TEST REPORT

Applicant Name :	FCC: Porta Phone Company Inc IC: PORTA PHONE CO., INC.
Address :	FCC: 145 Dean Knauss Drive Narragansett, Rhode Island 02882 United States IC: 145 Dean Knauss Drive Narragansett, RI 02882, United States of America
Report Number :	2401V84620E-RFB
FCC ID:	B4HDBX2CMOD
IC:	3064A-DBX2CMOD

Test Standard (s)

FCC PART 15.247; RSS-GEN ISSUE 5, FEBRUARY 2021 AMENDMENT 2; RSS-247 ISSUE 3, AUGUST 2023

Sample Description

Product Type:	2.4 GHz / 900 MHz Base Station Conference Module
Model No.:	DBX2-CMOD
Multiple Model(s) No.:	N/A
Trade Mark:	Dual Band Wireless
Date Received:	2024/07/09
Issue Date:	2024/08/20

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	2401V84620E-RFB	Original Report	2024/08/20

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

HVIN	DBX2-CMOD
FVIN	N/A
Product	2.4 GHz / 900 MHz Base Station Conference Module
Tested Model	DBX2-CMOD
Multiple Model(s)	N/A
Frequency Range	905-925MHz
Maximum conducted Peak output power	23.87dBm
Modulation Technique	GFSK
Antenna Specification#	0dBi(It is provided by the applicant)
Voltage Range	DC 3.7V from battery or DC 5V from adapter
Sample number	2O3R-1 (RF), 2O3R-2 (RE/CE) (Assigned by BACL, Shenzhen)
Sample/EUT Status	Good condition
Adapter Information	Model:YNQX09G050100UL Input: 100-240V~50/60Hz 0.3A Output: 5.0V, 1.0 A

Objective

This test report is in accordance with Part 2-Subpart J, Part 15-Subparts A and C of the Federal Communication Commissions rules and RSS-247 Issue 3, August 2023, RSS-GEN Issue 5, Feb. 2021Amendment 2 of the Innovation, Science and Economic Development Canada 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 and RSS-247 Issue 3, August 2023, RSS-GEN Issue 5, Feb. 2021 Amendment 2 of the Innovation, Science and Economic Development Canada rules.

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.

Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		±5%
RF Frequency		213.55 Hz(k=2, 95% level of confidence)
RF output power, conducted		0.72 dB(k=2, 95% level of confidence)
Unwanted Emission, conducted		1.75 dB(k=2, 95% level of confidence)
AC Power Lines Conducted Emissions	9 kHz~150 KHz	3.94dB(k=2, 95% level of confidence)
	150 kHz ~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.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0023.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in an engineering mode.

Channel list

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	**905.00**	11	910.50	22	916.00	33	921.50
1	905.50	12	911.00	23	916.50	34	922.00
2	906.00	13	911.50	24	917.00	35	922.50
3	906.50	14	912.00	25	917.50	36	923.00
4	907.00	15	912.50	26	918.00	37	923.50
5	907.50	16	913.00	27	918.50	38	924.00
6	908.00	17	913.50	28	919.00	39	924.50
7	908.50	18	914.00	29	919.50	**40**	**925.00**
8	909.00	19	914.50	30	920.00	/	/
9	909.50	**20**	**915.00**	31	920.50	/	/
10	910.00	21	915.50	32	921.00	/	/

Note:
1. The equipment has designed 41 channels totally, but only 26 channels selected from the 41 channels active at same time, which were separated by more than 500kHz.
2. EUT was test in channel 0, 20, 40.
3. The EUT has two RF modules, according to the manufacturer, the two modules can't transmit simultaneously.

EUT Exercise Software

EUT was configured to testing mode by applicant and power level is default*.

Special Accessories

No special accessory.

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

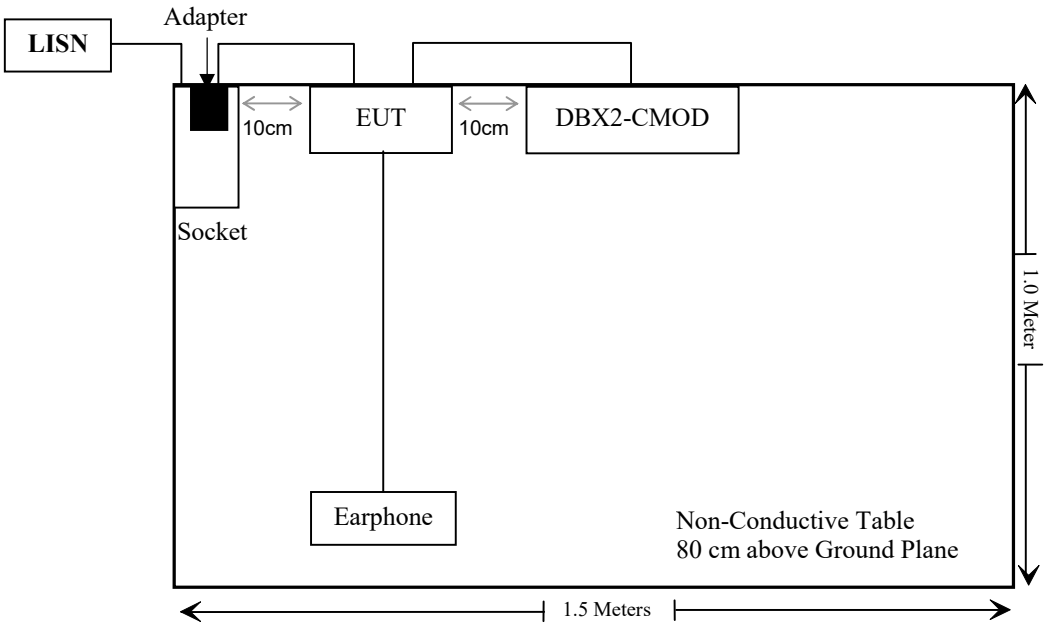
Manufacturer	Description	Model	Serial Number
Unknown	2.4 GHz / 900 MHz Base Station Conference Module	DBX2-CMOD	Unknown

