

TEST REPORT

Product Name	:	Electronic drum
Model Number	:	MK-0 PLUS
FCC ID	:	2BAIX-MK0PLUS

Prepared for Address	:	NINGBO KINLIN ELECTRONIC TECHNOLOGY CO., LTD. No. 335, Jingu Middle Road, Yinzhou District, Ningbo, China
Prepared by Address	::	EMTEK (NINGBO) CO., LTD. No. 8, Building 8, Lane 216, Qingyi Road, Ningbo Hi-Tech Zone, Ningbo, Zhejiang, China Tel: +86-574-27907998 Fax: +86-574-27721538
Report Number Date(s) of Tests	:	ENB2405310209W00101R May 31, 2024 to June 27, 2024

Date of issue : June 30, 2024

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1 TEST RESULT CERTIFICATION

Applicant	:	NINGBO KINLIN ELECTRONIC TECHNOLOGY CO., LTD.
Address	:	No. 335, Jingu Middle Road, Yinzhou District, Ningbo, China
Manufacturer	:	NINGBO KINLIN ELECTRONIC TECHNOLOGY CO., LTD.
Address	:	No. 335, Jingu Middle Road, Yinzhou District, Ningbo, China
EUT	:	Electronic drum
Model Name	:	MK-0 PLUS
Trademark	:	N/A

Measurement Procedure Used:

APPLICABLE S	STANDARDS
STANDARD	TEST RESULT
FCC 47 CFR Part 2, Subpart J FCC 47 CFR Part 15, Subpart C	PASS

The above equipment was tested by EMTEK (NINGBO) CO., LTD. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 2 and Part 15.247.

The test results of this report relate only to the tested sample identified in this report.

Date of Test :	May 31, 2024 to June 27, 2024
	Time Gao
Prepared by :	
	June Gao /Engineer
Reviewer :	Lucas Xn NINGBO,
	Lucas Xu /Supervisor
Approve & Authorized Signer :	Tomy We*
	Tony wei/Manager

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Modified History

Version	Report No.	Revision Date	Summary	
/	ENB2405310209W00101R	/	Original report	



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2 EUT TECHNICAL DESCRIPTION

Characteristics	Description	
Product Name	Electronic drum	
Model number	MK-0 PLUS	
Sample number	ENB2405310209W001-1-1	
Device Type	Bluetooth V5.0	
Data Rate	1Mbps for GFSK modulation 2Mbps for pi/4-DQPSK modulation 3Mbps for 8DPSK modulation	
Modulation	GFSK pi/4-DQPSK 8DPSK	
Operating Frequency Range	2402-2480MHz	
Number of Channels	79 channels	
Max Transmit Power	0.29 dBm	
Antenna Type	PCB Antenna	
Gain	1.67 dBi	
Test Voltage	AC 120V, 60Hz	
Temperature Range	-10℃ to +45℃	
Date of Received	May 31, 2024	

Note: for more details, please refer to the User's manual of the EUT.

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3 SUMMARY OF TEST RESULT

FCC PartClause	Test Parameter	Verdict	Remark
15.247(a)(1)	20 dB Bandwidth	PASS	
15.247(a)(1)	Carrier Frequency Separation	PASS	
15.247(a)(1)	Number of Hopping Frequencies	PASS	
15.247(a)(1)	Average Time of Occupancy (Dwell Time)	PASS	
15.247(b)(1)	Maximum Peak Conducted Output Power	PASS	
15.247(c)	Conducted Spurious Emissions	PASS	
15.247(d) 15.209	Radiated Spurious Emissions	PASS	
15.207	Conducted Emission	PASS	
15.203	Antenna Application	PASS	
NOTE1:N/A (Not Applicable)			

RELATED SUBMITTAL(S) / GRANT(S):

This submittal(s) (test report) is intended for FCC ID: 2BAIX-MK0PLUS filing to comply with Section 15.247 of the FCC Part 15, Subpart C.

