.56	172	100	QP
3	312.1794	37.91	-11.84	26.07	46.00	-19.93	154	100	QP
4	533.8321	33.40	-7.23	26.17	46.00	-19.83	129	100	QP
5	649.6597	31.66	-5.34	26.32	46.00	-19.68	131	100	QP
6*	869.1302	37.37	-1.59	35.78	46.00	-10.22	122	100	QP

Remark: Result = Reading Level + Factor, Margin = Result – Limit
Factor = Ant. Factor + Cable Loss – Pre-amplifier

Temperature:	24℃	Relative Humidity:	48%
Test Date:	Nov. 11, 2025	Pressure:	1010hPa
Test Voltage:	AC 120V, 60Hz	Phase:	Vertical
Test Mode:	Transmitting mode of BLE GFSK 2402MHz		



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1	38.2120	38.81	-13.65	25.16	40.00	-14.84	113	100	QP
2	144.8418	34.15	-13.79	20.36	43.50	-23.14	181	100	QP
3	187.7530	38.57	-15.09	23.48	43.50	-20.02	141	100	QP
4	312.1794	36.97	-11.84	25.13	46.00	-20.87	169	100	QP
5	459.1144	38.74	-9.06	29.68	46.00	-16.32	187	100	QP
6*	869.1302	39.34	-1.59	37.75	46.00	-8.25	125	100	QP

Remark: Result = Reading Level + Factor, Margin = Result – Limit
Factor = Ant. Factor + Cable Loss – Pre-amplifier

Remark:
1. Measuring frequencies from 9 kHz to the 1 GHz, Radiated emission test from 9kHz to 30MHzwas verified, and no any emission was found except system noise floor.
2. * denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
3. The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120kHz, 1 MHz for measuring above 1 GHz, below 30MHz was 10kHz.

Above 1 GHz Test Results:

CH00 (2402MHz)

Horizontal:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2402	103.57	-5.84	97.73	114	-16.27	PK
2402	83.17	-5.84	77.33	94	-16.67	AV
4804	60.35	-3.64	56.71	74	-17.29	PK
4804	40.3	-3.64	36.66	54	-17.34	AV
7206	57.36	-0.95	56.41	74	-17.59	PK
7206	37.01	-0.95	36.06	54	-17.94	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Emission Level – Limit						

Vertical:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2402	103.3	-5.84	97.46	114	-16.54	PK
2402	82.98	-5.84	77.14	94	-16.86	AV
4804	60.33	-3.64	56.69	74	-17.31	PK
4804	40.09	-3.64	36.45	54	-17.55	AV
7206	56.96	-0.95	56.01	74	-17.99	PK
7206	36.47	-0.95	35.52	54	-18.48	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Emission Level – Limit						

CH19 (2440MHz)

Horizontal:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2440	103.22	-5.71	97.51	114	-16.49	PK
2440	82.83	-5.71	77.12	94	-16.88	AV
4880	60.03	-3.51	56.52	74	-17.48	PK
4880	39.95	-3.51	36.44	54	-17.56	AV
7320	56.97	-0.82	56.15	74	-17.85	PK
7320	36.69	-0.82	35.87	54	-18.13	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Emission Level – Limit						

Vertical:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2440	102.76	-5.71	97.05	114	-16.95	PK
2440	82.52	-5.71	76.81	94	-17.19	AV
4880	59.75	-3.51	56.24	74	-17.76	PK
4880	39.62	-3.51	36.11	54	-17.89	AV
7320	56.5	-0.82	55.68	74	-18.32	PK
7320	35.98	-0.82	35.16	54	-18.84	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Emission Level – Limit						

CH39 (2480MHz)

Horizontal:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2480	103.15	-5.65	97.5	114	-16.5	PK
2480	82.78	-5.65	77.13	94	-16.87	AV
4960	60.07	-3.43	56.64	74	-17.36	PK
4960	39.99	-3.43	36.56	54	-17.44	AV
7440	57.01	-0.75	56.26	74	-17.74	PK
7440	36.7	-0.75	35.95	54	-18.05	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Emission Level – Limit						