External I/O Cable

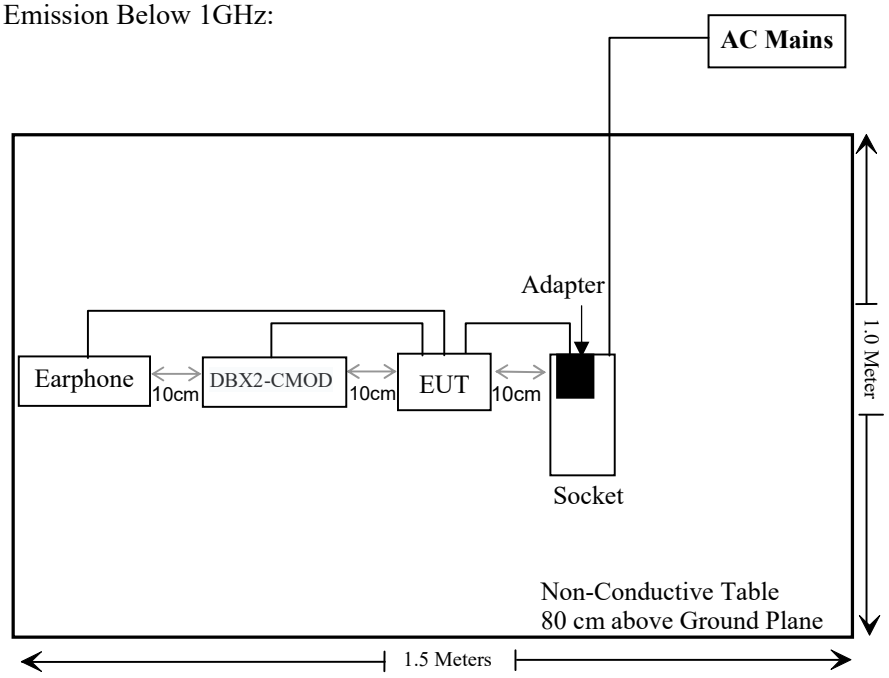
Cable Description	Length (m)	From Port	To
Un-shielded Un-detachable AC cable	1.2	Socket	LISN/AC Mains
Un-shielded Un-detachable DC cable	1.5	EUT	Adapter
Un-shielded Un-detachable Audio cable	1.1	EUT	Earphone
Shielded Detachable HDMI cable	0.7	EUT	EVX2-CM

Block Diagram of Test Setup

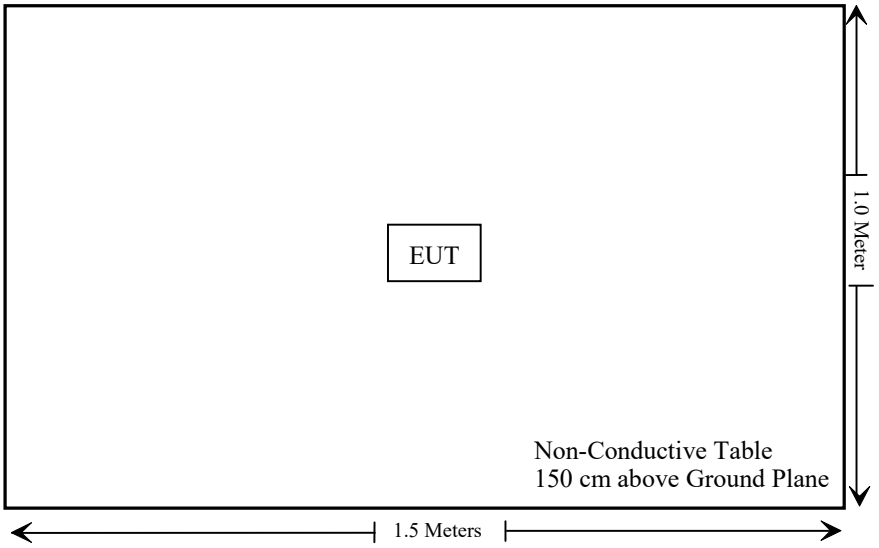
For Conducted Emission



For Radiated Emission Below 1GHz:



For Radiated Emission Above 1GHz:



SUMMARY OF TEST RESULTS

FCC Rules	ISEDC Rules	Description of Test	Result
§15.247 (i), §2.1093	RSS-102	RF Exposure	Compliant
§15.203	RSS-Gen §6.8	Antenna Requirement	Compliant
§15.207(a)	RSS-Gen §8.8	AC Line Conducted Emissions	Compliant
§15.205, §15.209 & §15.247(d)	RSS-247 § 5.5	Radiated Emissions	Compliant
§15.247(a)(1)(i)	RSS- Gen§6.7, RSS-247 § 5.1 (c)	99% Occupied Bandwidth & 20 dB Emission Bandwidth	Compliant
§15.247(a)(1)	RSS-247 § 5.1 (b)	Channel Separation Test	Compliant
§15.247(a)(1)(i)	RSS-247 § 5.1 (c)	Time of Occupancy (Dwell Time)	Compliant
§15.247(a)(1)(i)	RSS-247 § 5.1 (c)	Quantity of hopping channel Test	Compliant
§15.247(b)(2)	RSS-247§ 5.4(a)	Peak Output Power Measurement	Compliant
§15.247(d)	RSS-247 § 5.5	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	2024/05/21	2025/05/20
Unknown	CE Cable	Unknown	UF A210B-1-0720-504504	2024/05/21	2025/05/20
Audix	EMI Test software	E3	191218(V9)	NCR	NCR
Radiated emission test					
Rohde & Schwarz	EMI Test Receiver	ESR3	102455	2024/01/16	2025/01/15
Sonoma instrument	Pre-amplifier	310 N	186238	2024/05/21	2025/05/20
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2023/07/20	2026/07/19
Unknown	Cable	Chamber A Cable 1	N/A	2024/06/18	2025/06/17
Unknown	Cable	XH500C	J-10M-A	2024/06/18	2025/06/17
BACL	Active Loop Antenna	1313-1A	4031911	2024/05/14	2027/05/13
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	2024/06/18	2025/06/17
Schwarzbeck	Horn Antenna	BBHA9120D(1201)	1143	2023/07/26	2026/07/25
Unknown	RF Cable	KMSE	735	2024/06/18	2025/06/17
Unknown	RF Cable	UFA147	219661	2024/06/18	2025/06/17
JD	Multiplex Switch Test Control Set	DT7220FSU	DQ77926	2024/06/18	2025/06/17
Audix	EMI Test software	E3	191218(V9)	NCR	NCR
RF Conducted Test					
R&S	SPECTRUM ANALYZER	FSU26	200120	2024/01/08	2025/01/07
Rohde & Schwarz	Spectrum Analyzer	FSV40	101942	2023/12/18	2024/12/17
Unknown	10dB Attenuator	Unknown	F-03-EM065	2024/06/27	2025/06/26

*** 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) (1) & §2.1093 – RF EXPOSURE

Applicable Standard

According to FCC §2.1093 and §1.1307(b) (1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

Measurement Result

Please refer to SAR test report: 2401V84620E-SAA.

RSS-102 – RF EXPOSURE

Applicable Standard

According to RSS-102, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

Result

Compliance. Please refer to SAR test report: 2401V84620E-SAB.

FCC §15.203 & RSS-GEN §6.8– 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.

The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below).

When measurements at the antenna port are used to determine the RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna's manufacturer.

The test report shall state the RF power, output power setting and spurious emission measurements with each antenna type that is used with the transmitter being tested.

For licence-exempt equipment with detachable antennas, the user manual shall also contain the following notice in a conspicuous location:

This radio transmitter [enter the device's ISED certification number] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.
Immediately following the above notice, the manufacturer shall provide a list of all antenna types which can be used with the transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna type.

Antenna Connector Construction

The EUT has two internal antennas arrangements which were permanently attached and the gain are 0dBi, fulfill the requirement of this section. Please refer to the EUT photos.

Type	Antenna Gain	Impedance
Monopole	0dBi	50Ω

Result: Compliant.

FCC §15.207 (a) & RSS-GEN §8.8 – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC §15.207(a) & RSS-Gen §8.8

Unless stated otherwise in the applicable RSS, for radio apparatus that are designed to be connected to the public utility AC power network, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the range 150 kHz to 30 MHz shall not exceed the limits in table 4, as measured using a 50 μH / 50 Ω line impedance stabilization network. This requirement applies for the radio frequency voltage measured between each power line and the ground terminal of each AC power-line mains cable of the EUT.

For an EUT that connects to the AC power lines indirectly, through another device, the requirement for compliance with the limits in table 4 shall apply at the terminals of the AC power-line mains cable of a representative support device, while it provides power to the EUT. The lower limit applies at the boundary between the frequency ranges. The device used to power the EUT shall be representative of typical applications.

Table 4 - AC Power Lines Conducted Emission Limits		
Frequency range (MHz)	Conducted limit (dBμV)	
	Quasi-Peak	Average
0.15 – 0.5	66 to 56[1]	56 to 46[1]
0.5 – 5	56	46
5 – 30	60	50

