TEST REPORT

Applicant Name:	JEM ACCESSORIES INC.
Address:	32 Brunswick Avenue, Edison, New Jersey, United States,08817
Report Number:	SZ3240321-14674E-RF-00A
FCC ID:	2AHAS-XBS91076

Test Standard (s)

FCC PART 15.247

Sample Description

Product Type:	BLUETOOTH SOUND BAR
Model No.:	XBS9-1076-BLK
Multiple Model(s) No.:	XBS9-1076
Trade Mark:	N/A
Date Received:	2024/03/21
Issue Date:	2024/05/20

Test Result:	Pass▲

▲ In the configuration tested, the EUT complied with the standards above.

Prepared and Checked By:

Jojo Guo
RF Engineer

Approved By:

Nancy Wang
RF Supervisor

Note: The information marked # is provided by the applicant, the laboratory is not responsible for its authenticity and this information can affect the validity of the result in the test report. Customer model name, addresses, names, trademarks etc. are included.

This report may contain data that are not covered by the NVLAP accreditation and are marked with an asterisk "▼".

TABLE OF CONTENTS

DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	SZ3240321-14674E-RF-00A	Original Report	2024/05/20

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	BLUETOOTH SOUND BAR
Tested Model	XBS9-1076-BLK
Multiple Model(s)	XBS9-1076
Frequency Range	Bluetooth: 2402~2480MHz
Transmit Peak Power	4.55 dBm
Modulation Technique	Bluetooth: GFSK, π/4-DQPSK, 8DPSK
Antenna Specification#	-0.58dBi (provided by the applicant)
Voltage Range	DC 5V from adapter
Sample serial number	2IOJ-1 (Assigned by BACL, Shenzhen)
Sample/EUT Status	Good condition
Adapter Information	Model: HT12D-0502000AU Input: AC 100-240V, 50/60Hz, 0.3A, Max Output: DC 5.0V, 2.0A, 10.0W
Note: The multiple models are electrically identical with the test model except for model number. Please refer to the declaration letter# for more detail, which was provided by manufacturer.	

Objective

This test report is in accordance with Part 2-Subpart J, Part 15-Subparts A and C of the Federal Communication Commission rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, section 15.203, 15.207, 15.205, 15.209 and 15.247 rules.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Each test item follows test standards and with no deviation.

Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		±5%
RF output power, conducted		0.72 dB(k=2, 95% level of confidence)
AC Power Lines Conducted Emissions	9kHz-150kHz	3.94dB(k=2, 95% level of confidence)
	150kHz-30MHz	3.84dB(k=2, 95% level of confidence)
Radiated Emissions	9kHz - 30MHz	3.30dB(k=2, 95% level of confidence)
	30MHz~200MHz (Horizontal)	4.48dB(k=2, 95% level of confidence)
	30MHz~200MHz (Vertical)	4.55dB(k=2, 95% level of confidence)
	200MHz~1000MHz (Horizontal)	4.85dB(k=2, 95% level of confidence)
	200MHz~1000MHz (Vertical)	5.05dB(k=2, 95% level of confidence)
	1GHz - 6GHz	5.35dB(k=2, 95% level of confidence)
	6GHz - 18GHz	5.44dB(k=2, 95% level of confidence)
	18GHz - 40GHz	5.16dB(k=2, 95% level of confidence)
Temperature		±1℃
Humidity		±1%
Supply voltages		±0.4%

Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 5F(B-West) , 6F, 7F, the 3rd Phase of Wan Li Industrial Building D, Shihua Rd, FuTian Free Trade Zone, Shenzhen, China.

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 715558, the FCC Designation No. : CN5045.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in a typical mode.

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	40	2442
1	2403	41	2443
2	2404	42	2444
…	…	…	…
…	…	…	…
36	2438	75	2477
37	2439	76	2478
38	2440	77	2479
39	2441	78	2480

EUT was tested with Channel 0, 39 and 78.
During configuring the EUT, the maximum output power mode is EDR (8DPSK) Low Channel

EUT Exercise Software

"BT-tool-v1.1.2"# exercise software was used and the power level is 7#. The software and power level was provided by the applicant.

Special Accessories

No special accessory.

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

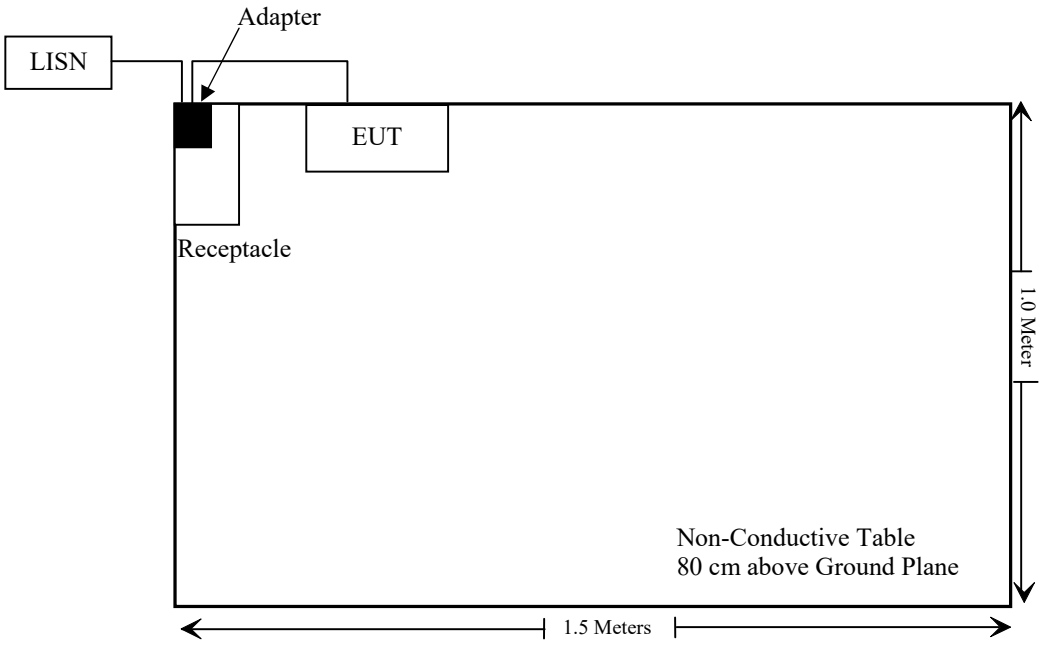
Manufacturer	Description	Model	Serial Number
Bull	Receptacle	Unknown	Unknown

External I/O Cable

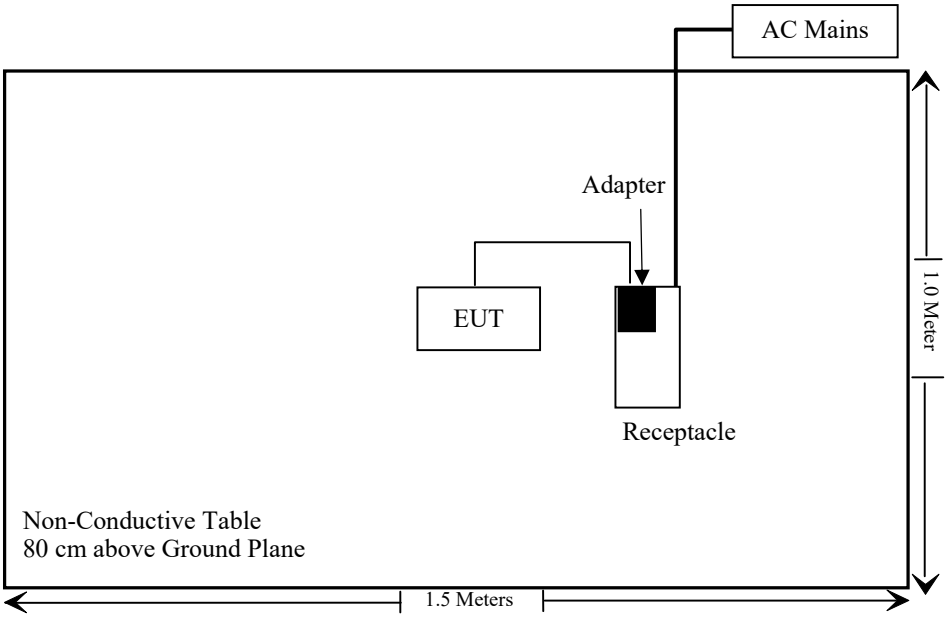
Cable Description	Length (m)	From Port	To
Un-shielding Un-Detachable DC Cable	1.8	EUT	Adapter
Un-shielding Un-Detachable AC Cable	1.8	Receptacle	LISN/AC Mains

Block Diagram of Test Setup

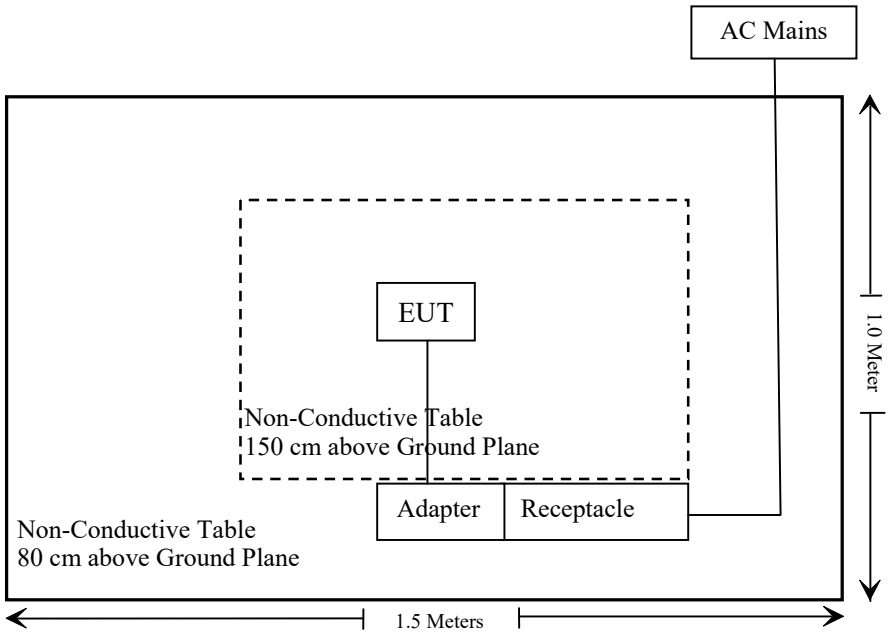
For Conducted Emissions:



For Radiated Emissions below 1GHz:



For Radiated Emissions above 1GHz:



SUMMARY OF TEST RESULTS

Rules	Description of Test	Result
FCC 15.247 (i), §1.1307 (b) (3) & §2.1091	MPE-Based Exemption	Compliant
FCC §15.203	Antenna Requirement	Compliant
FCC §15.207(a)	AC Line Conducted Emissions	Compliant
FCC §15.205, §15.209, §15.247(d)	Radiated Emissions	Compliant
FCC §15.247(a)(1)	20 dB Emission Bandwidth & 99% Occupied Bandwidth	Compliant
FCC §15.247(a)(1)	Channel Separation Test	Compliant
FCC §15.247(a)(1)(iii)	Time of Occupancy (Dwell Time)	Compliant
FCC §15.247(a)(1)(iii)	Quantity of hopping channel Test	Compliant
FCC §15.247(b)(1)	Peak Output Power Measurement	Compliant
FCC §15.247(d)	Band edges	Compliant

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2024/01/16	2025/01/15
Rohde & Schwarz	LISN	ENV216	101613	2024/01/16	2025/01/15
Rohde & Schwarz	Transient Limiter	ESH3Z2	DE25985	2023/08/03	2024/08/02
Unknown	CE Cable	CE Cable	UF A210B-1-0720-504504	2023/08/03	2024/08/02
Audix	EMI Test software	E3	191218(V9)	NCR	NCR
Radiated Emission Test					
R&S	EMI Test Receiver	ESR3	102455	2024/01/16	2025/01/15
Sonoma instrument	Pre-amplifier	310 N	186238	2023/06/08	2024/06/07
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2023/07/20	2026/07/19
BACL	Active Loop Antenna	1313-1A	4031911	2024/03/21	2025/03/20
Unknown	Cable	Chamber Cable 1	F-03-EM236	2023/08/03	2024/08/02
Unknown	Cable	Chamber Cable 4	EC-007	2023/08/03	2024/08/02
Audix	EMI Test software	E3	19821b(V9)	NCR	NCR
Rohde & Schwarz	Spectrum Analyzer	FSV40	101605	2024/03/27	2025/03/26
COM-POWER	Pre-amplifier	PA-122	181919	2023/06/29	2024/06/28
Schwarzbeck	Horn Antenna	BBHA9120D(1201)	1143	2023/07/26	2026/07/25
Unknown	RF Cable	KMSE	0735	2023/10/08	2024/10/07
Unknown	RF Cable	UFA147	219661	2023/10/08	2024/10/07
Unknown	RF Cable	XH750A-N	J-10M	2023/10/08	2024/10/07
SNSD	2.4G Band Reject filter	BSF2402-2480MN-0898-001	2.4G filter	2023/08/03	2024/08/02
Audix	EMI Test software	E3	191218(V9)	NCR	NCR
A.H.System	Pre-amplifier	PAM-1840VH	190	2023/08/02	2024/08/01
Electro-Mechanics Co	Horn Antenna	3116	9510-2270	2023/09/18	2026/09/17
RF Conducted Test					
Rohde & Schwarz	Spectrum Analyzer	FSU26	200982	2023/12/18	2024/12/17
MARCONI	10dB Attenuator	6534/3	2942	2023/07/04	2024/07/03
Unknown	RF Cable	65475	01670515	2023/07/04	2024/07/03

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC §15.247 (i) & §1.1307 (b) (3) & §2.1091- MPE-BASED EXEMPTION

Applicable Standard

According to subpart 15.247 (i) and subpart 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

According to KDB 447498 D04 Interim General RF Exposure Guidance

MPE-Based Exemption:

An alternative to the SAR-based exemption is provided in § 1.1307(b)(3)(i)(C), for a much wider frequency range, from 300 kHz to 100 GHz, applicable for separation distances greater or equal to $\lambda/2\pi$, where λ is the free-space operating wavelength in meters. The MPE-based test exemption condition is in terms of ERP, defined as the product of the maximum antenna gain and the delivered maximum time-averaged power. For this case, a RF source is an RF exempt device if its ERP (watts) is no more than a frequency-dependent value, as detailed tabular form in Appendix B. These limits have been derived based on the basic specifications on Maximum Permissible Exposure (MPE) considered for the FCC rules in § 1.1310(e)(1).