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4 TEST METHODOLOGY

4.1 GENERAL DESCRIPTION OF APPLIED STANDARDS

According to its specifications, the EUT must comply with the requirements of the following standards: FCC 47 CFR Part 2, Subpart J FCC 47 CFR Part 15, Subpart C

FCC KDB 558074 D01 15.247 Meas Guidance v05r02

4.2 MEASUREMENT EQUIPMENT USED

4.2.1 Conducted Emission Test Equipment

Equ.No.	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
ENE-001	EMI Test Receiver	R&S	ESCI	101108	Dec 14, 2023	1 Year
ENE-158	L.I.S.N	Schwarzbeck	NNLK 8129	0373	Nov 17, 2023	1 Year
ENE-004	L.I.S.N	Schwarzbeck	NSLK 8126	8126-462	July 06, 2023	1 Year
ENE-006	Pulse Limiter	MTS-systemtec hnik	IMP-136	2611115-001 -0033	July 06, 2023	1 Year
ENE-278	RF Switching Unit	HTEC	HRSU	222101	July 06, 2023	1 Year
ENE-083	RF Cable	Hubber Suhner/Swiss	CBL-RE-3	1	May 30, 2024	1 Year
ENE-162- 2	RF Cable	TIMES	2M(N-N)	605236-0002	May 30, 2024	1 Year
ENE-149	Conduction Test Room 1#	SKET	11.5*5*4m	1	Dec 17, 2021	3 Year

4.2.2 Radiated Emission Test Equipment

Equ. No.	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
ENE-186	EMI Test Receiver	R&S	ESR7	102487	Apr 25, 2024	1 Year
ENE-009	Pre-Amplifier	CD	PAP-0203	22015	July 06, 2023	1 Year
ENE-010	Bilog Antenna	Schwarzbeck	VULB 9163	9163-467	July 11, 2022	2 Year
ENE-061	Attenuator 6dB	Bracke	BM10008.6	N/A	July 06, 2023	1 Year
ENE-025-1	RF Cable	CD	CBL3-NN-3m	100319-21405 00-1	Apr 14, 2024	1 Year
ENE-025-2	RF Cable	CD	CBL3-NN-0.5m	100319-21405 00-2	Apr 14, 2024	1 Year
ENE-137-1	RF Cable	CD	CBL3-NN-6m	101216-21460 00-1	Apr 14, 2024	1 Year
ENE-137-2	RF Cable	CD	CBL3-NN-6m	101216-21460 00-2	Apr 14, 2024	1 Year
ENE-146	3-Meter Anechoic Chamber1#	SKET	9*6*6m	1	Apr 17, 2023	3 Year

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4.2.3	Radio Frequency Test Equipment
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Equ. No.	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
ENE-256	EXA Signal Anaalyzer	Keysight	N9010B	MY62060219	July 05, 2023	1 Year
ENE-172	RF Control Unit	Tonscend	JS0806-2(V.6E)	21L8060521	February 27, 2024	1 Year
ENE-092	DC Power Supply	KEFUNA	KDP3603	2004D3062946	July 07, 2023	1 Year



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4.3 DESCRIPTION OF TEST MODES

The EUT has been tested under its typical operating condition.

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

Test of channel included the lowest and middle and highest frequency to perform the test, then record on this report.

Those data rates (1Mbps for Bluetooth GFSK modulation; 2Mbps for Bluetooth pi/4-DQPSK modulation; 3Mbps for Bluetooth 8DPSK) were used for all test.

Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	39	2441	· · · ·	
1	2403	40	2442	76	2478
2	2404	41	2443	77	2479
				78	2480
Note: fc=2402MHz+(k-1)×1MHz k=1 to 79					

Frequency and Channel list for Bluetooth V5.0

Test Frequency and Channel for Bluetooth V5.0

Lowest Frequency		Middle F	requency	Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	39	2441	78	2480

4.4 TEST SOFTWARE

Item	Software
Radiated Emission:	FCC (V2.23)
Conducted Emission	FCC (V2.23)

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5 FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

No. 8, Building 8, Lane 216, Qingyi Road, Ningbo Hi-Tech Zone, Ningbo, Zhejiang, China The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.10 and CISPR Publication 32.