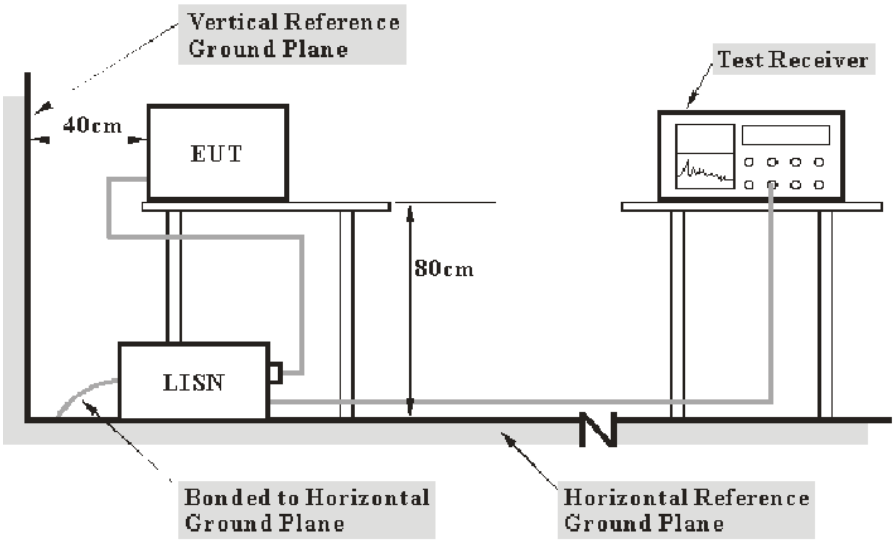
Note 1: The level decreases linearly with the logarithm of the frequency.

For an EUT with a permanent or detachable antenna operating between 150 kHz and 30 MHz, the AC power-line conducted emissions must be measured using the following configurations:

(a) Perform the AC power-line conducted emissions test with the antenna connected to determine compliance with the limits of table 4 outside the transmitter's fundamental emission band.

(b) Retest with a dummy load instead of the antenna to determine compliance with the limits of table 4 within the transmitter's fundamental emission band. For a detachable antenna, remove the antenna and connect a suitable dummy load to the antenna connector. For a permanent antenna, remove the antenna and terminate the RF output with a dummy load or network that simulates the antenna in the fundamental frequency band.

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 and RSS-Gen limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

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

During the conducted emission test, the adapter was connected to the outlet of the LISN.

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.

Corrected Factor & Margin Calculation

The Corrected factor is calculated by adding LISN VDF (Voltage Division Factor), 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, a over limit of -7 dB means the emission is 7 dB below the limit. The equation for margin calculation is as follows:

Over limit = Level – Limit
Level= read level + factor

Test Data

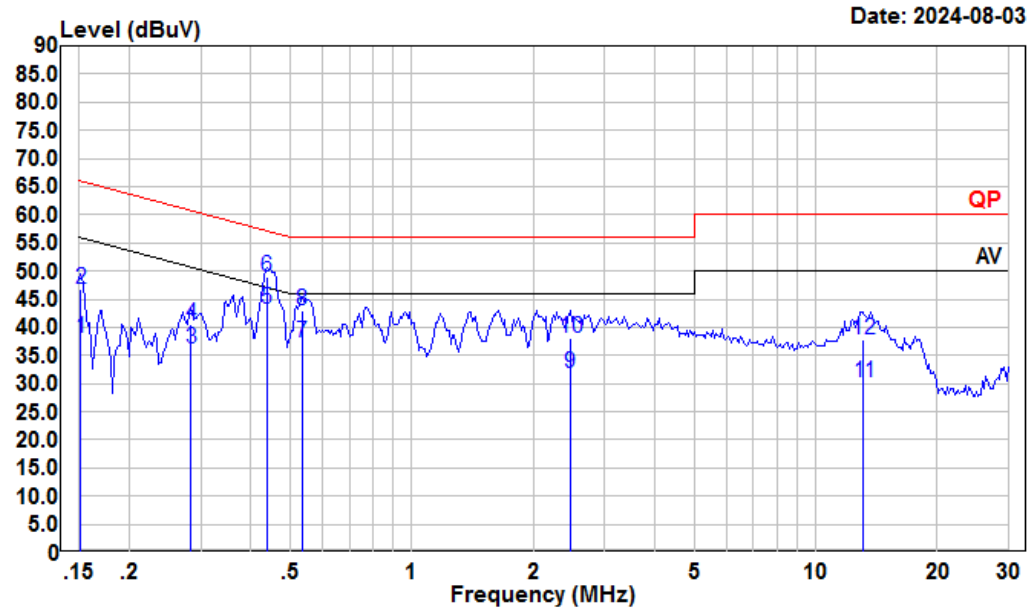
Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	68 %
ATM Pressure:	101.0 kPa

The testing was performed by Macy Shi on 2024-08-03.

EUT operation mode: Transmitting (*Maximum output power mode, ANT B High channel)*