Vertical:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2480	102.84	-5.63	97.21	114	-16.79	PK
2480	82.55	-5.65	76.9	94	-17.1	AV
4960	59.84	-3.43	56.41	74	-17.59	PK
4960	39.66	-3.43	36.23	54	-17.77	AV
7440	56.55	-0.75	55.8	74	-18.2	PK
7440	36.04	-0.75	35.29	54	-18.71	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. Margin = Emission Level – Limit						

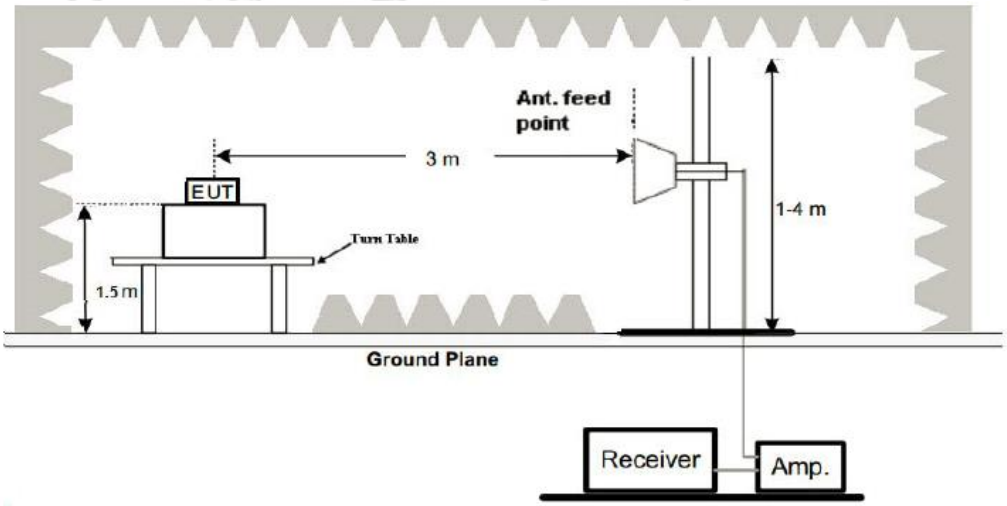
Remark:
1. Measuring frequencies from 1 GHz to the 25 GHz.
2. “F” denotes fundamental frequency; “H” denotes spurious frequency. “E” denotes band edge frequency.
3. * denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
4. Data of measurement within this frequency range shown “--- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120kHz, 1 MHz for measuring above 1 GHz, below 30MHz was 10kHz. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for peak measurement with peak detector at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average measurement with peak detection at frequency above 1GHz.
6. When the test results of Peak Detected below the limits of Average Detected, the Average Detected is not need completed. For example: Top Channel at Fundamental 73.16dBuV/m(PK Value) <93.98(AV Limit), at harmonic 53.20 dBuV/m(PK Value) <54 dBuV/m(AV Limit), the Average Detected not need to completed.
7. For fundamental frequency, RBW >20dB BW, VBW>=3XRBW, PK detector for PK value, AV detector for AV value.

5 BAND EDGE

5.1 TEST LIMIT

FCC PART 15.249(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

5.2 TEST SETUP



5.3 MEASUREMENT EQUIPMENT USED

Refer to Section 2.6.