Table 1 to § 1.1307(b)(3)(i)(C) - Single RF Sources Subject to Routine Environmental Evaluation

RF Source frequency (MHz)	Threshold ERP (watts)
0.3-1.34	1,920 R^2.
1.34-30	3,450 R^2/f^2.
30-300	3.83 R^2.
300-1,500	0.0128 R^2f.
1,500-100,000	19.2R^2.

R = minimum separation distance from the body of a nearby person (appropriate units, e.g., m);
f = frequency in MHz

For multiple RF sources: Multiple RF sources are exempt if:

in the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation:

$$\sum_{i=1}^{a}\frac{P_i}{P_{th,i}}+\sum_{j=1}^{b}\frac{ERP_j}{ERP_{th,j}}+\sum_{k=1}^{c}\frac{Evaluated_k}{Exposure\ Limit_k}\leq 1$$

Result

Mode	Frequency (MHz)	Tune up conducted power# (dBm)	Antenna Gain#		ERP		Evaluation Distance (m)	ERP Limit (nW)
			(dBi)	(dBd)	(dBm)	(nW)		
Bluetooth	2402-2480	5	-0.58	-2.73	2.27	1.69	0.2	768
BLE	2402-2480	0.5	-0.58	-2.73	-2.23	0.60	0.2	768

Note: The tune up conducted power and antenna gain was declared by the applicant.

To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 20cm from nearby persons.

Result: Compliant

FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

According to FCC § 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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. 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.

Antenna Connector Construction

The EUT has an internal antenna arrangement, which was permanently attached, the antenna gain[#] is -0.58dBi, fulfill the requirement of this section. Please refer to the EUT photos.

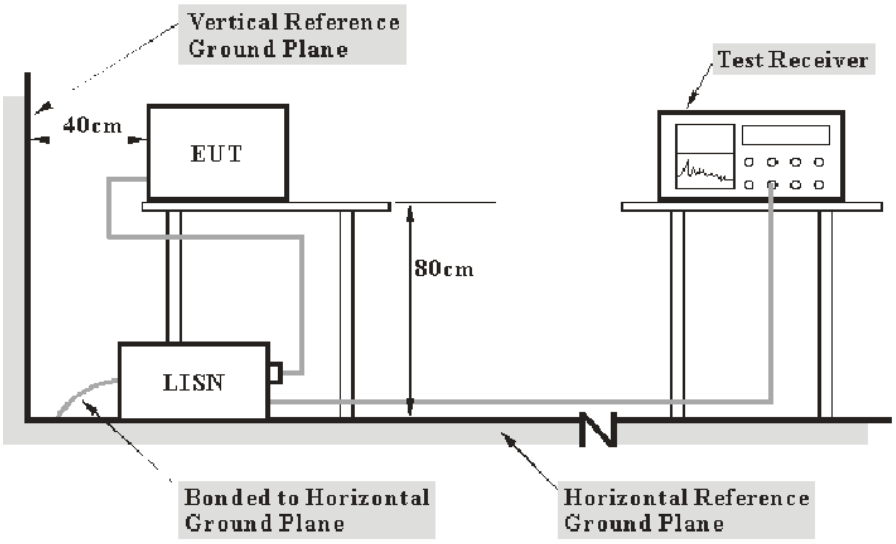
Result: Compliant

FCC §15.207 (a) - AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC §15.207(a)

EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The measurement procedure of EUT setup is according with ANSI C63.10-2013. The related limit was specified in FCC Part 15.207.

The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All final data was recorded in the Quasi-peak and average detection mode.

Factor & Over Limit Calculation

The factor is calculated by adding LISN VDF (Voltage Division Factor) and Cable Loss. The basic equation is as follows:

Factor = LISN VDF + Cable Loss

The "**Over limit**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, an Over limit of -7 dB means the emission is 7 dB below the limit. The equation for calculation is as follows:

Over Limit = Level – Limit
Level = Read Level + Factor

Note: The term "cable loss" refers to the combination of a cable and a 10dB transient limiter (attenuator).

Test Data

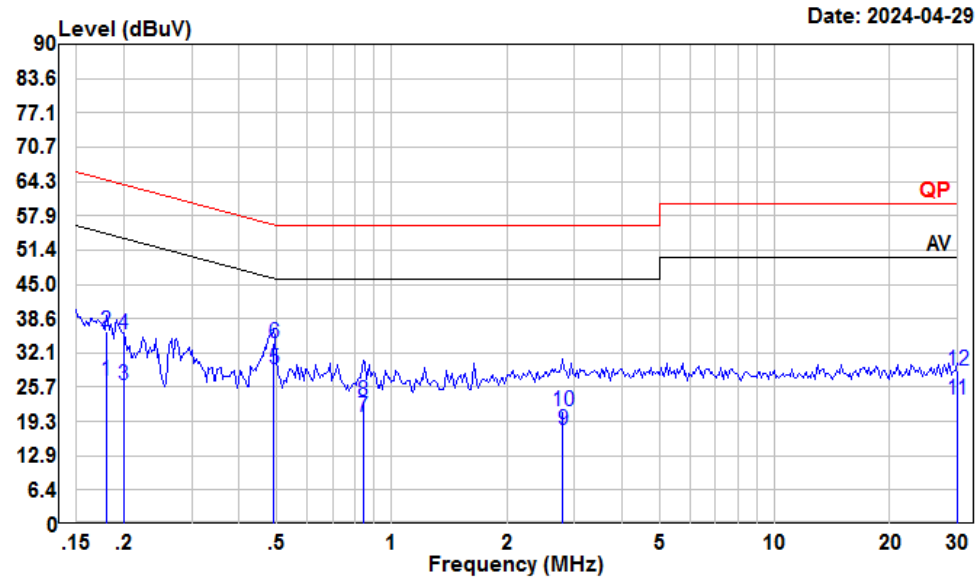
Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	55 %
ATM Pressure:	101 kPa

The testing was performed by Macy Shi on 2024-04-29.

EUT operation mode: Transmitting (Maximum output power mode, EDR (8DPSK) Low Channel)

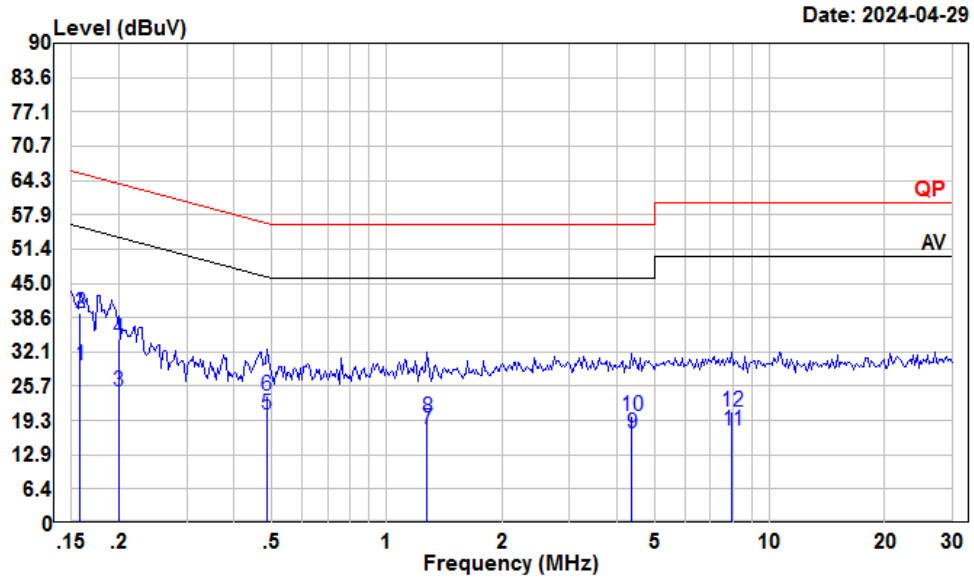
AC 120V/60 Hz, Line



Condition: Line
Project : SZ3240321-14674E-RF
Tester : Macy shi
Note : BT

	Freq	Read Level	LISN Level	Factor	Cable Loss	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dB	dBuV	dB	
1	0.18	5.91	26.88	10.84	10.13	54.50	-27.62	Average
2	0.18	15.15	36.12	10.84	10.13	64.50	-28.38	QP
3	0.20	5.19	26.08	10.80	10.09	53.62	-27.54	Average
4	0.20	14.69	35.58	10.80	10.09	63.62	-28.04	QP
5	0.49	8.47	29.14	10.51	10.16	46.14	-17.00	Average
6	0.49	13.43	34.10	10.51	10.16	56.14	-22.04	QP
7	0.84	-0.59	20.03	10.45	10.17	46.00	-25.97	Average
8	0.84	2.60	23.22	10.45	10.17	56.00	-32.78	QP
9	2.79	-3.15	17.56	10.46	10.25	46.00	-28.44	Average
10	2.79	0.61	21.32	10.46	10.25	56.00	-34.68	QP
11	30.00	2.76	23.52	10.50	10.26	50.00	-26.48	Average
12	30.00	8.07	28.83	10.50	10.26	60.00	-31.17	QP

AC 120V/60 Hz, Neutral



Condition: Neutral
Project : SZ3240321-14674E-RF
Tester : Macy shi
Note : BT

	Freq	Read Level	LISN Level	Factor	Cable Loss	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dB	dBuV	dB	
1	0.16	8.86	29.57	10.56	10.15	55.56	-25.99	Average
2	0.16	18.75	39.46	10.56	10.15	65.56	-26.10	QP
3	0.20	4.16	24.65	10.40	10.09	53.62	-28.97	Average
4	0.20	14.09	34.58	10.40	10.09	63.62	-29.04	QP
5	0.49	-0.52	20.33	10.69	10.16	46.23	-25.90	Average
6	0.49	3.13	23.98	10.69	10.16	56.23	-32.25	QP
7	1.28	-3.12	17.65	10.72	10.05	46.00	-28.35	Average
8	1.28	-0.92	19.85	10.72	10.05	56.00	-36.15	QP
9	4.36	-3.70	17.00	10.45	10.25	46.00	-29.00	Average
10	4.36	-0.47	20.23	10.45	10.25	56.00	-35.77	QP
11	7.98	-3.63	17.34	10.74	10.23	50.00	-32.66	Average
12	7.98	-0.08	20.89	10.74	10.23	60.00	-39.11	QP

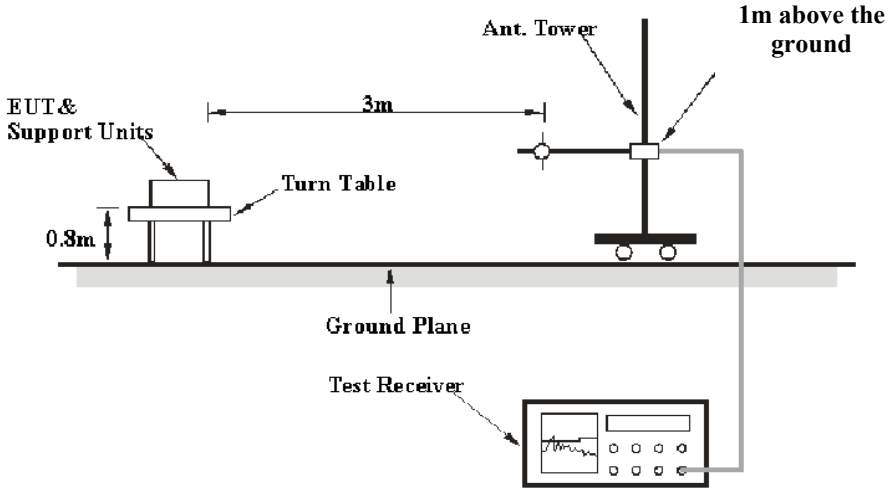
FCC §15.205, §15.209 & §15.247(d) - RADIATED EMISSIONS

Applicable Standard

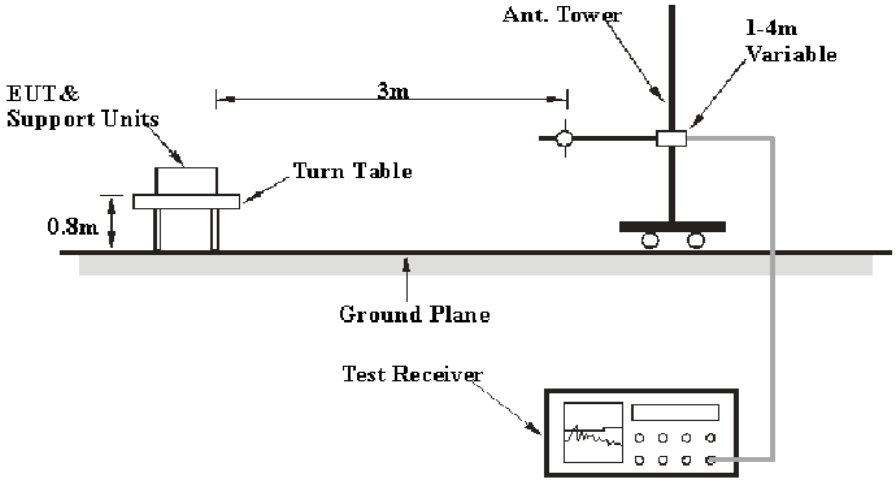
FCC §15.205; §15.209; §15.247(d)

EUT Setup

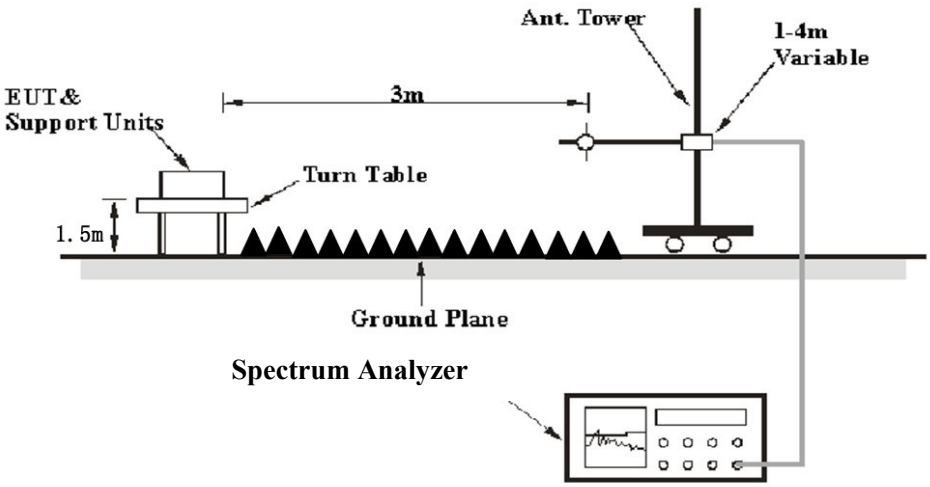
9 kHz-30MHz:



30MHz-1GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209 and FCC 15.247 limits.