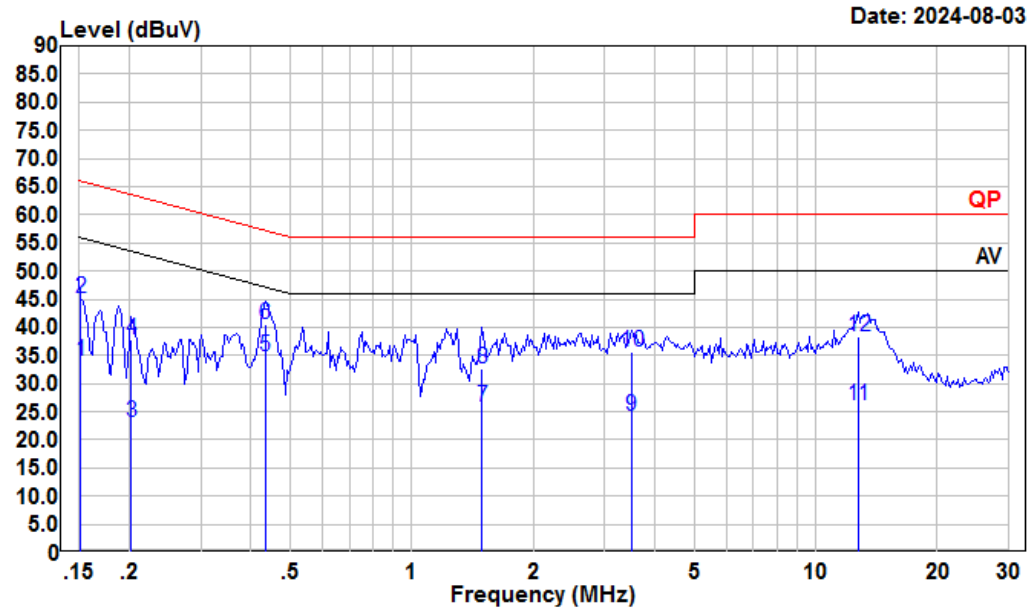
AC 120V/60 Hz, Line



Condition: Line
Project : 2401V84620E-RF
tester : Macy.shi
Note : TX

	Freq	Read Level	LISN Level	Factor	Cable Loss	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dB	dBuV	dB	
1	0.152	17.16	38.19	10.90	10.13	55.91	-17.72	Average
2	0.152	25.68	46.71	10.90	10.13	65.91	-19.20	QP
3	0.283	15.39	36.18	10.69	10.10	50.72	-14.54	Average
4	0.283	19.79	40.58	10.69	10.10	60.72	-20.14	QP
5	0.437	22.69	43.34	10.54	10.11	47.11	-3.77	Average
6	0.437	28.43	49.08	10.54	10.11	57.11	-8.03	QP
7	0.535	16.63	37.26	10.50	10.13	46.00	-8.74	Average
8	0.535	22.40	43.03	10.50	10.13	56.00	-12.97	QP
9	2.461	11.25	31.93	10.51	10.17	46.00	-14.07	Average
10	2.461	17.40	38.08	10.51	10.17	56.00	-17.92	QP
11	13.127	9.31	30.13	10.60	10.22	50.00	-19.87	Average
12	13.127	17.06	37.88	10.60	10.22	60.00	-22.12	QP

AC 120V/60 Hz, Neutral



Condition: Neutral
Project : 2401V84620E-RF
tester : Macy.shi
Note : TX

	Freq	Read Level	Level	LISN Factor	Cable Loss	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dB	dBuV	dB	
1	0.152	13.28	34.00	10.59	10.13	55.91	-21.91	Average
2	0.152	24.30	45.02	10.59	10.13	65.91	-20.89	QP
3	0.202	2.56	23.05	10.40	10.09	53.54	-30.49	Average
4	0.202	17.38	37.87	10.40	10.09	63.54	-25.67	QP
5	0.433	14.06	34.82	10.65	10.11	47.20	-12.38	Average
6	0.433	19.78	40.54	10.65	10.11	57.20	-16.66	QP
7	1.495	4.97	25.74	10.61	10.16	46.00	-20.26	Average
8	1.495	11.94	32.71	10.61	10.16	56.00	-23.29	QP
9	3.491	3.74	24.33	10.40	10.19	46.00	-21.67	Average
10	3.491	14.96	35.55	10.40	10.19	56.00	-20.45	QP
11	12.716	5.19	26.21	10.80	10.22	50.00	-23.79	Average
12	12.716	17.30	38.32	10.80	10.22	60.00	-21.68	QP