5.4 TEST PROCEDURE

1. The EUT operates at transmitting mode. The operate channel is tested to verify the largest transmission and spurious emissions power at the continuous transmission mode. The band edge compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc.
2. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission: (a) PEAK: RBW=1MHz, VBW=3MHz / Sweep=AUTO
   (b) AVERAGE: RBW=1MHz ; VBW=3MHz / Sweep=AUTO

5.5 TEST RESULT

PASS

Operation Mode: TX CH00 (2402MHz)

Horizontal:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2310	55.63	-5.81	49.82	74	-24.18	PK
2310	/	-5.81	/	54	/	AV
2390	55.72	-5.84	49.88	74	-24.12	PK
2390	/	-5.84	/	54	/	AV
2400	55.62	-5.84	49.78	74	-24.22	PK
2400	/	-5.84	/	54	/	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Vertical:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2310	55.46	-5.81	49.65	74	-24.35	PK
2310	/	-5.81	/	54	/	AV
2390	55.56	-5.84	49.72	74	-24.28	PK
2390	/	-5.84	/	54	/	AV
2400	55.71	-5.84	49.87	74	-24.13	PK
2400	/	-5.84	/	54	/	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Operation Mode: TX CH39 (2480MHz)

Horizontal:

Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2483.5	54.66	-5.65	49.01	74	-24.99	PK
2483.5	/	-5.65	/	54	/	AV
2500	55.77	-5.72	50.05	74	-23.95	PK
2500	/	-5.72	/	54	/	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Vertical:

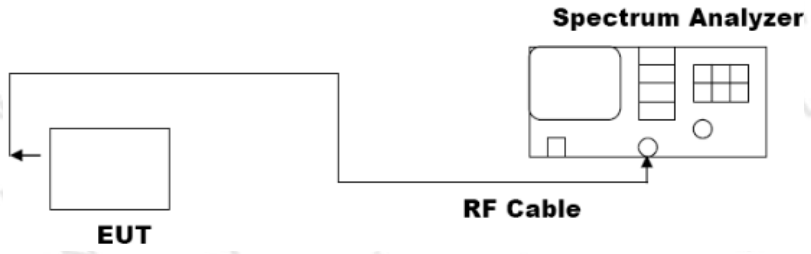
Frequency (MHz)	Reading Result (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2483.5	56.22	-5.65	50.57	74	-23.43	PK
2483.5	/	-5.65	/	54	/	AV
2500	55.73	-5.72	50.01	74	-23.99	PK
2500	/	-5.72	/	54	/	AV
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Note:

1. Since the peak value is less than the average limit, the average value does not reflected in the report.

6 20dB Bandwidth

6.1 TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)



6.2 MEASUREMENT EQUIPMENT USED

Refer to Section 2.6.

6.3 TEST PROCEDURE

1. The RF output of EUT was connected to the spectrum analyzer by RF cable. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 30 kHz. Set the Video bandwidth (VBW) = 100 kHz. In order to make an accurate measurement.
4. For 20dB Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 1-5% of the emission bandwidth and set the Video bandwidth (VBW) ≥ 3 * RBW.
5. Measure and record the results in the test report.