EMI Test Receiver & Spectrum Analyzer Setup

The EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Measurement
9 kHz – 150 kHz	/	/	200 Hz	QP
	300 Hz	1 kHz	/	PK
150 kHz – 30 MHz	/	/	9 kHz	QP
	10 kHz	30 kHz	/	PK
30 MHz – 1000 MHz	/	/	120 kHz	QP
	100 kHz	300 kHz	/	PK
Above 1 GHz	Harmonics & Band Edge			
	1MHz	3 MHz	/	PK
	Average Emission Level=Peak Emission Level+20*log(Duty cycle)			
	Other Emissions			
	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	Average

For Duty cycle measurement:

Use the duty cycle factor correction factor method per 15.35(c).
Duty cycle=On time/100milliseconds, On time=N1*L1+N2*L2+…Nn-1*Ln-1+Nn*Ln,
Where N1 is number of type 1 pulses, L1 is length of type 1 pulse, etc.

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All final data was recorded in Quasi-peak detection mode except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz, average detection modes for frequency bands 9–90 kHz and 110–490 kHz, peak and average detection modes for frequencies above 1 GHz.

For 9 kHz-30MHz, the report shall list the six emissions with the smallest margin relative to the limit, for each of the three antenna orientations (parallel, perpendicular, and ground-parallel) unless the margin is greater than 20 dB.

If the maximized peak measured value complies with under the QP/Average limit more than 6dB, then it is unnecessary to perform an QP/Average measurement.

All emissions under the average limit and under the noise floor have not recorded in the report.

Factor & Over Limit/Margin Calculation

The Factor is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain. The basic equation is as follows:

Factor = Antenna Factor + Cable Loss - Amplifier Gain

The "**Over Limit/Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, an Over Limit/margin of -7dB means the emission is 7dB below the limit. The equation for calculation is as follows:

Over Limit/Margin = Level/Corrected Amplitude – Limit
Level / Corrected Amplitude = Read Level + Factor

Test Data

Environmental Conditions

Temperature:	22~25.6 ℃
Relative Humidity:	50~54 %
ATM Pressure:	101 kPa

The testing was performed by Warren Huang on 2024-04-29 for below 1GHz and Dylan Yang from 2024-04-29 to 2024-04-30 for above 1GHz.

Test mode: Transmitting

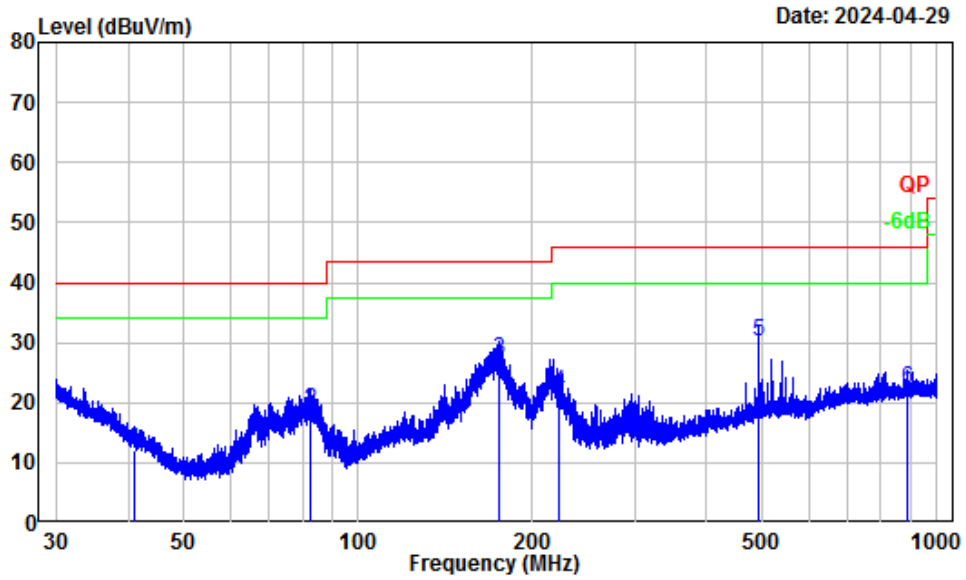
Note: After pre-scan in the X, Y and Z axes of orientation, the worst case Z-axis of orientation were recorded.

9 kHz-30MHz: *(Maximum output power mode, EDR (8DPSK) Low channel)*

For the radiated spurious emission below 30MHz, the emissions are 20dB below the limit or the noise floor which are not recorded.

30MHz-1GHz: *(Maximum output power mode, EDR (8DPSK) Low channel)*

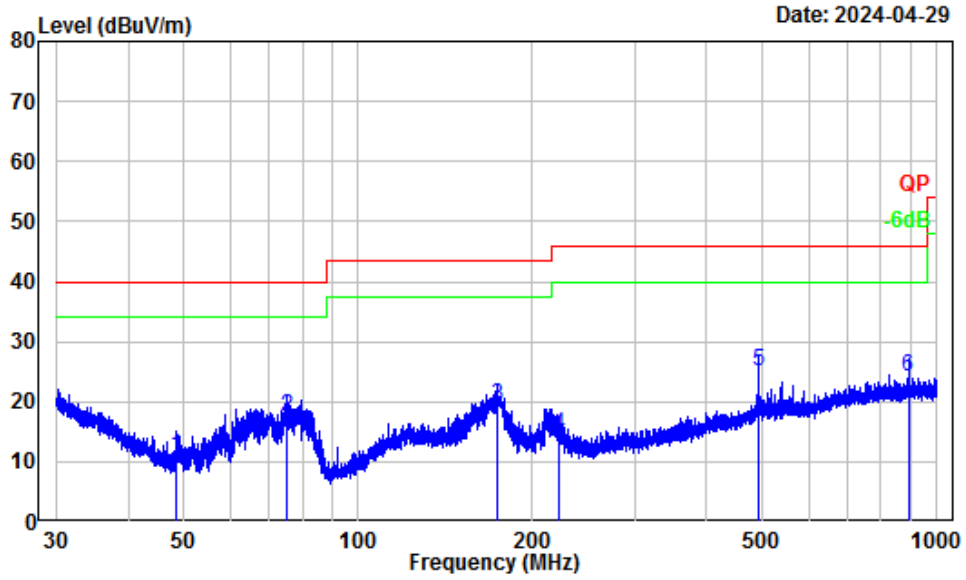
Horizontal



Site : Chamber A
Condition : 3m Horizontal
Project Number: SZ3240321-14674E-RF
Note : BT
Tester : Warren Huang

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	40.93	-12.12	24.13	12.01	40.00	-27.99	QP
2	82.90	-18.20	37.00	18.80	40.00	-21.20	QP
3	174.58	-14.51	41.67	27.16	43.50	-16.34	QP
4	221.98	-13.94	35.57	21.63	46.00	-24.37	QP
5	491.61	-8.49	38.56	30.07	46.00	-15.93	QP
6	889.17	-4.52	26.89	22.37	46.00	-23.63	QP

Vertical



Site : Chamber A
Condition : 3m Vertical
Project Number: SZ3240321-14674E-RF
Note : BT
Tester : Warren Huang

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	48.40	-17.76	28.69	10.93	40.00	-29.07	QP
2	75.08	-18.69	36.32	17.63	40.00	-22.37	QP
3	173.59	-14.80	34.20	19.40	43.50	-24.10	QP
4	222.36	-14.79	29.36	14.57	46.00	-31.43	QP
5	491.61	-8.74	33.67	24.93	46.00	-21.07	QP
6	892.29	-4.88	29.13	24.25	46.00	-21.75	QP

Above 1GHz:

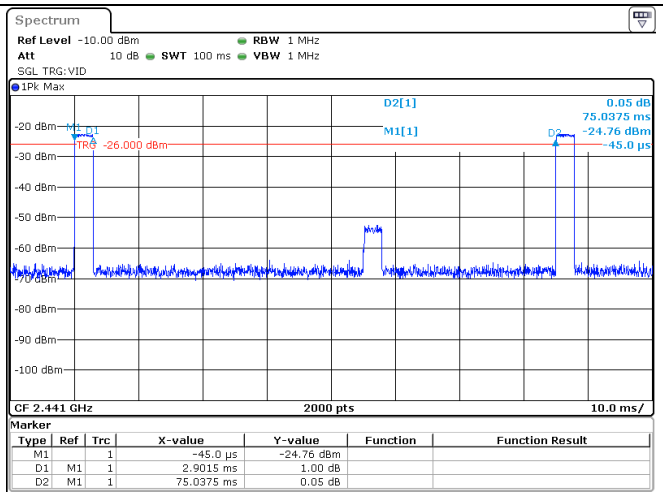
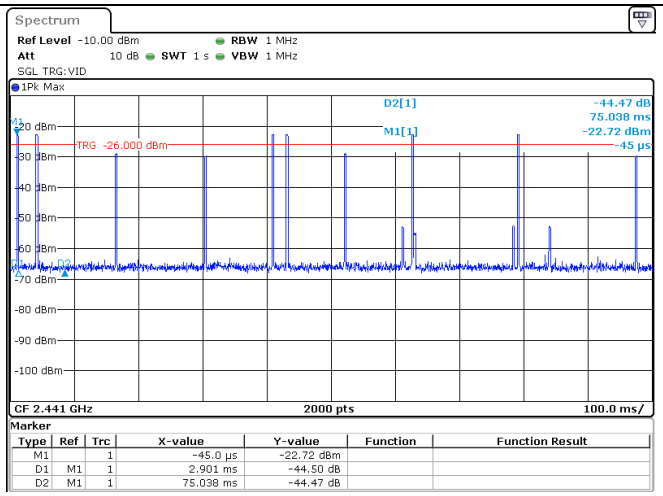
Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/AV					
8DPSK							
Low Channel 2402MHz							
2386.47	54.59	PK	H	-3.17	51.42	74	-22.58
2376.05	54.09	PK	V	-3.17	50.92	74	-23.08
4804.00	59.19	PK	H	1.69	60.88	74	-13.12
4804.00	55.74	PK	V	1.69	57.43	74	-16.57
Middle Channel 2441MHz							
4882.00	57.62	PK	H	1.79	59.41	74	-14.59
4882.00	44.48	PK	V	1.79	46.27	74	-27.73
High Channel 2480MHz							
2484.17	60.03	PK	H	-3.17	56.86	74	-17.14
2483.85	56.32	PK	V	-3.17	53.15	74	-20.85
4960.00	54.54	PK	H	2.77	57.31	74	-16.69
4960.00	55.95	PK	V	2.77	58.72	74	-15.28

Note:
Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor
Corrected Amplitude/Level = Factor + Reading
Margin = Corrected Amplitude/Level - Limit
The other spurious emission which is in the noise floor level was not recorded.