FCC §15.205, §15.209 & §15.247(d) & RSS-247§ 5.5 – RADIATED EMISSIONS

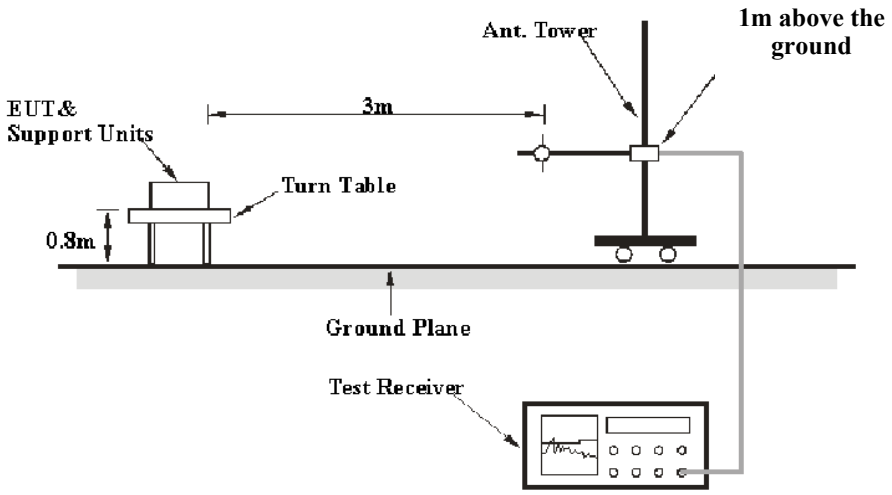
Applicable Standard

FCC §15.205; §15.209; §15.247(d) and RSS-247 §5.5

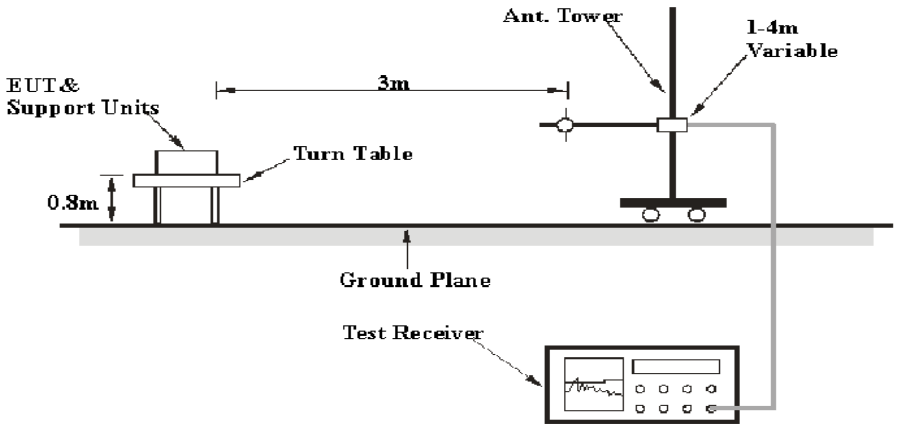
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

EUT Setup

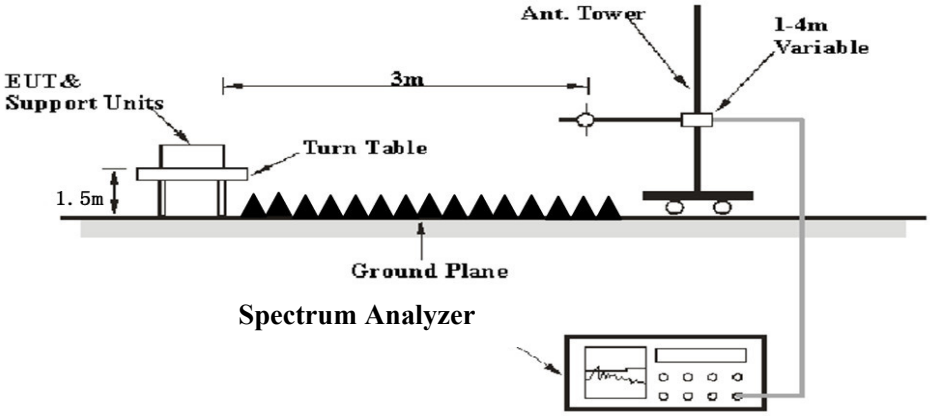
9 kHz-30MHz:



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, FCC 15.247 limits and RSS-247/RSS-Gen 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			
	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:	101.0 kPa

The testing was performed by Jack Liu on 2024-08-09 for below 1GHz and Sadow Tan from 2024-07-19 to 2024-08-16 for above 1GHz.

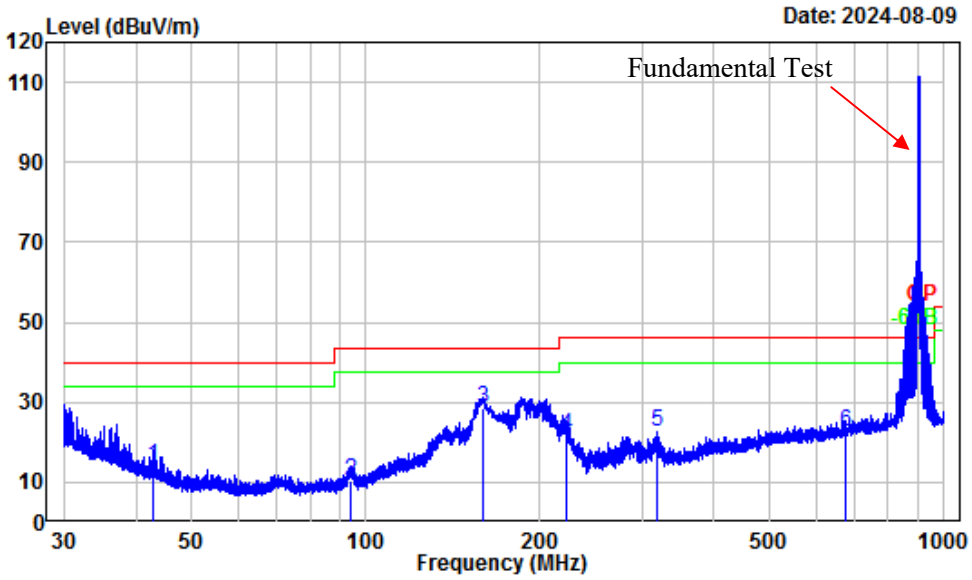
EUT operation mode: Transmitting (Pre-scan in the X,Y and Z axes of orientation, the worst case z-axis of orientation was recorded)

9 kHz-30MHz: (*Maximum output power mode, ANT B High channel)*

The amplitude of spurious emissions attenuated more than 20 dB below the limit was not recorded.