5.2 LABORATORY ACCREDITATIONS AND LISTINGS

Site Description	
EMC Lab.	: Accredited by CNAS The Certificate Registration Number is L6666. The Laboratory has been assessed and proved to be in compliance with CNAS-CL01:2018 (identical to ISO/IEC 17025:2017)
	Designation by FCC Designation Number: CN1354 Test Firm Registration Number: 427606
	Accredited by A2LA The certificate is valid until May 31, 2025
	Accredited by Industry Canada The Conformity Assessment Body Identifier is CN0114 Test Firm Registration Number: 9469A
Name of Firm Site Location	 EMTEK (NINGBO) CO., LTD. No. 8, Building 8, Lane 216, Qingyi Road, Ningbo Hi-Tech Zone, Ningbo, Zhejiang, China

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6 TEST SYSTEM UNCERTAINTY

The following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Parameter	Uncertainty
Radio Frequency	±1x10^-5
Maximum Peak Output Power Test	±1.0dB
Conducted Emissions Test	±2.0dB
Radiated Emission Test	±2.0dB
Occupied Bandwidth Test	±1.0dB
Band Edge Test	±3dB
All emission, radiated	±3dB
Antenna Port Emission	±3dB
Temperature	±0.5℃
Humidity	±3%

Measurement Uncertainty for a level of Confidence of 95%

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7 SETUP OF EQUIPMENT UNDER TEST

7.1 RADIO FREQUENCY TEST SETUP 1

The Bluetooth component's antenna ports(s) of the EUT are connected to the measurement instrument per an appropriate attenuator. The EUT is controlled by PC/software to emit the specified signals for the purpose of measurements.



7.2 RADIO FREQUENCY TEST SETUP 2

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.10. The test distance is 3m.The setup is according to the requirements in Section 13.1.4.1 of ANSI C63.10-2014 and CAN/CSA-CEI/IEC CISPR 22.

Below 30MHz:

The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna (loop antenna). The Antenna should be positioned with its plane vertical at the specified distance from the EUT androtated about its vertical axis formaximum response at each azimuth about the EUT. The center of the loopshall be 1 m above the ground.For certain applications, the loop antennaplane may also need to be positioned horizontally at the specified distance from the EUT.

30MHz-1GHz:

The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

Above 1GHz:

The EUT is placed on a turntable 1.5 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

(a) Radiated Emission Test Set-Up, Frequency Below 30MHz



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(b)Radiated Emission Test Set-Up, Frequency Below 1000MHz





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Report No. ENB2405310209W00101R

Ver. 1.0



7.3 CONDUCTED EMISSION TEST SETUP

The mains cable of the EUT (Game fitness board) must be connected to LISN. The LISN shall be placed 0.8 m from the boundary of EUT and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance is between the closest points of the LISN and the EUT. All other units of the EUT and associated equipment shall be at least 0.8m from the LISN.

Ground connections, where required for safety purposes, shall be connected to the reference ground point of the LISN and, where not otherwise provided or specified by the manufacturer, shall be of same length as the mains cable and run parallel to the mains connection at a separation distance of not more than 0.1 m.

According to the requirements in Section 13.1.4.1 of ANSI C63.10-2014 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode.



7.4 SUPPORT EQUIPMENT

EUT Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
1	1	1	1

Auxiliary Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	1	1	/

Auxiliary Equipment List ar	Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number	
1	/	1	1	

Notes:

- 1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
- 2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

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8 FREQUENCY HOPPING SYSTEM REQUIREMENTS

8.1 Standard Applicable

According to FCC Part 15.247(a)(1), The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

(g) Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. However, the system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this section should the transmitter be presented with a continuous data (or information) stream. In addition, a system employing short transmission bursts must comply with the definition of a frequency hopping system and must distribute its transmissions over the minimum number of hopping channels specified in this section.

(h) The incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hopsets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

8.2 EUT Pseudorandom Frequency Hopping Sequence

The channel is represented by a pseudo-random hopping sequence hopping through the 79 RF channels.