Field Strength of Average							
Frequency (MHz)	**Peak Measurement @3m (dBµV/m)**	**Polar (H/V)**	**Duty Cycle Corrected Factor (dB)**	**Average Level (dBµV/m)**	**Limit (dBµV/m)**	**Margin (dB)**	**Comment**
Low Channel 2402MHz							
2386.47	51.42	H	-24.73	26.69	54	-27.31	Bandedge
2376.05	50.92	V	-24.73	26.19	54	-27.81	Bandedge
4804.00	60.88	H	-24.73	36.15	54	-17.85	Harmonic
4804.00	57.43	V	-24.73	32.70	54	-21.30	Harmonic
Middle Channel 2441MHz							
4882.00	59.41	H	-24.73	34.68	54	-19.32	Harmonic
4882.00	46.27	V	-24.73	21.54	54	-32.46	Harmonic
High Channel 2480MHz							
2484.17	56.86	H	-24.73	32.13	54	-21.87	Bandedge
2483.85	53.15	V	-24.73	28.42	54	-25.58	Bandedge
4960.00	57.31	H	-24.73	32.58	54	-21.42	Harmonic
4960.00	58.72	V	-24.73	33.99	54	-20.01	Harmonic

Note: Average level= Peak level+ Duty Cycle Corrected Factor
Margin = Average level - Limit

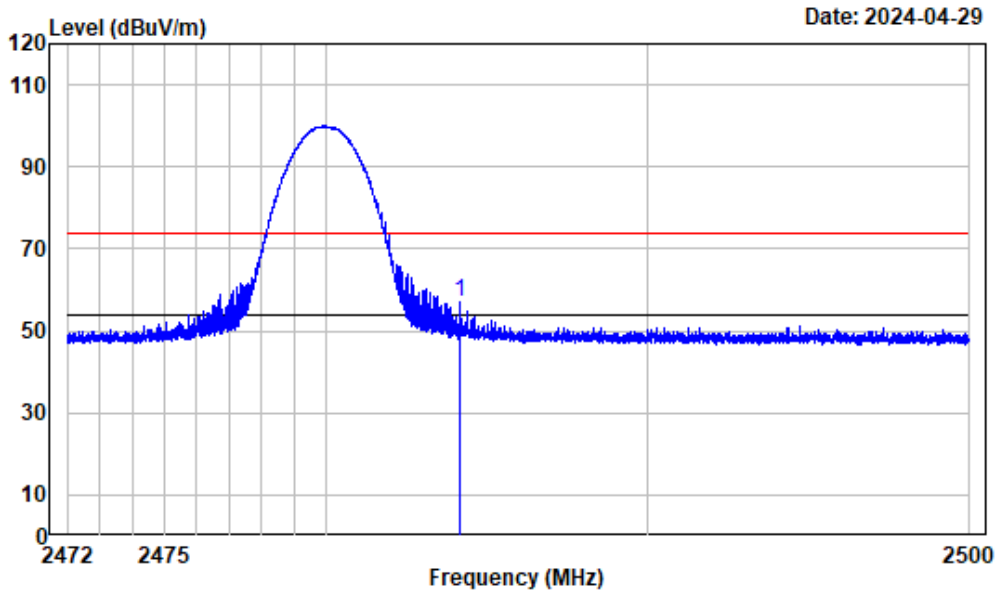
Worst case duty cycle:
Duty cycle = Ton/100ms = 2.9015*2/100=0.058
Duty Cycle Corrected Factor = 20lg (Duty cycle) = 20lg0.058 = -24.73

Duty Cycle (100ms)	
Duty Cycle (1s)	

Test plots for example as below:

Band Edge Measurements (Radiated):

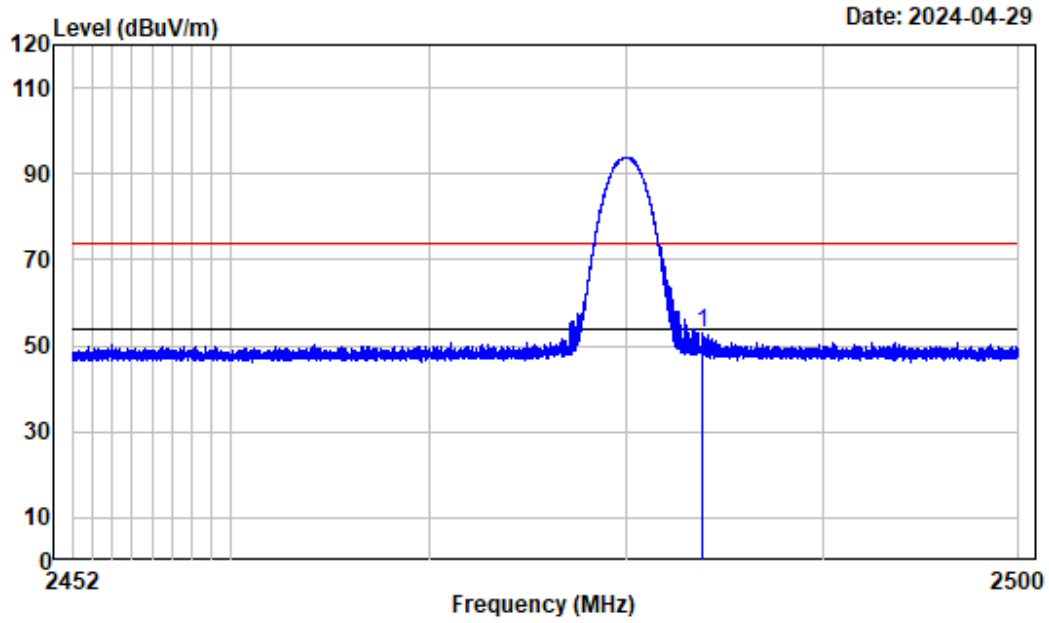
8DPSK			
Test Channel:	**2480MHz**	**Ant. Polar. :**	**Horizontal**



Condition : Horizontal
Project No.: SZ3240321-14674E-RF
Tester : Dylan
Note : BT_3DH5_2480

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2484.166	-3.17	60.03	56.86	74.00	-17.14	peak

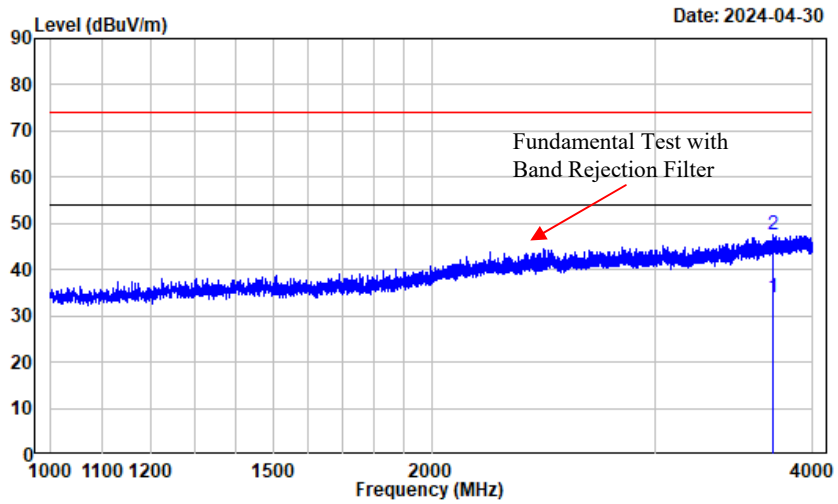
8DPSK			
Test Channel:	**2480MHz**	**Ant. Polar. :**	**Vertical**



Condition : Vertical
Project No.: SZ3240321-14674E-RF
Tester : Dylan
Note : BT_3DH5_2480

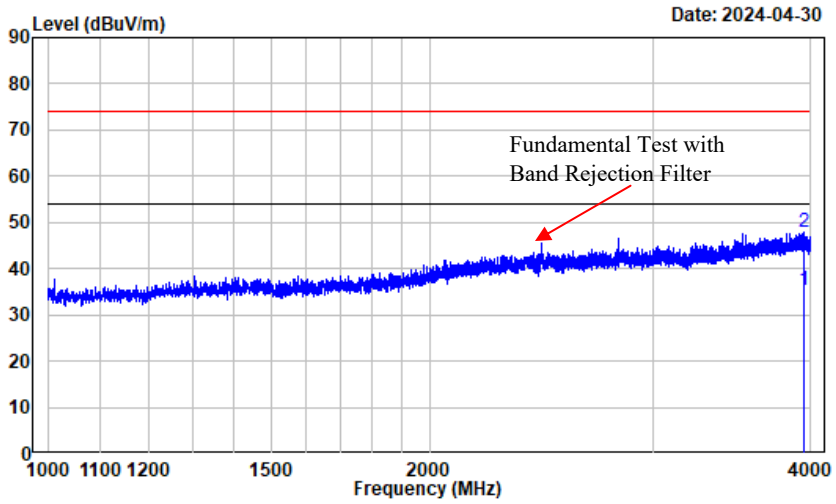
	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2483.848	-3.17	56.32	53.15	74.00	-20.85	peak

Harmonic Measurements:

Horizontal	
1-4GHz	 Condition : Horizontal Project No.: SZ3240321-14674E-RF Tester : Dylan Note : BT_3DH5_2480 Freq Factor Read Level Limit Line Over Limit Remark MHz dB/m dBuV dBuV/m dBuV/m dB 1 3721.375 -1.04 34.92 33.88 54.00 -20.12 average 2 3721.375 -1.04 48.42 47.38 74.00 -26.62 peak

Vertical

1-4GHz

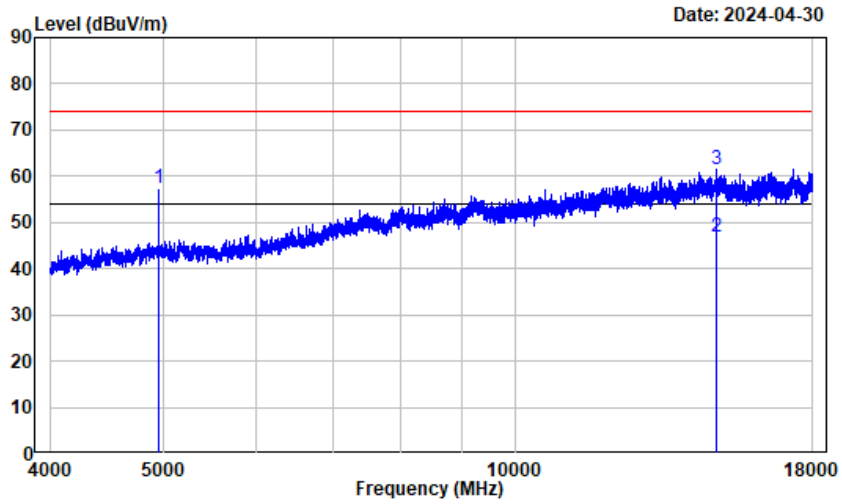


Condition : Vertical
Project No.: SZ3240321-14674E-RF
Tester : Dylan
Note : BT_3DH5_2480

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	3949.000	-0.18	35.42	35.24	54.00	-18.76	average
2	3949.000	-0.18	47.95	47.77	74.00	-26.23	peak

Horizontal

4-18GHz

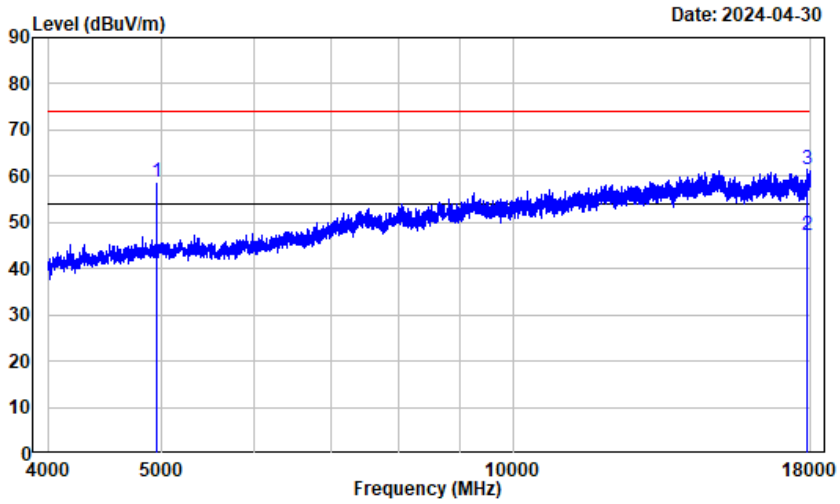


Condition : Horizontal
Project No.: SZ3240321-14674E-RF
Tester : Dylan
Note : BT_3DH5_2480

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	4960.000	2.77	54.54	57.31	74.00	-16.69	Peak
2	14878.000	16.65	30.12	46.77	54.00	-7.23	average
3	14878.000	16.65	44.79	61.44	74.00	-12.56	peak

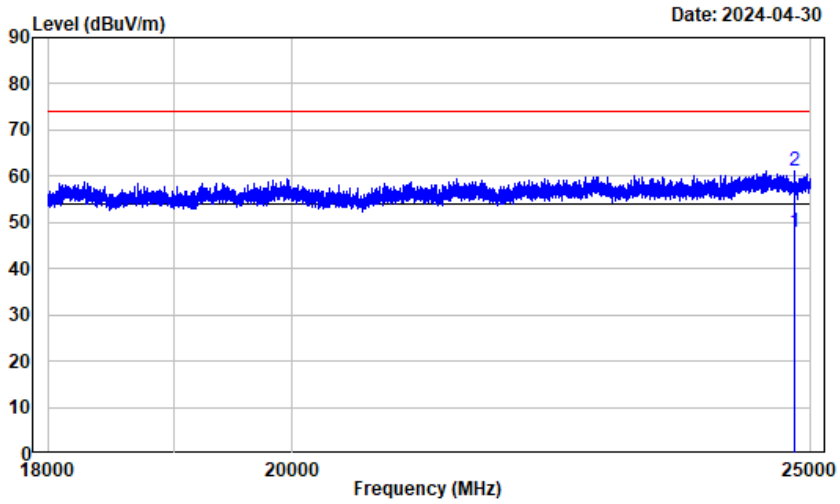
Vertical

4-18GHz



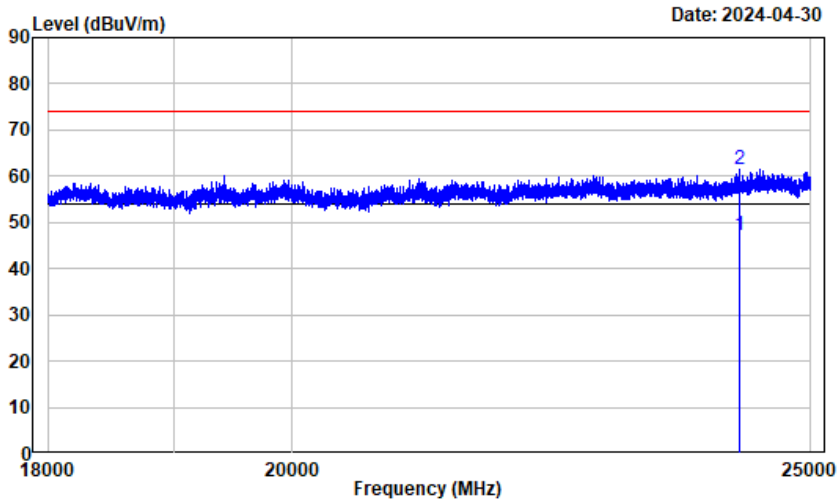
Condition : Vertical
Project No.: SZ3240321-14674E-RF
Tester : Dylan
Note : BT_3DH5_2480

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	4960.000	2.77	55.95	58.72	74.00	-15.28	Peak
2	17879.250	23.57	23.70	47.27	54.00	-6.73	average
3	17879.250	23.57	37.85	61.42	74.00	-12.58	peak

Horizontal	
18-25GHz	 Condition : Horizontal Project No.: SZ3240321-14674E-RF Tester : Dylan Note : BT_3DH5_2480 Freq / Factor / Read Level / Level / Limit Line / Over Limit / Remark MHz / dB/m / dBuV / dBuV/m / dBuV/m / dB 1 24826.750 18.59 29.35 47.94 54.00 -6.06 Average 2 24826.750 18.59 42.70 61.29 74.00 -12.71 peak

Vertical

18-25GHz



Condition : Vertical
Project No.: SZ3240321-14674E-RF
Tester : Dylan
Note : BT_3DH5_2480

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	24241.380	18.38	28.79	47.17	54.00	-6.83	Average
2	24241.380	18.38	43.10	61.48	74.00	-12.52	peak

FCC §15.247(a) (1) - CHANNEL SEPARATION TEST

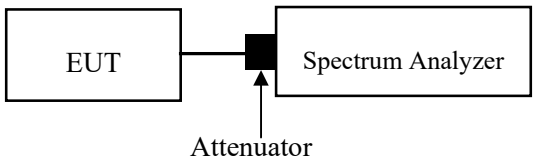
Applicable Standard

Frequency hopping systems shall have hoping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater provided the systems operate with an output power no greater than 125 mW. 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.