30MHz-1GHz: (*Maximum output power mode, ANT B High channel)*

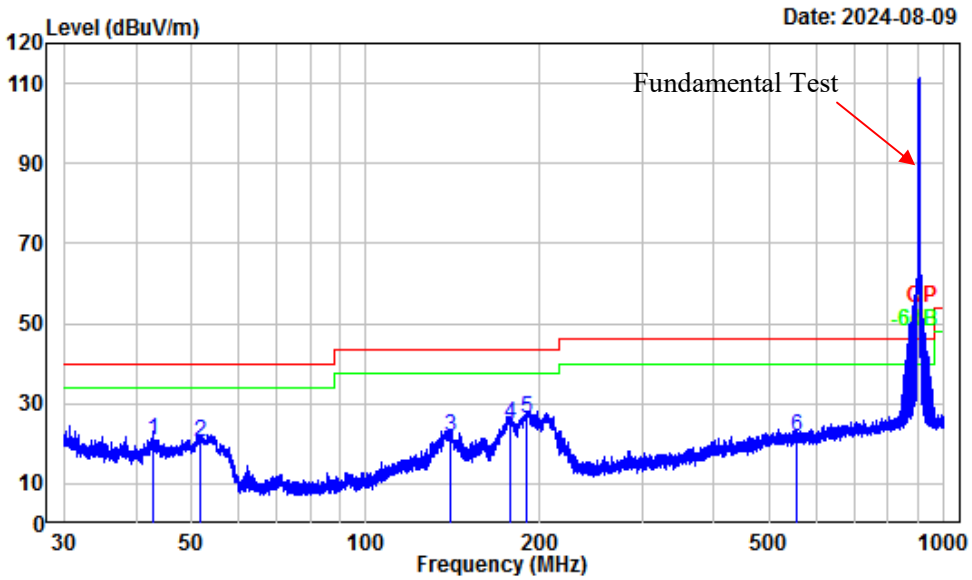
Horizontal



Site : Chamber A
Condition : 3m Horizontal
Project Number: 2401V84620E-RF
Test Mode : GFSK
Tester : Jack Liu

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	42.96	-14.04	27.91	13.87	40.00	-26.13	QP
2	94.35	-17.06	27.44	10.38	43.50	-33.12	QP
3	159.23	-12.71	41.03	28.32	43.50	-15.18	QP
4	222.56	-13.08	34.80	21.72	46.00	-24.28	QP
5	319.66	-10.80	33.29	22.49	46.00	-23.51	QP
6	674.91	-3.83	26.35	22.52	46.00	-23.48	QP

Vertical



Site : Chamber A
Condition : 3m Vertical
Project Number: 2401V84620E-RF
Test Mode : GFSK
Tester : Jack Liu

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	42.84	-13.97	35.02	21.05	40.00	-18.95	QP
2	51.71	-17.95	38.31	20.36	40.00	-19.64	QP
3	139.85	-11.88	33.64	21.76	43.50	-21.74	QP
4	177.82	-13.53	38.33	24.80	43.50	-18.70	QP
5	189.74	-14.22	40.50	26.28	43.50	-17.22	QP
6	554.58	-5.41	27.05	21.64	46.00	-24.36	QP

Above 1GHz:

ANT A

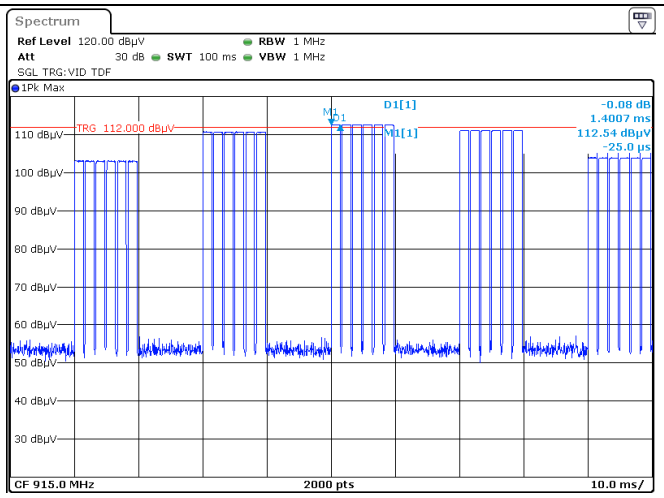
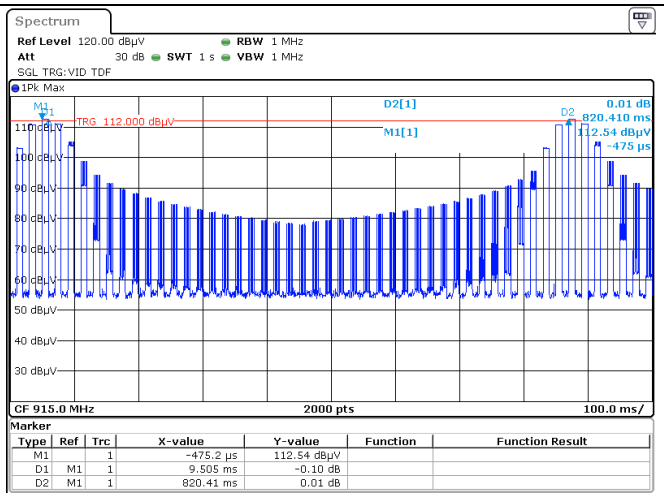
Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/AV					
Low Channel(905MHz)							
1810.00	69.04	PK	H	-6.50	62.54	74	-11.46
1810.00	67.71	PK	V	-6.50	61.21	74	-12.79
2715.00	66.33	PK	H	-2.49	63.84	74	-10.16
2715.00	68.33	PK	V	-2.49	65.84	74	-8.16
3620.00	56.69	PK	H	-1.94	54.75	74	-19.25
3620.00	57.97	PK	V	-1.94	56.03	74	-17.97
4525.00	60.00	PK	H	1.19	61.19	74	-12.81
4525.00	63.69	PK	V	1.19	64.88	74	-9.12
Middle Channel(915MHz)							
1830.00	67.71	PK	H	-6.40	61.31	74	-12.69
1830.00	64.27	PK	V	-6.40	57.87	74	-16.13
2745.00	68.43	PK	H	-2.49	65.94	74	-8.06
2745.00	68.85	PK	V	-2.49	66.36	74	-7.64
3660.00	56.45	PK	H	-1.84	54.61	74	-19.39
3660.00	57.77	PK	V	-1.84	55.93	74	-18.07
4575.00	60.37	PK	H	1.29	61.66	74	-12.34
4575.00	63.78	PK	V	1.29	65.07	74	-8.93
High Channel(925MHz)							
1850.00	68.25	PK	H	-6.29	61.96	74	-12.04
1850.00	69.21	PK	V	-6.29	62.92	74	-11.08
2775.00	67.87	PK	H	-2.46	65.41	74	-8.59
2775.00	69.04	PK	V	-2.46	66.58	74	-7.42
3700.00	54.90	PK	H	-1.54	53.36	74	-20.64
3700.00	55.79	PK	V	-1.54	54.25	74	-19.75
4625.00	60.89	PK	H	0.99	61.88	74	-12.12
4625.00	64.35	PK	V	0.99	65.34	74	-8.66