The hopping sequence is unique for the piconet and is determined by the Bluetooth device address of the master; thephase in the hopping sequence is determined by the Bluetooth clock of the master. The channel is divide into time slots where each slot corresponds to an RF hop frequency. Consecutive hopscorrespond to different RF hop frequencies. The normal hop is 1 600 hops/s.

The pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage, and the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONEs; i.e. the shift register is initialized with nine ones. Number of shift register stages: 9

Length of pseudo-random sequence: 29-1 = 524 bits

Longest sequence of zeros: 8 (non-inverted signal)

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Linear Feedback Shift Register for Generation of the PRBS sequence

0246	62 64	78 1	73 75 77

Each frequency used equally on the average by each transmitter.

The system receiver have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shift frequencies in synchronization with the transmitted signals.

8.3 Equal Hopping Frequency Use

All Bluetooth units participating in the piconet are time and hop-synchronized to the channel.

Example of a 79 hopping sequence in data mode:

35, 27, 6, 44, 14, 61, 74, 32, 1, 11, 23, 2, 55, 65, 29, 3, 9, 52, 78, 58, 40, 25, 0, 7, 18, 26, 76, 60, 47, 50, 2, 5, 16, 37, 70, 63, 66, 54, 20, 13, 4, 8, 15, 21, 26, 10, 73, 77, 67, 69, 43, 24, 57, 39, 46, 72, 48, 33, 17, 31, 75, 19, 41, 62, 68, 28, 51, 66, 30, 56, 34, 59, 71, 22, 49, 64, 38, 45, 36, 42, 53 Each Frequency used equally on the average by each transmitter

8.4 Frequency Hopping System

This transmitter device is frequency hopping device, and complies with FCC part 15.247 rule.

This device uses Bluetooth radio which operates in 2400-2483.5 MHz band. Bluetooth uses a radio technology called frequency-hopping spread spectrum, which chops up the data being sent and transmits chunks of it on up to 79 bands (1 MHz each; centred from 2402 to 2480 MHz) in the range 2,400-2,483.5 MHz. The transmitter switches hop frequencies 1,600 times per second to assure a high degree of data security. All Bluetooth devices participating in a given piconet are synchronized to the frequency-hopping channel for the piconet. The frequency hopping sequence is determined by the master's device address and the phase of the hopping sequence (the frequency to hop at a specific time) is determined by the master's internal clock. Therefore, all slaves in a piconet must know the master's device address and must synchronize their clocks with the master's clock.

Adaptive Frequency Hopping (AFH) was introduced in the Bluetooth specification to provide an effective way for a Bluetooth radio to counteract normal interference. AFH identifies "bad" channels, where either other wireless devices are interfering with the Bluetooth signal or the Bluetooth signal is interfering with another device. The AFH- enabled Bluetooth device will then communicate with other devices within its piconet to share details of any identified bad channels. The devices will then switch to alternative available "good" channels, away from the areas of interference, thus having no impact on the bandwidth used.

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9 TEST REQUIREMENTS

9.1 20DB BANDWIDTH

Applicable Standard

According to FCC Part 15.247(a)(1) and 558074 D01 15.247 Meas Guidance V05r02

Conformance Limit

No limit requirement.

Test Configuration

Test according to clause 7.1 radio frequency test setup 1

Test Procedure

The EUT was operating in Bluetooth V5.0 and controlled its channel. Printed out the test result from the spectrum by hard copy function.

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.

Set to the maximum power setting and enable the EUT transmit continuously

Set RBW = 30 kHz.

Set the video bandwidth (VBW) =100kHz.

Set Span= approximately 2 to 3 times the 20 dB bandwidth

Set Detector = Peak.

Set Trace mode = max hold.

Set Sweep = auto couple.

The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize.Use the marker-to-peak function to set the marker to the peak of the emission. Use themarker-delta function to measure 20 dB down one side of the emission. Reset the markerdeltafunction, and move the marker to the other side of the emission, until it is (asclose as possible to) even with the reference marker level. The marker-delta reading atthis point is the 20 dB bandwidth of the emission.

If this value varies with differentmodes of operation (e.g., data rate, modulation format, etc.), repeat this test for eachvariation.