Test Procedure

Test Method: ANSI C63.10-2013 Clause 7.8.2

1. Set the EUT in transmitting mode, maxhold the channel.
2. Set the adjacent channel of the EUT and maxhold another trace.
3. Measure the channel separation.



Test Data

Environmental Conditions

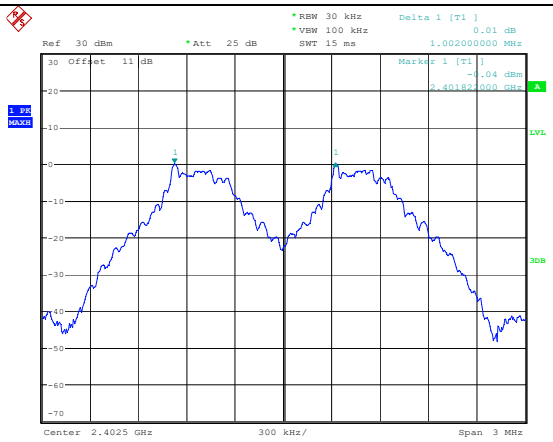
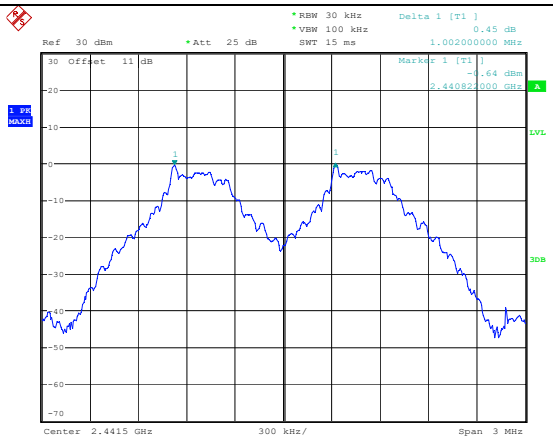
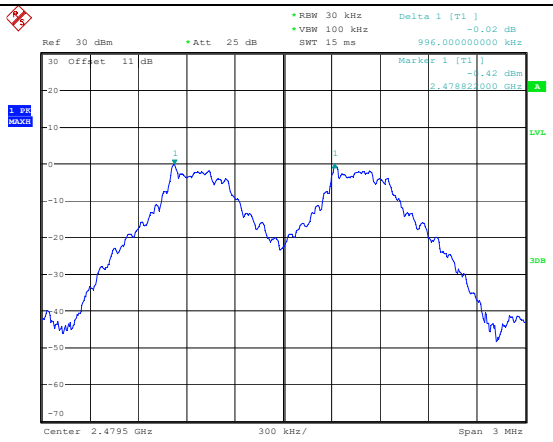
Temperature:	25.4 ℃
Relative Humidity:	53 %
ATM Pressure:	101 kPa

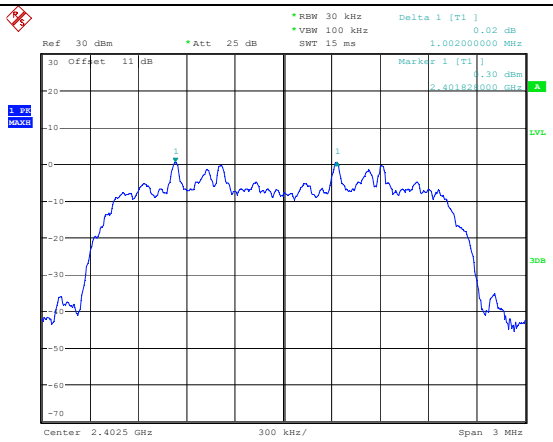
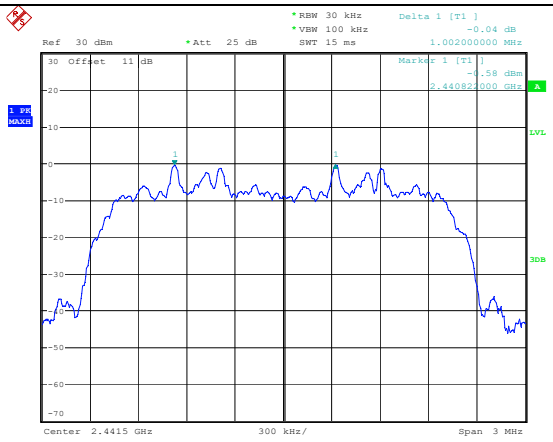
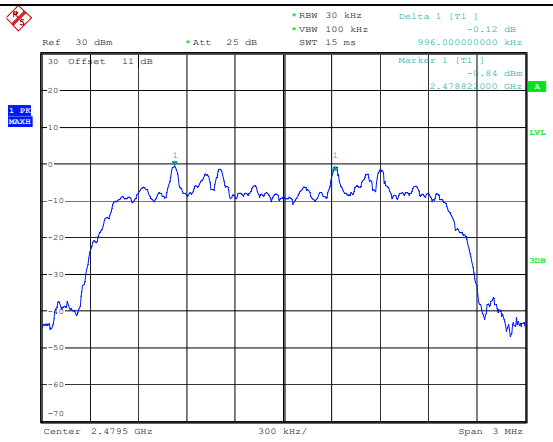
The testing was performed by Bamboo Zhan on 2024-05-01.

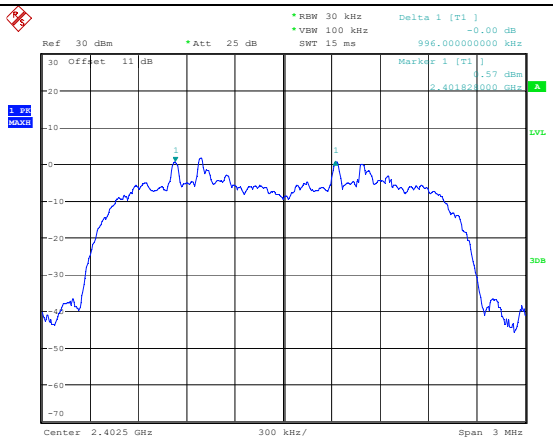
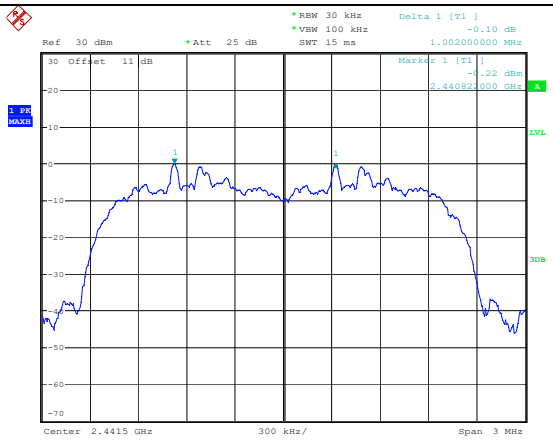
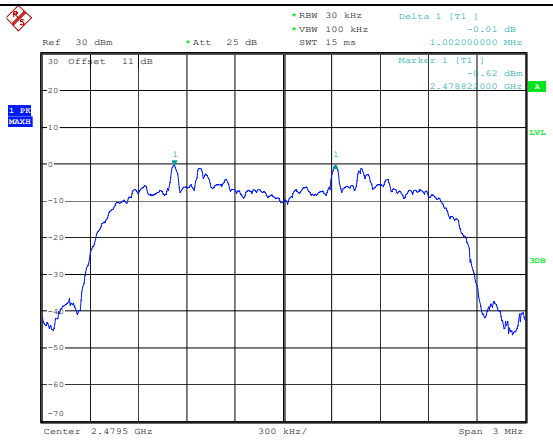
EUT operation mode: Transmitting

Test Result: Compliant.

Test Modes	Test Frequency (MHz)	Channel Separation (MHz)	Limits (MHz)
BDR Mode (GFSK)	2402	1.002	0.624
	2441	1.002	0.624
	2480	0.996	0.624
EDR Mode (π/4-DQPSK)	2402	1.002	0.878
	2441	1.002	0.878
	2480	0.996	0.862
EDR Mode (8DPSK)	2402	0.996	0.864
	2441	1.002	0.867
	2480	1.002	0.867

BDR Mode (GFSK)	
Low Channel	
Middle Channel	
High Channel	

EDR Mode (π/4-DQPSK)	
Low Channel	 ProjectNo.:SZ3240321-14674E-RF Tester:Bamboo Zhan Date: 1.MAY.2024 18:53:59
Middle Channel	 ProjectNo.:SZ3240321-14674E-RF Tester:Bamboo Zhan Date: 1.MAY.2024 18:54:59
High Channel	 ProjectNo.:SZ3240321-14674E-RF Tester:Bamboo Zhan Date: 1.MAY.2024 18:55:53

EDR Mode (8DPSK)	
Low Channel	 ProjectNo.:SZ3240321-14674E-RF Tester:Bamboo Zhan Date: 1.MAY.2024 18:56:51
Middle Channel	 ProjectNo.:SZ3240321-14674E-RF Tester:Bamboo Zhan Date: 1.MAY.2024 18:57:47
High Channel	 ProjectNo.:SZ3240321-14674E-RF Tester:Bamboo Zhan Date: 1.MAY.2024 18:58:48

FCC §15.247(a) (1) - 20 dB EMISSION BANDWIDTH

Applicable Standard

Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

Test Procedure

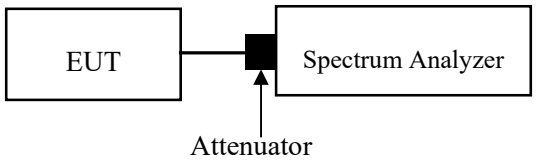
Test Method: ANSI C63.10-2013 Clause 7.8.7 & Clause 6.9.2

The following conditions shall be observed for measuring the occupied bandwidth and 20 dB bandwidth:
• The transmitter shall be operated at its maximum carrier power measured under normal test conditions.

• The span of the spectrum analyzer shall be set large enough to capture all products of the modulation process, including the emission skirts, around the carrier frequency, but small enough to avoid having other emissions (e.g. on adjacent channels) within the span.

• The detector of the spectrum analyzer shall be set to “Sample”. However, a peak, or peak hold, may be used in place of the sampling detector since this usually produces a wider bandwidth than the actual bandwidth (worst-case measurement). Use of a peak hold (or “Max Hold”) may be necessary to determine the occupied / 20 dB bandwidth if the device is not transmitting continuously.

• The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW/ 20dB bandwidth and video bandwidth (VBW) shall be approximately three times RBW, unless otherwise specified by the applicable requirement.



Test Data

Environmental Conditions

Temperature:	25.4 ℃
Relative Humidity:	53 %
ATM Pressure:	101 kPa

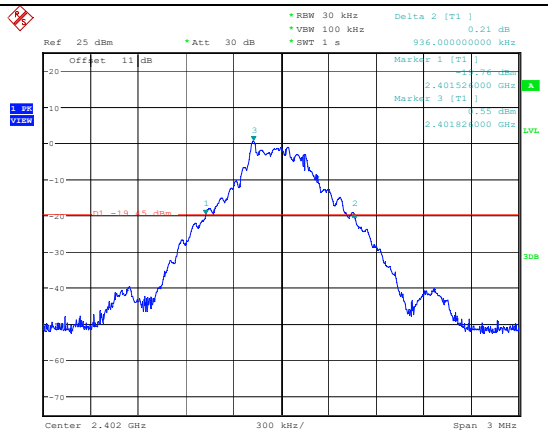
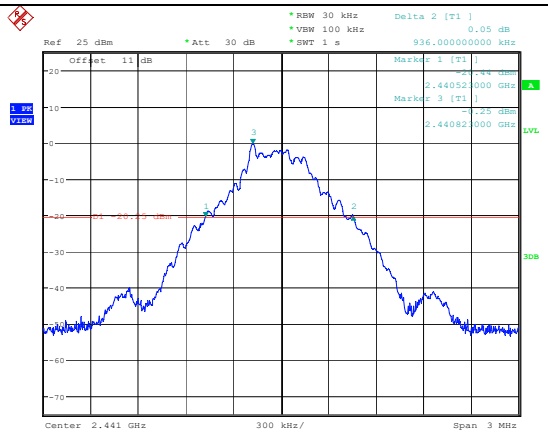
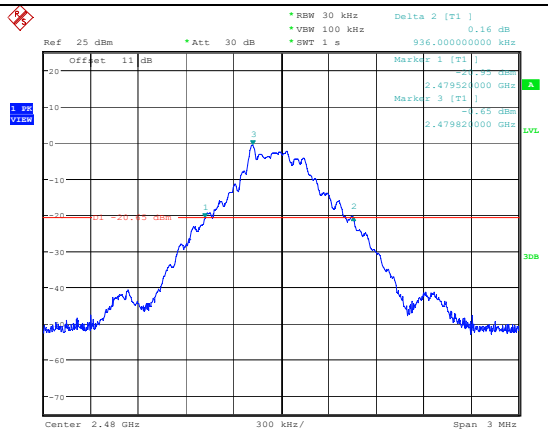
The testing was performed by Bamboo Zhan on 2024-05-01.