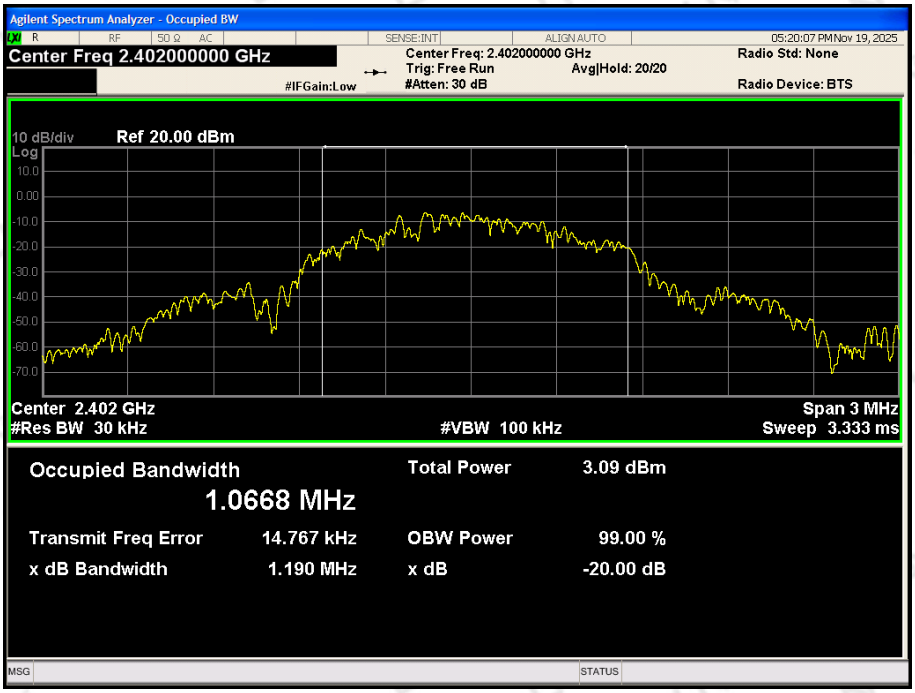
6.4 TEST RESULT

PASS

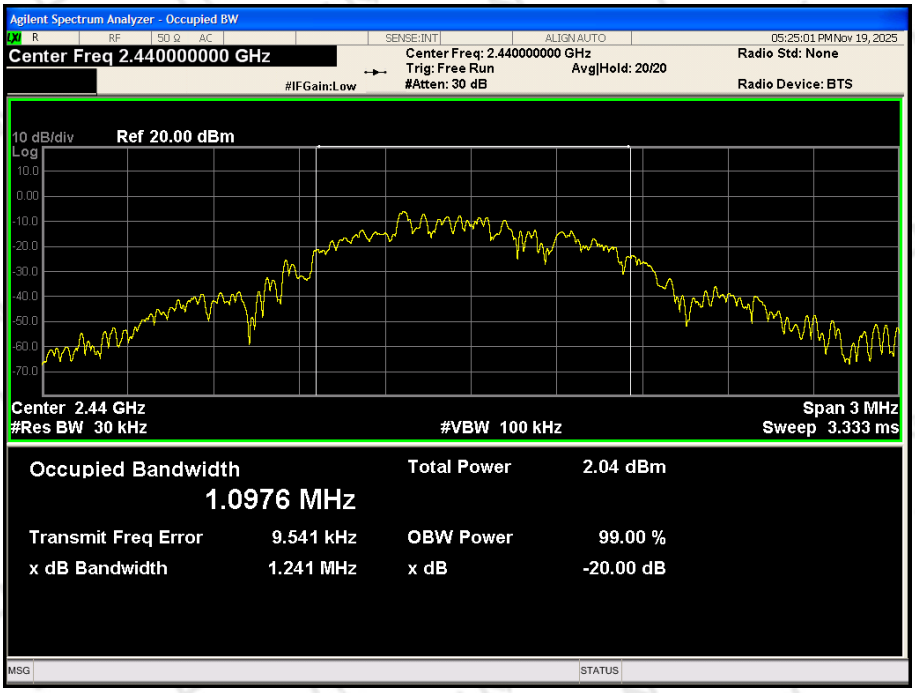
GFSK Modulation:

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	Result
CH00	2402	1.190	PASS
CH19	2440	1.241	PASS
CH39	2480	1.229	PASS