Measure and record the results in the test report.

Test Results

Temperature:	26 °C	Test D	Date: June 17, 2024
Humidity:	62 %	Test B	By: Lucas Xu
Modulation	Channel		20dB Bandwidth
Mode	Number	(MHz)	(MHz)
	0	2402	0.9431
GFSK	39	2441	0.9864
	78	2480	0.9397
	0	2402	1.2220
pi/4-DQPSK	39	2441	1.2410
-	78	2480	1.2720
	0	2402	1.2180
8DPSK	39	2441	1.2750
	78	2480	1.2030

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20dB Bandwidth Test Model Channel 0: 2402MHz **GFSK Modulation** Spectrum Analyzer 1 Dccupied BW Ö + Frequency Input Ζ: 50 Ω Corr CCorr Freq Ref: Int (S) Center Freq: 2.402000000 GHz Avg|Hold:>10/10 Radio Std: None KEYSIGHT Input: RF Atten: 30 dB Trig: Free Run µW Path: Standard Gate: Off Center Frequency Settings Align: Auto 2.402000000 GHz #IF Gain: Low Da Spar 1 Graph Ref LvI Offset 11.00 dB Ref Value 20.00 dBm 3.0000 MHz Scale/Div 10.0 dB CF Step _00 300 000 kHz Auto Man Freq Offset Center 2.402000 GHz #Video BW 100.00 kHz Span 3 MHz #Res BW 30.000 kHz Sweep 3.20 ms (1001 pts) 2 Metrics ۷ Measure Trace Trace 1 Occupied Bandwidth 865.48 kHz Total Power 6.07 dBm 99.00 % -20.00 dB Transmit Freq Error 7.318 kHz % of OBW Power x dB Bandwidth 943.1 kHz x dB Jun 17, 2024 1:06:35 PM \gtrsim ッつ ? N 20dB Bandwidth **Test Model** Channel 39: 2441MHz **GFSK Modulation** Spectrum Analyzer 1 Occupied BW Ö + Frequency Input Ζ: 50 Ω Corr CCorr Freq Ref: Int (S) Atten: 30 dB Trig: Free Run µW Path: Standard Gate: Off #IF Gain: Low Center Freq: 2.441000000 GHz KEYSIGHT Input: RF Center Frequency 2.441000000 GHz Avg|Hold:>10/10 Radio Std: None Settings Align: Auto L)(I Span 3.0000 MHz 1 Granh ۷ Ref LvI Offset 11.00 dB Ref Value 20.00 dBm Scale/Div 10.0 dB CF Step 300.000 kHz Auto Man Freq Offset Center 2.441000 GHz #Res BW 30.000 kHz Span 3 MHz Sweep 3.20 ms (1001 pts) #Video BW 100.00 kHz 2 Metrics ۷ Measure Trace Trace 1 Occupied Bandwidth 889.58 kHz 6.51 dBm Total Power Transmit Freq Error x dB Bandwidth 14.978 kHz % of OBW Power 99.00 % -20.00 dB 986.4 kHz x dB Jun 17, 2024 \gtrsim ? ょう