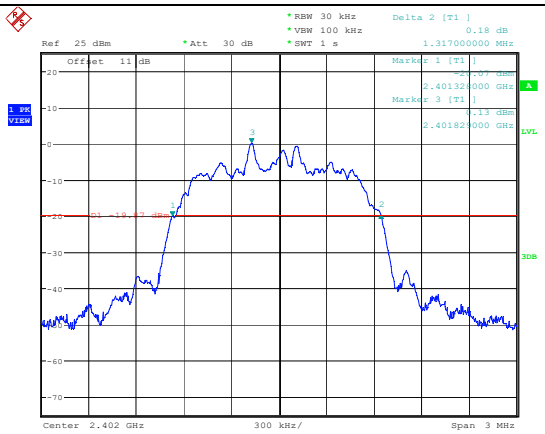
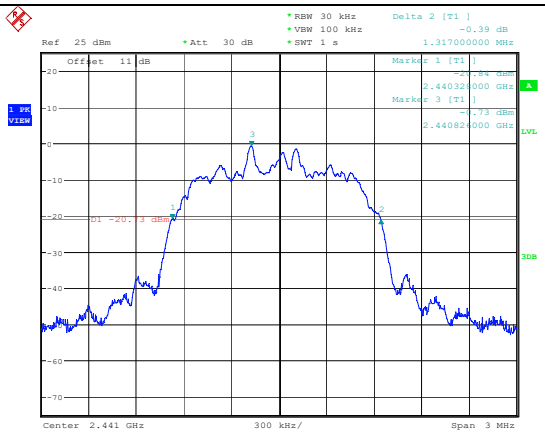
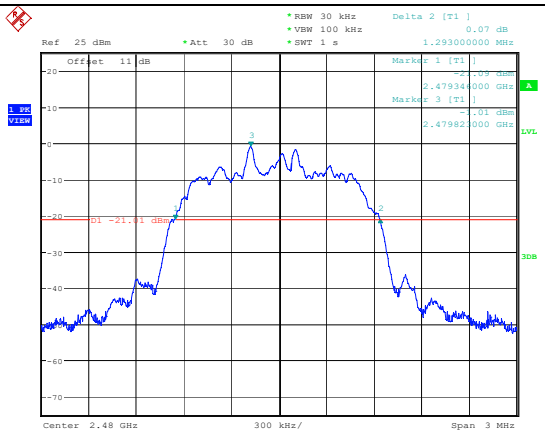
EUT operation mode: Transmitting

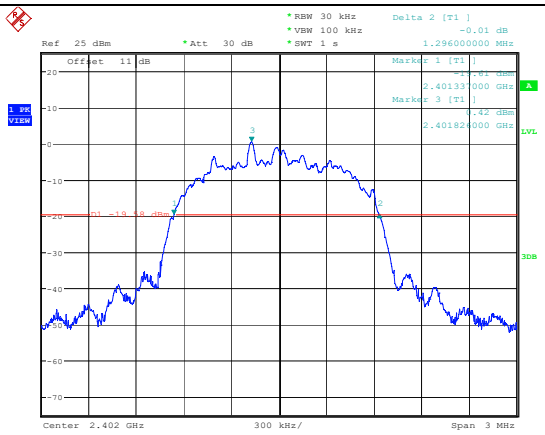
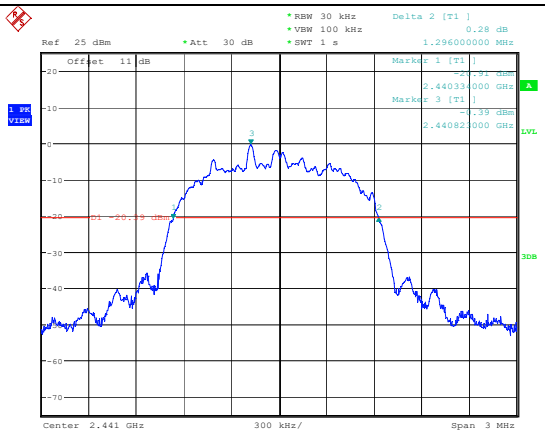
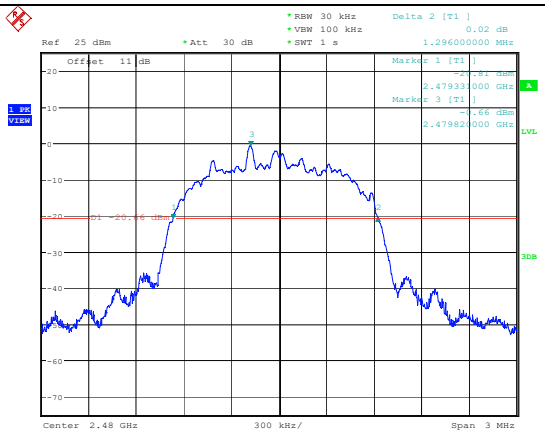
Test Result: Compliant.

Test Modes	Test Channel	Test Frequency (MHz)	20 dB Bandwidth (MHz)
BDR Mode (GFSK)	Lowest	2402	0.936
	Middle	2441	0.936
	Highest	2480	0.936
EDR Mode (π/4-DQPSK)	Lowest	2402	1.317
	Middle	2441	1.317
	Highest	2480	1.293
EDR Mode (8DPSK)	Lowest	2402	1.296
	Middle	2441	1.296
	Highest	2480	1.296

20 dB Bandwidth

BDR Mode (GFSK)	
Low Channel	
Middle Channel	
High Channel	

EDR Mode (π/4-DQPSK)	
Low Channel	 ProjectNo.:SZ3240321-14674E-RF Tester:Bamboo Zhan Date: 1.MAY.2024 17:45:00
Middle Channel	 ProjectNo.:SZ3240321-14674E-RF Tester:Bamboo Zhan Date: 1.MAY.2024 17:54:50
High Channel	 ProjectNo.:SZ3240321-14674E-RF Tester:Bamboo Zhan Date: 1.MAY.2024 18:03:39

EDR Mode (8DPSK)	
Low Channel	 ProjectNo.:SZ3240321-14674E-RF Tester:Bamboo Zhan Date: 1.MAY.2024 17:48:08
Middle Channel	 ProjectNo.:SZ3240321-14674E-RF Tester:Bamboo Zhan Date: 1.MAY.2024 17:57:05
High Channel	 ProjectNo.:SZ3240321-14674E-RF Tester:Bamboo Zhan Date: 1.MAY.2024 18:06:40

FCC §15.247(a) (1) (iii) - QUANTITY OF HOPPING CHANNEL TEST

Applicable Standard

Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

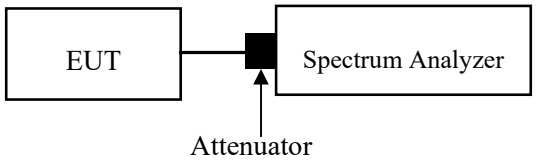
Test Procedure

Test Method: ANSI C63.10-2013 Clause 7.8.3

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.

2. Set the EUT in hopping mode from first channel to last.

3. By using the max-hold function record the quantity of the channel.



Test Data

Environmental Conditions

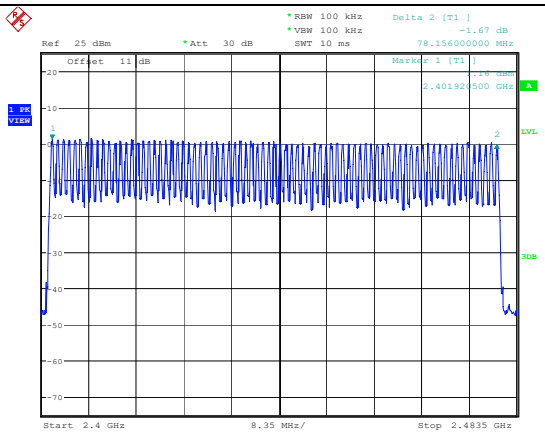
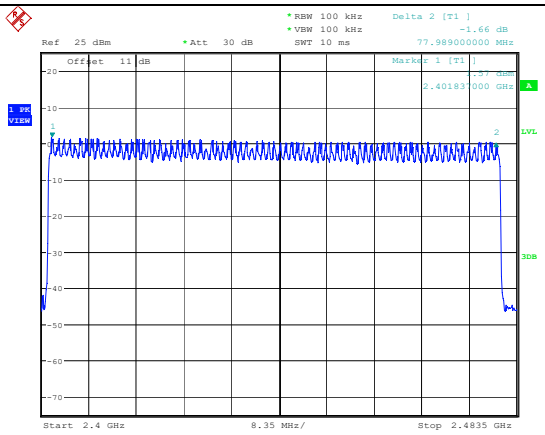
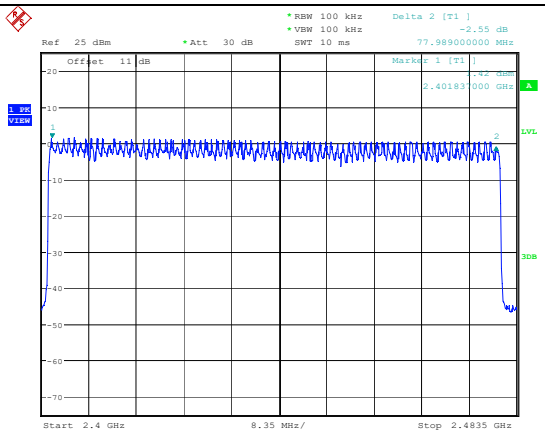
Temperature:	25.4 ℃
Relative Humidity:	53 %
ATM Pressure:	101 kPa

The testing was performed by Bamboo Zhan on 2024-05-01.

EUT operation mode: Transmitting

Test Result: Compliant.

Test Modes	Frequency Range (MHz)	Number of Hopping Channel	Limits
GFSK	2400-2483.5	79	≥15
π/4-DQPSK	2400-2483.5	79	≥15
8DPSK	2400-2483.5	79	≥15

Hopping Channel	
GFSK	 ProjectNo.:SZ3240321-14674E-RF Tester:Bamboo Zhan Date: 1.MAY.2024 18:14:57
π/4-DQPSK	 ProjectNo.:SZ3240321-14674E-RF Tester:Bamboo Zhan Date: 1.MAY.2024 18:27:24
8DPSK	 ProjectNo.:SZ3240321-14674E-RF Tester:Bamboo Zhan Date: 1.MAY.2024 18:37:35

FCC §15.247(a) (1) (iii) - TIME OF OCCUPANCY (DWELL TIME)

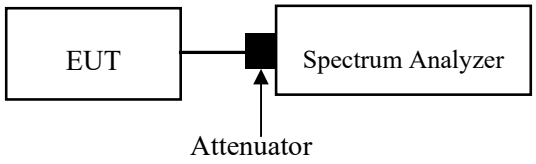
Applicable Standard

Frequency hopping systems in the 2400-2483.5 MHz shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

Test Procedure

Test Method: ANSI C63.10-2013 Clause 7.8.4

1. The EUT was worked in channel hopping.
2. Set the RBW to: 1MHz.
3. Set the VBW ≥ 3×RBW.
4. Set the span to 0Hz.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Recorded the time of single pulses



Test Data

Environmental Conditions

Temperature:	25.4 ℃
Relative Humidity:	53 %
ATM Pressure:	101 kPa

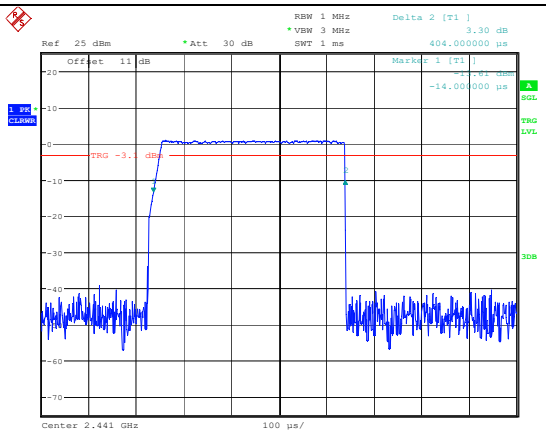
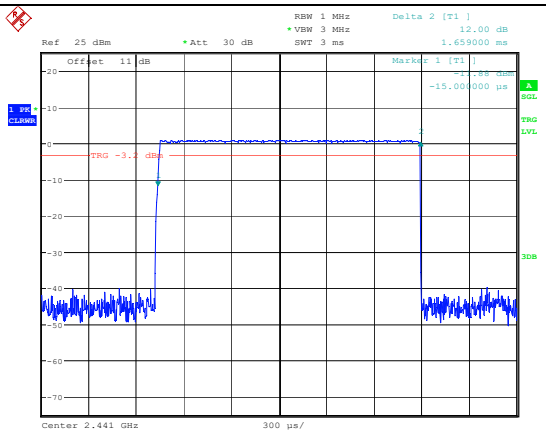
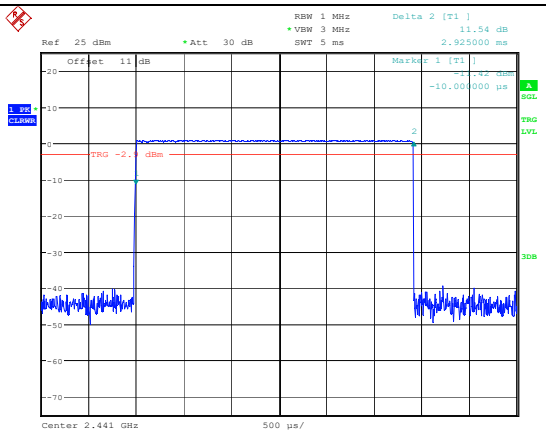
The testing was performed by Bamboo Zhan on 2024-05-01.