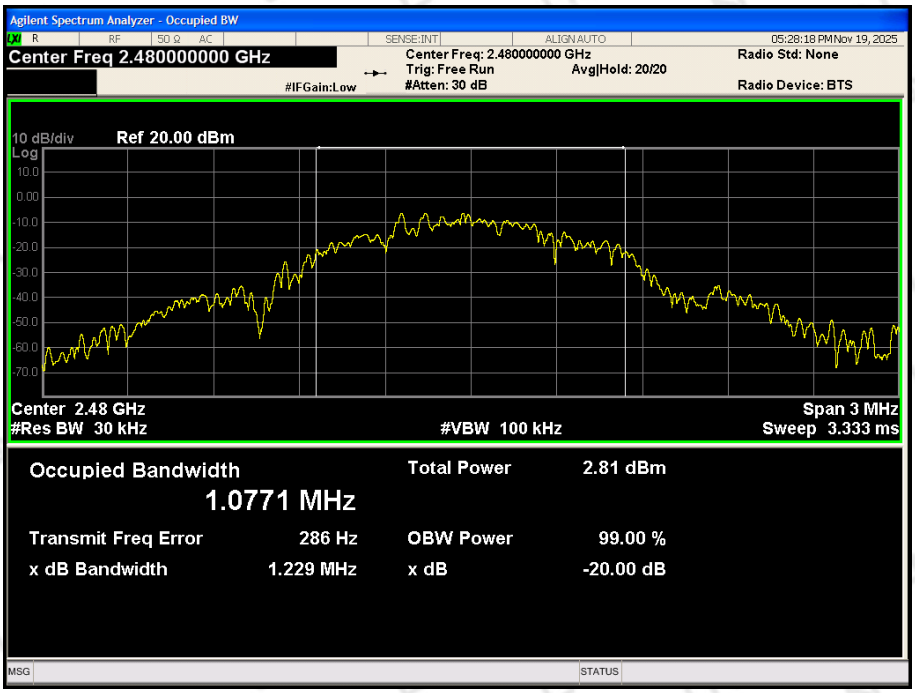
CH00: 2402MHz



CH19: 2440MHz



CH39: 2480MHz

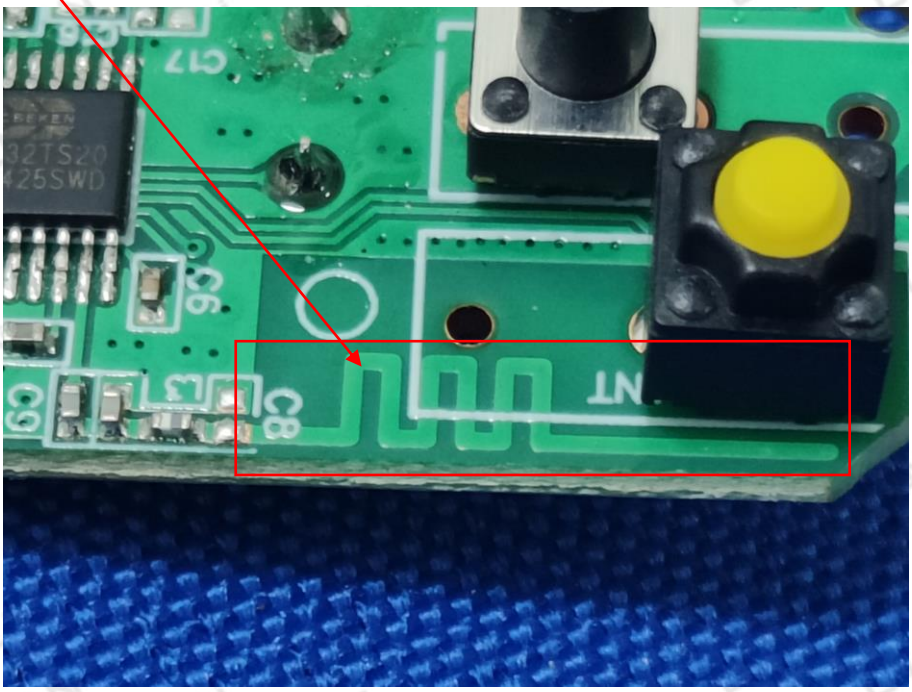


7 ANTENNA REQUIREMENT

Standard Applicable:
For intentional device, according to FCC 47 CFR Section 15.203, 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.