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20dB Bandwidth Test Model Channel 78: 2480MHz **GFSK Modulation** Spectrum Analyzer 1 Dccupied BW Ö + Frequency Input Ζ: 50 Ω Corr CCorr Freq Ref: Int (S) Atten: 30 dB Trig: Free Run µW Path: Standard Gate: Off Center Freq: 2.480000000 GHz Avg|Hold:>10/10 Radio Std: None KEYSIGHT Input: RF Center Frequency Settings Align: Auto 2.480000000 GHz #IF Gain: Low Da Spar 1 Graph Ref LvI Offset 11.00 dB Ref Value 20.00 dBm 3.0000 MHz Scale/Div 10.0 dB CF Step Log 300 000 kHz Auto Man Freq Offset Center 2.480000 GHz #Video BW 100.00 kHz Span 3 MHz #Res BW 30.000 kHz Sweep 3.20 ms (1001 pts) 2 Metrics ۷ Measure Trace Trace 1 Occupied Bandwidth 861.01 kHz Total Power 6.10 dBm 99.00 % -20.00 dB Transmit Freq Error 12.059 kHz % of OBW Power x dB Bandwidth 939.7 kHz x dB **?** Jun 17, 2024 \gtrsim **1**500 N 20dB Bandwidth Test Model pi/4-DQPSK Modulation Channel 0: 2402MHz Spectrum Analyzer 1 Occupied BW Ö + Frequency Input Ζ: 50 Ω Corr CCorr Freq Ref: Int (S) Atten: 30 dB Trig: Free Run µW Path: Standard Gate: Off #IF Gain: Low Center Freq: 2.402000000 GHz Avg|Hold:>10/10 Radio Std: None KEYSIGHT Input: RF Center Frequency Settings Align: Auto 2.402000000 GHz Da Span 1 Graph ۷ Ref LvI Offset 11.00 dB Ref Value 20.00 dBm 3.0000 MHz Scale/Div 10.0 dB CF Step Log 300 000 kHz Auto Man Freq Offset 0 Hz Center 2.402000 GHz #Res BW 30.000 kHz #Video BW 100.00 kHz Span 3 MHz Sweep 3.20 ms (1001 pts) 2 Metrics Measure Trace Trace 1 Occupied Bandwidth 1.1510 MHz Total Power 5.40 dBm Transmit Freq Error 15.732 kHz % of OBW Power 99.00 % -20.00 dB x dB Bandwidth 1.222 MHz x dB 4 5 C 1.07:43 PM \gtrsim

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Test Model Channel 78: 24 Spectrum Analyzer 1 + Coupled BW KEYSIGHT Input: RF Coupling: DC Align: Auto Freq Ref. Int (S) Corr CCorr Freq Ref. Int (S)	30MHz 8DPSK Modulation Frequency V V See Run Center Freq: 2.48000000 GHz ff Avg Hold:>10/10 Radio Std: None 2.48000000 GHz Settings
Channel 78: 24 Spectrum Analyzer 1 Occupied BW KEYSIGHT Input: RF Coupling: DC Corr CCorr Corr CCorr Align: Auto Feq Ref. Int (S) W Path: Standard	BOMHz 8DPSK Modulation See Run Center Freq: 2.480000000 GHz ff Avg[Hold:>10/10 n: Low Radio Std: None
Spectrum Analyzer 1 Occupied BW Imput Z: 50 Ω Atten: 30 dB Trig: f KEYSIGHT Input RF Coupling: DC Corr CCorr Atten: 30 dB Trig: f Imput Z: 50 Ω Coupling: DC Corr CCorr Freq Ref. Int (S) W Path: Standard Gate: #IF G	ee Run Center Freq: 2.480000000 GHz ff AvglHold>10/10 n: Low Radio Std: None 2.480000000 GHz
KEYSIGHT Input: RF Input Z: 50 Ω Atten: 30 dB Trig: Coupling: DC Corr CCorr Freq Ref: Int (S) WW Path: Standard Gate.	See Run Center Freq: 2.480000000 GHz ff Avg[Hold>10/10 n: Low Radio Std: None
	Cran
T Graph T Ref Lvi Offset 11.00 dB	span 3.0000 MHz
Log	CF Step 300.000 kHz
	Man
300	Freq Offset 0 Hz
-50.0	
Center 2.480000 GHz #Video BW 100.00 kHz #Res BW 30.000 kHz	Span 3 MHz Sweep 3.20 ms (1001 pts)
2 Metrics v	
Mea	ure Trace 1
1.1547 MHz Tota	Power 5.12 dBm
Transmit Freq Error16.888 kHz% ofx dB Bandwidth1.203 MHzx dB	DBW Power 99.00 % -20.00 dB

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9.2 CARRIER FREQUENCY SEPARATION

Applicable Standard

According to FCC Part 15.247(a)(1) and 558074 D01 15.247 Meas Guidance V05r02

Conformance Limit

Frequency hopping systems operating in the 2400-2483.5MHz band shall have hoppingchannel carrier frequencies separated by a minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater.