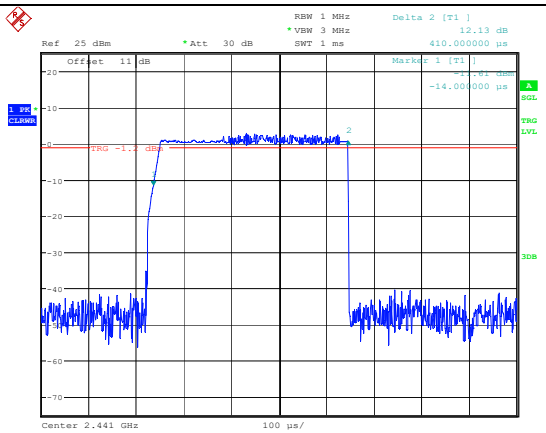
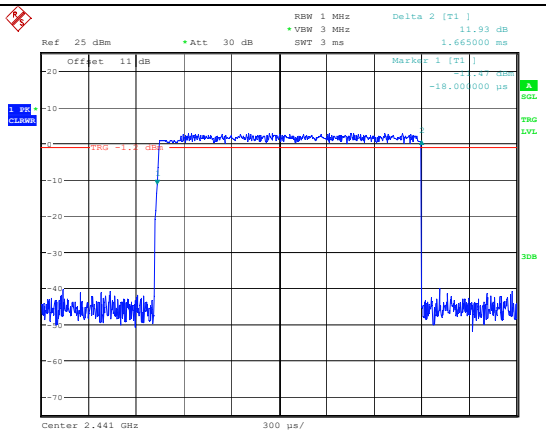
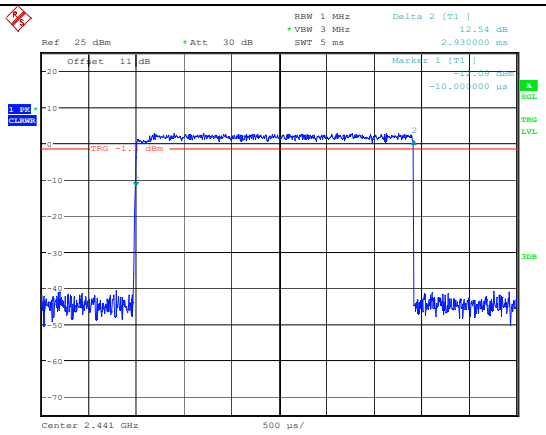
EUT operation mode: Transmitting

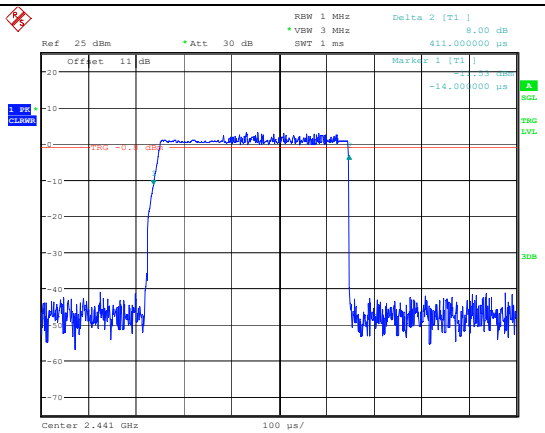
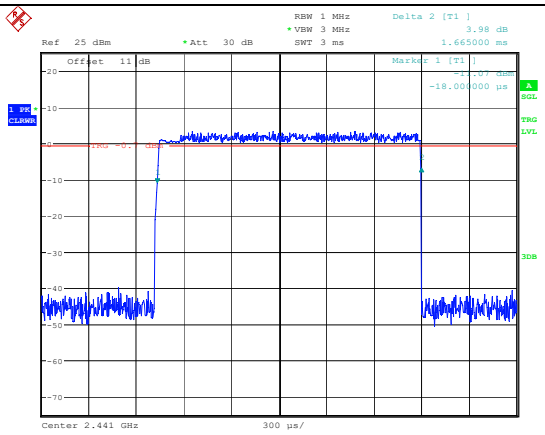
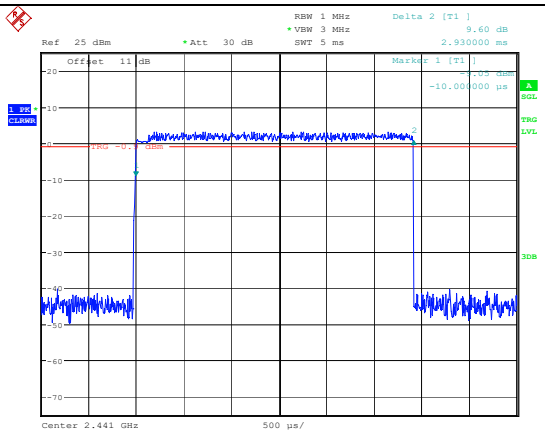
Test Result: Compliant.

Test Modes	Packet Type	Test Frequency (MHz)	Pulse width (ms)	Result (s)	Limit (s)
BDR Mode (GFSK)	DH1	2441	0.404	0.129	0.400
	DH3	2441	1.659	0.265	0.400
	DH5	2441	2.925	0.312	0.400
EDR Mode (π/4-DQPSK)	2DH1	2441	0.410	0.131	0.400
	2DH3	2441	1.665	0.266	0.400
	2DH5	2441	2.930	0.313	0.400
EDR Mode (8DPSK)	3DH1	2441	0.411	0.132	0.400
	3DH3	2441	1.665	0.266	0.400
	3DH5	2441	2.930	0.313	0.400

Note:
DH1:Dwell time=Pulse time (ms) × (1600/2/79) ×31.6 s
DH3:Dwell time=Pulse time (ms) × (1600/4/79) ×31.6 s
DH5:Dwell time=Pulse time (ms) × (1600/6/79) ×31.6 s

BDR Mode (GFSK)	
DH1	
DH3	
DH5	

EDR Mode (π/4-DQPSK)	
2DH1	
2DH3	
2DH5	

EDR Mode (8DPSK)	
3DH1	
3DH3	
3DH5	

FCC §15.247(b) (1) - PEAK OUTPUT POWER MEASUREMENT

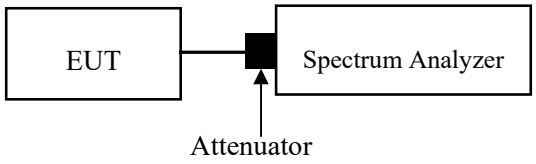
Applicable Standard

According to §15.247(b) (1), for frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. And for all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 watts.

Test Procedure

Test Method: ANSI C63.10-2013 Clause 7.8.5

1. Place the EUT on a bench and set in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to one test equipment.
3. Add a correction factor to the display.



Test Data

Environmental Conditions

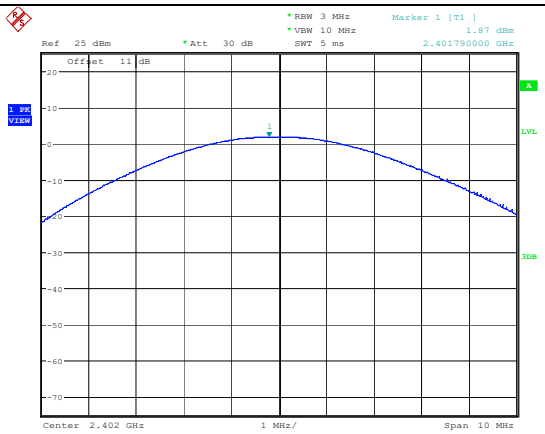
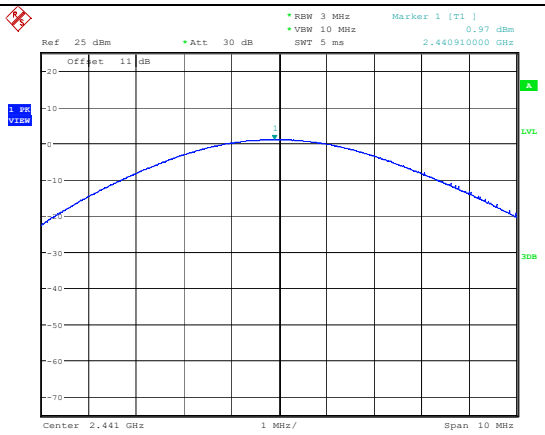
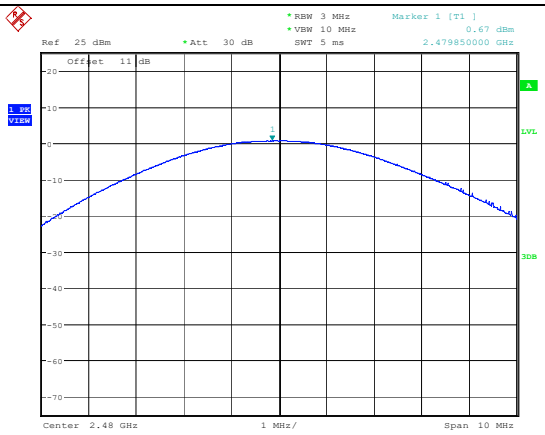
Temperature:	25.4 ℃
Relative Humidity:	53 %
ATM Pressure:	101 kPa

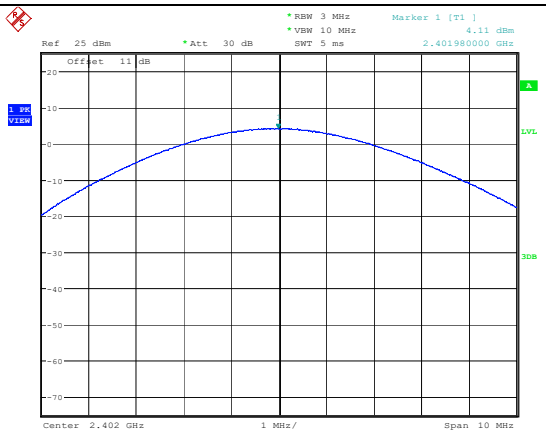
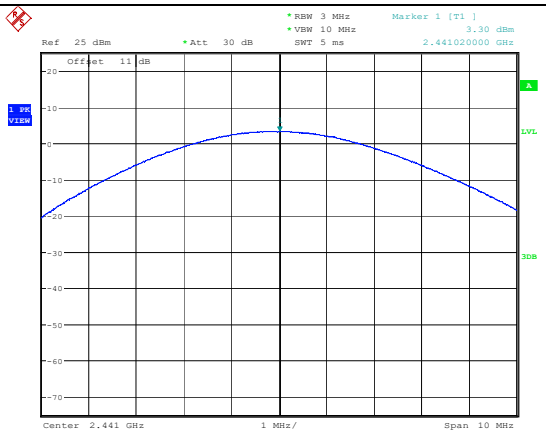
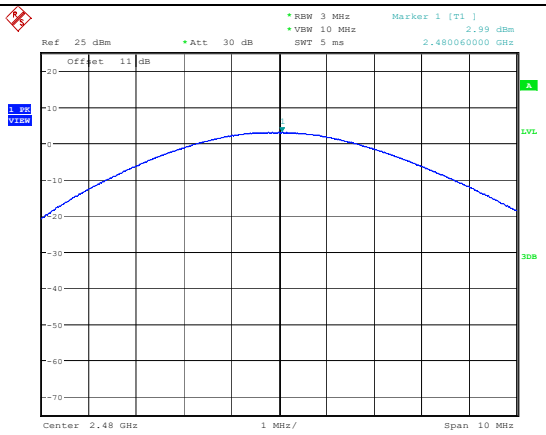
The testing was performed by Bamboo Zhan on 2024-05-01.

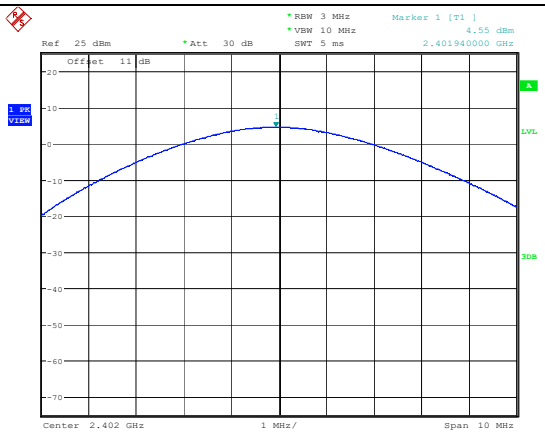
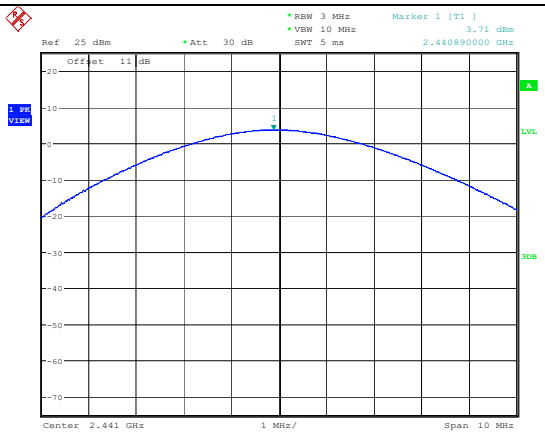
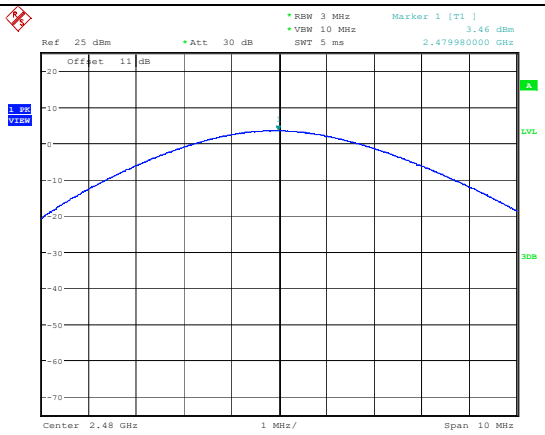
EUT operation mode: Transmitting

Test Result: Compliant.