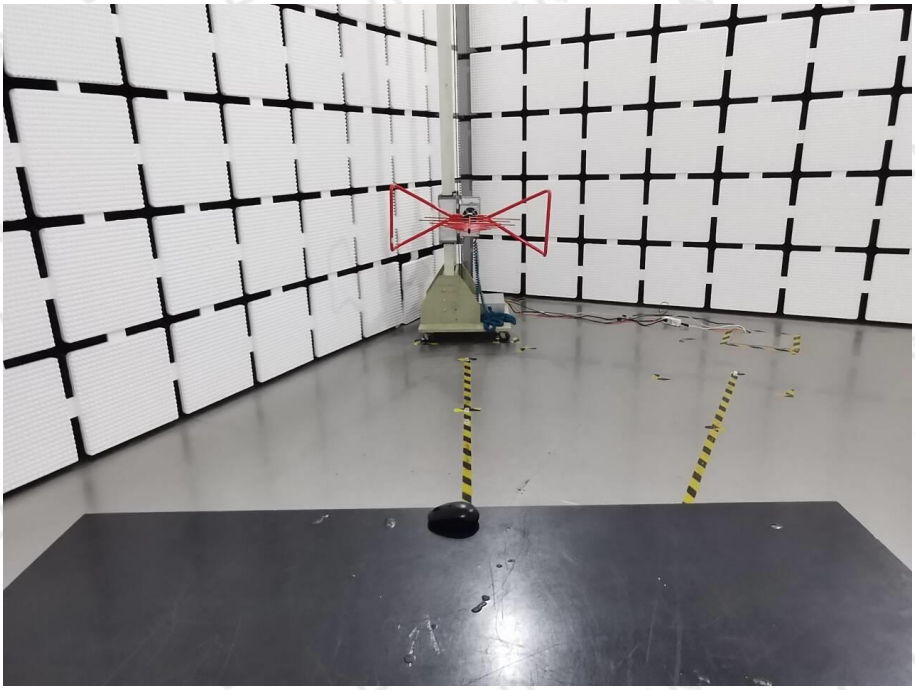
Antenna Connected Construction
The antenna used in this product is a PCB Antenna, The directional gains of antenna used for transmitting is -1.66dBi.

ANTENNA:



8 PHOTO OF TEST

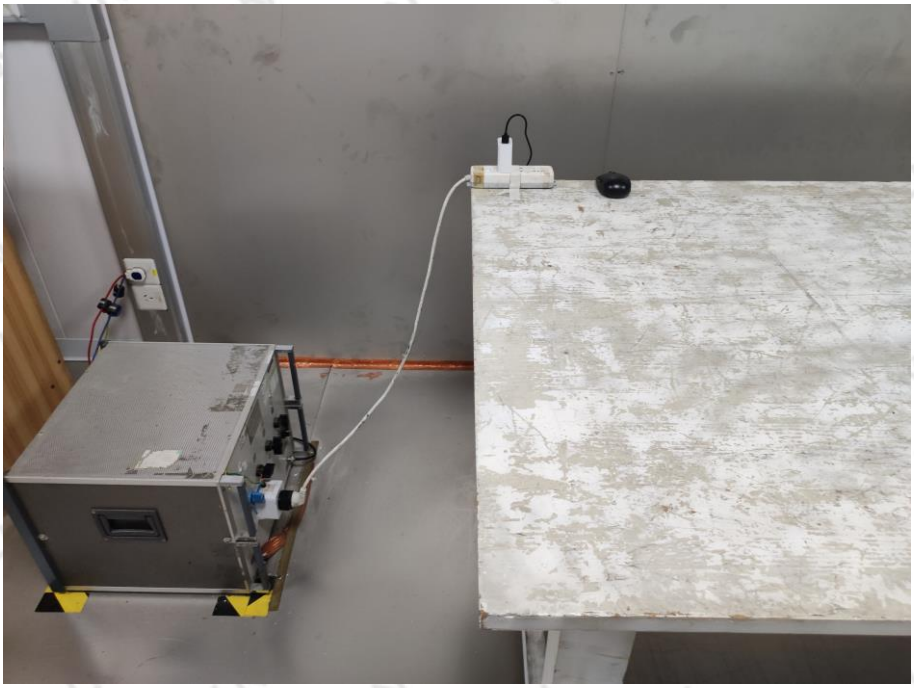
RADIATED EMISSION



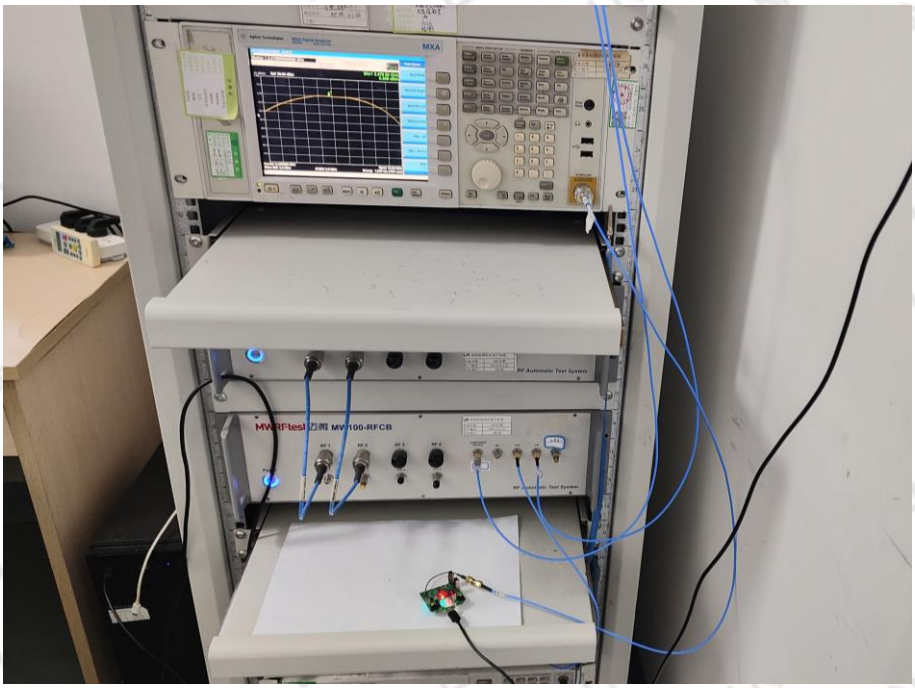
30MHz-1000MHz

Above 1GHz

CONDUCTED EMISSION



RF CONDUCTED



Statement

1. This report must have the signature of the authorized signatory and the special seal of the report, otherwise it will be considered invalid. If there is no anti-counterfeiting electronic seal of the laboratory in the report in PDF format or it is displayed as "×", the report is invalid.
2. This report shall not be modified, added or deleted without authorization. The antenna gain in the report is provided by the customer.
3. The results of this report are only valid for the EUT provided by Applicant to our laboratory for inspection (That is, EUT received by our laboratory. Without special explanation, it refers to the samples presented in the report "PHOTO OF EUT").
4. If there is any objection to the test data and conclusions of this report, please submit it in writing within 10 working days after the date of issuance of the report.
5. Without the written consent of the laboratory, this report shall not be copied (except for full copy), nor shall it be used as publicity materials or advertising.
6. The cover of the report is for decoration only, not included in the body of the report.
7. The paper report issued by our laboratory has the same effect as the electronic report. In case of any difference between the two, the electronic report shall prevail.
8. The Chinese and English reports issued by our laboratory have the same effect. In case of any difference in understanding, the Chinese version shall prevail.
9. Please provide the complete report documents issued by our laboratory when inquiring the report.
10. For cases where compliance is determined based on test values, when relevant specifications, standards, documents, and customers have no relevant requirements and no other special instructions, the test report issued by this laboratory is carried out in full value and adopts ILAC-G8:09 /2019 "Simple Acceptance Rule" for judgment.
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End of Report