In case of an output power less than 125mW, the frequency hopping system may have channels separated by a minimum of 25kHz ortwo-thirds of the 20dB bandwidth of the hopping channel, whichever is greater.

Test Configuration

Test according to clause 7.1 radio frequency test setup 1

Test Procedure

According to FCC Part15.247(a)(1)

The EUT must have its hopping function enabled. Use the following spectrum analyzersettings: Set the RBW =100kHz. Set VBW =300kHz.

Set the span = wide enough to capture the peaks of two adjacent channels

Set Sweep time = auto couple.

Set Detector = peak. Set Trace mode = max hold.

Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section. Submit this plot.

Test Results

Temperature:	26 °C	Test Date:	June 17, 2024
Humidity:	62 %	Test By:	Lucas Xu

Modulation	Channel	Channel Frequency	Measurement Bandwidth	Limit	Vordict
Mode	Number	(MHz)	(MHz)	(MHz)	Verdici
	0	2402	1.002	>0.63	PASS
GFSK	39	2441	1.002	>0.66	PASS
	78	2480	0.996	>0.63	PASS
	0	2402	0.996	>0.81	PASS
pi/4-DQPSK	39	2441	0.999	>0.83	PASS
	78	2480	0.999	>0.85	PASS
	0	2402	1.002	>0.81	PASS
8DPSK	39	2441	0.999	>0.85	PASS
	78	2480	0.999	>0.80	PASS
Note: Limit = 20dB bandwidth * 2/3, if it is greater than 25kHz and the output power is less than					

125mW (21dBm).

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9.3 NUMBER OF HOPPING FREQUENCIES

Applicable Standard

According to FCC Part 15.247(a)(1) (iii)and 558074 D01 15.247 Meas Guidance V05r02

Conformance Limit

Frequency hopping systems operating in the 2400-2483.5MHz band shall use at least15 channels.

Test Configuration

Test according to clause 7.1 radio frequency test setup 1

Test Procedure

According to FCC Part15.247(a)(1)(iii)
 The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:
 Span = the frequency band of operation
 RBW = 100kHz
 VBW ≥ RBW
 Sweep = auto
 Detector function = peak
 Trace = max hold
 Allow the trace to stabilize. It may prove necessary to break the span up to sections, inorder to clearly show all of the hopping frequencies.

Test Results

Temperature:	26 ℃	Test Date:	June 17, 2024
Humidity:	62 %	Test By:	Lucas Xu

Hopping Channel Frequency	Quantity of Hopping Channel	Quantity of Hopping Channel
Range		limit
2402-2480 (GFSK)	79	>15
Note: Note: Both BR & EDR m	ode has same result .	

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		Number Of Hopping Frequencies						
lest Model	Span:2400-2483.5MHz					GFSK		
Spectrum Analyze Swept SA	er 1 🔹 🕇 🕇						Frequency	() 器
	put: RF oupling: DC lign: Auto	Input Ζ: 50 Ω Corr CCorr Freq Ref: Int (S)	#Atten: 30 dB PNC μW Path: Standard Gate IF G Siα): Fast e: Off ain: Low Frack: Off	Avg Type: Log-I Avg Hold:>100/ Trig: Free Run	Power 100 PNNNNN	Center Frequency 2.441750000 GHz	Settings
1 Spectrum Scale/Div 10 dB	T	Re	f LvI Offset 11.00 dB f Level 20.00 dBm		ΔMkr1	78.824 0 MHz -0.72 dB	Span 83.5000000 MHz Swept Span	
10.0							Full Span	
-10.0	WWWWAANW	WWWWW	UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU	*****	WWWWWW	MMMm122	Start Freq 2.400000000 GHz Stop Freq	
-20.0							2.483500000 GHz	
-40.0							CF Step 300.000 kHz	
-60.0							Auto Man Freq Offset	
-70.0 Start 2.40000 GH #Res BW 100 kH	z	#	ŧVideo BW 300 kHz		Swee	Stop 2.48350 GHz	0 Hz X Axis Scale Log	
170	2	Jun 17, 2024 2:18:10 PM					Signal Track (Span Zoom)	

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