Test Modes	Test Frequency (MHz)	Peak Conducted Output Power (dBm)	Limits (dBm)
BDR Mode (GFSK)	2402	1.87	21
	2441	0.97	21
	2480	0.67	21
EDR Mode (π/4-DQPSK)	2402	4.11	21
	2441	3.30	21
	2480	2.99	21
EDR Mode (8DPSK)	2402	4.55	21
	2441	3.71	21
	2480	3.46	21

BDR Mode (GFSK)	
Low Channel	
Middle Channel	
High Channel	

EDR Mode (π/4-DQPSK)	
Low Channel	 ProjectNo.:SZ3240321-14674E-RF Tester:Bamboo Zhan Date: 1.MAY.2024 17:42:56
Middle Channel	 ProjectNo.:SZ3240321-14674E-RF Tester:Bamboo Zhan Date: 1.MAY.2024 17:53:36
High Channel	 ProjectNo.:SZ3240321-14674E-RF Tester:Bamboo Zhan Date: 1.MAY.2024 18:02:23

EDR Mode (8DPSK)	
Low Channel	 ProjectNo.:SZ3240321-14674E-RF Tester:Bamboo Zhan Date: 1.MAY.2024 17:46:16
Middle Channel	 ProjectNo.:SZ3240321-14674E-RF Tester:Bamboo Zhan Date: 1.MAY.2024 17:55:49
High Channel	 ProjectNo.:SZ3240321-14674E-RF Tester:Bamboo Zhan Date: 1.MAY.2024 18:05:25

FCC §15.247(d) § 5.5 - BAND EDGES TESTING

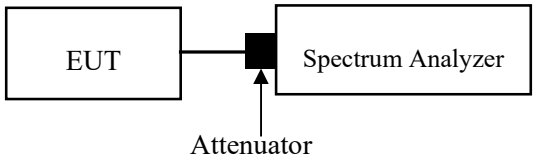
Applicable Standard

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Test Procedure

Test Method: ANSI C63.10-2013 Clause 7.8.6 & Clause 6.10

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Remove the antenna from the EUT and then connect to a low loss RF cable from the antenna port to a EMI test receiver, then turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.



Test Data

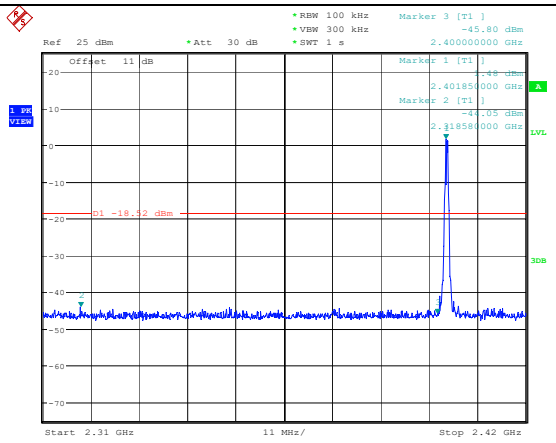
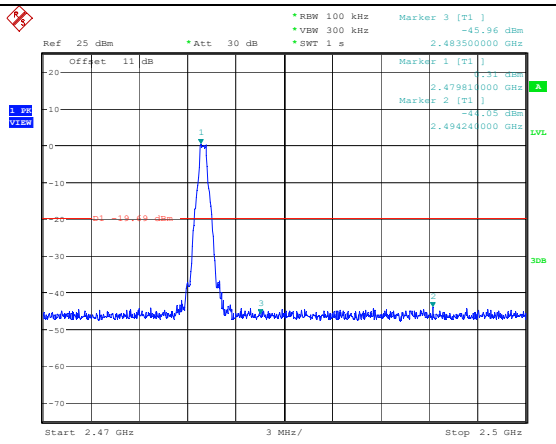
Environmental Conditions

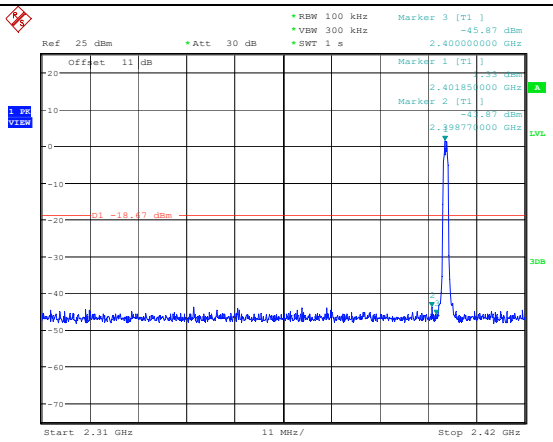
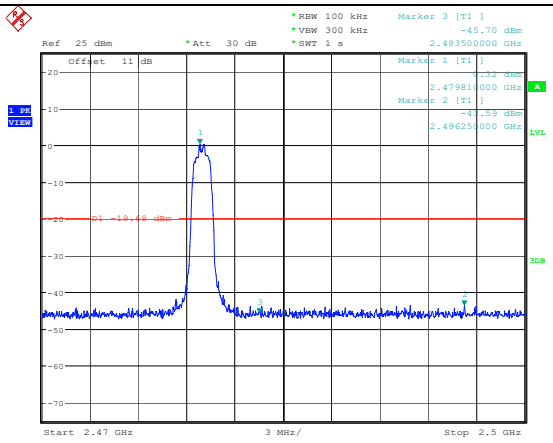
Temperature:	25.4~26 ℃
Relative Humidity:	51~53 %
ATM Pressure:	101 kPa

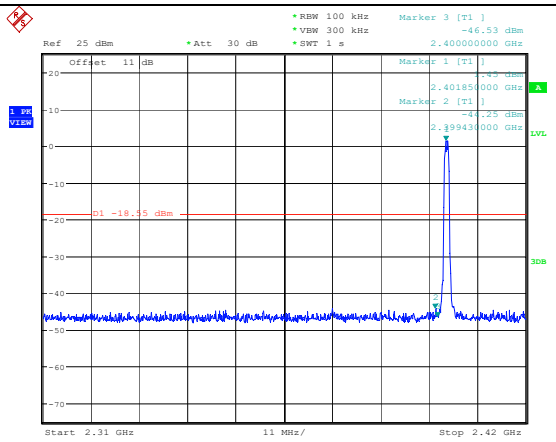
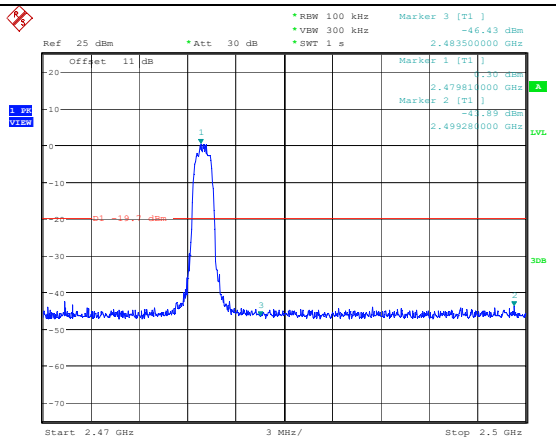
The testing was performed by Bamboo Zhan and Cheeb Huang from 2024-05-01 to 2024-05-06.

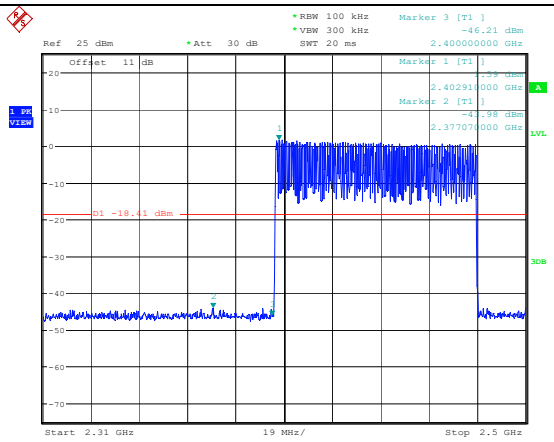
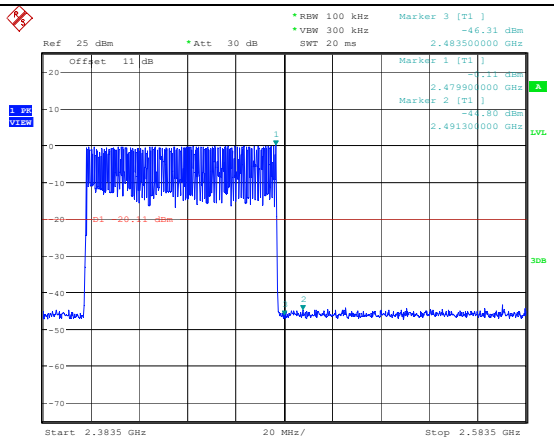
EUT operation mode: Transmitting

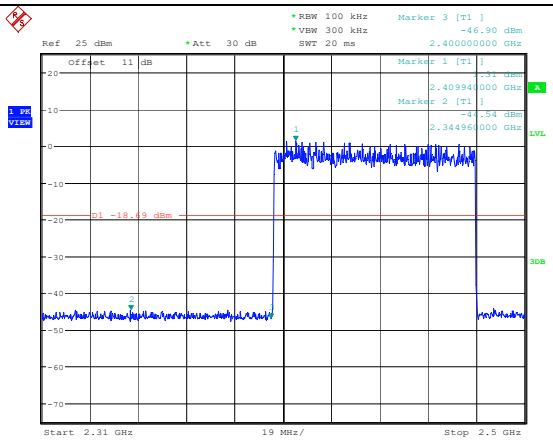
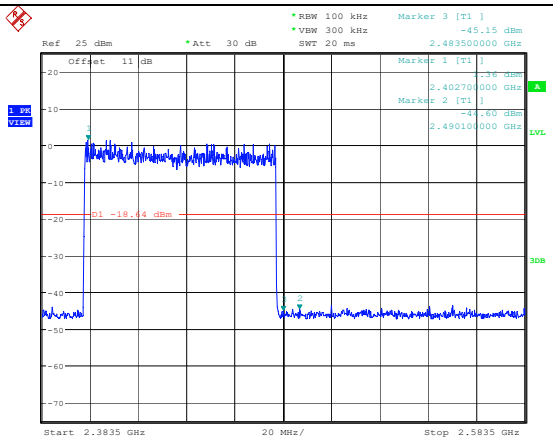
Test Result: Compliant.

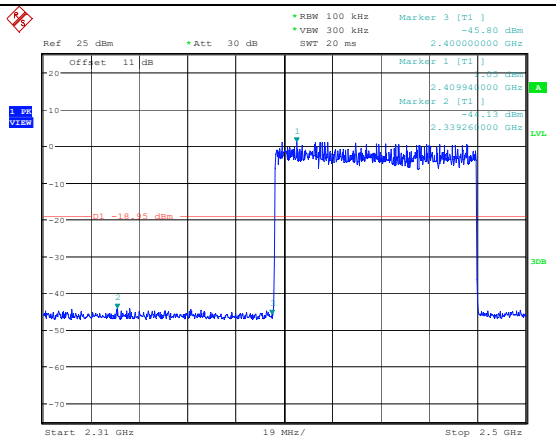
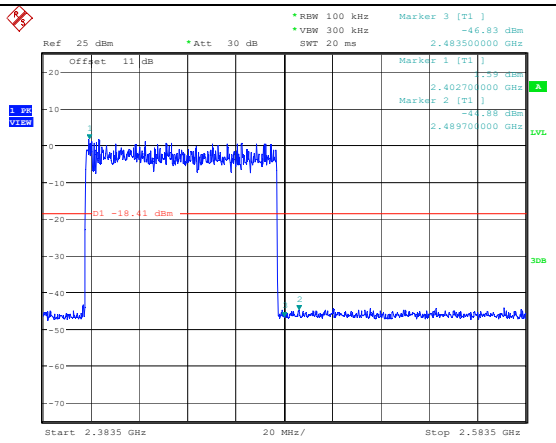
Band Edge, Single Channel	
BDR Mode (GFSK), Left Side	
BDR Mode (GFSK), Right Side	

Band Edge, Single Channel	
EDR Mode (π/4-DQPSK), Left Side	
EDR Mode (π/4-DQPSK), Right Side	

Band Edge, Single Channel	
EDR Mode (8DPSK), Left Side	
EDR Mode (8DPSK), Right Side	

Band Edge, Hopping Channel	
BDR Mode (GFSK), Left Side	 ProjectNo.:SZ3240321-14674E-RF Tester:Bamboo Zhan Date: 1.MAY.2024 18:17:54
BDR Mode (GFSK), Right Side	 ProjectNo.:SZ3240321-14674E-RF Tester:Cheeb Huang Date: 6.MAY.2024 14:51:45

Band Edge, Hopping Channel	
EDR Mode (π/4-DQPSK), Left Side	
EDR Mode (π/4-DQPSK), Right Side	

Band Edge, Hopping Channel	
EDR Mode (8DPSK), Left Side	
EDR Mode (8DPSK), Right Side	

EUT PHOTOGRAPHS

Please refer to the attachment SZ3240321-14674E-RF External photo and SZ3240321-14674E-RF Internal photo.

TEST SETUP PHOTOGRAPHS

Please refer to the attachment SZ3240321-14674E-RF Test Setup photo.

******* END OF REPORT *******