Field Strength of Average							
Frequency (MHz)	Peak Measurement @3m (dBµV/m)	Polar (H/V)	Duty Cycle Correction Factor (dB)	Corrected Amplitude (dBµV/m)	FCC Part 15.247/RSS-247		
					Limit (dBµV/m)	Margin (dB)	Comment
Low Channel(905MHz)							
1810.00	62.54	H	-21.51	41.03	54	-12.97	Harmonic
1810.00	61.21	V	-21.51	39.70	54	-14.30	Harmonic
2715.00	63.84	H	-21.51	42.33	54	-11.67	Harmonic
2715.00	65.84	V	-21.51	44.33	54	-9.67	Harmonic
3620.00	54.75	H	-21.51	33.24	54	-20.76	Harmonic
3620.00	56.03	V	-21.51	34.52	54	-19.48	Harmonic
4525.00	61.19	H	-21.51	39.68	54	-14.32	Harmonic
4525.00	64.88	V	-21.51	43.37	54	-10.63	Harmonic
Middle Channel(915MHz)							
1830.00	61.31	H	-21.51	39.80	54	-14.20	Harmonic
1830.00	57.87	V	-21.51	36.36	54	-17.64	Harmonic
2745.00	65.94	H	-21.51	44.43	54	-9.57	Harmonic
2745.00	66.36	V	-21.51	44.85	54	-9.15	Harmonic
3660.00	54.61	H	-21.51	33.10	54	-20.90	Harmonic
3660.00	55.93	V	-21.51	34.42	54	-19.58	Harmonic
4575.00	61.66	H	-21.51	40.15	54	-13.85	Harmonic
4575.00	65.07	V	-21.51	43.56	54	-10.44	Harmonic
High Channel(925MHz)							
1850.00	61.96	H	-21.51	40.45	54	-13.55	Harmonic
1850.00	62.92	V	-21.51	41.41	54	-12.59	Harmonic
2775.00	65.41	H	-21.51	43.90	54	-10.10	Harmonic
2775.00	66.58	V	-21.51	45.07	54	-8.93	Harmonic
3700.00	53.36	H	-21.51	31.85	54	-22.15	Harmonic
3700.00	54.25	V	-21.51	32.74	54	-21.26	Harmonic
4625.00	61.88	H	-21.51	40.37	54	-13.63	Harmonic
4625.00	65.34	V	-21.51	43.83	54	-10.17	Harmonic

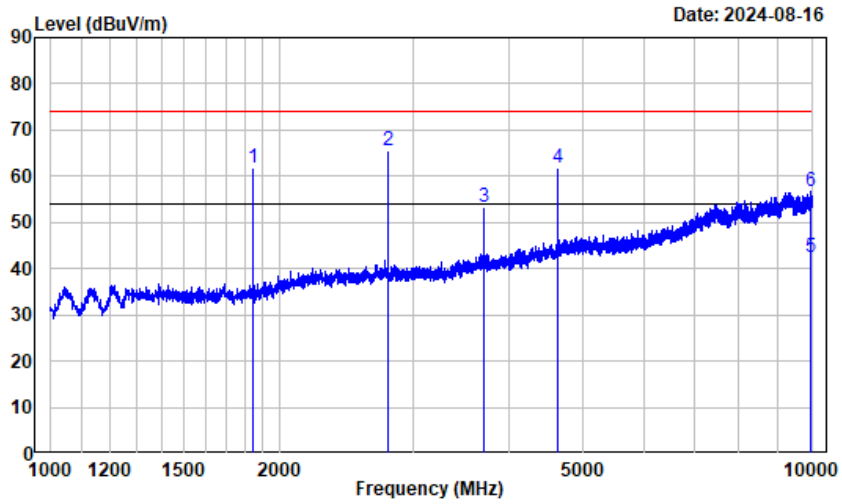
Note:

Corrected. Amplitude = Factor + Reading
Margin = Corrected. Amplitude - Limit
Average level= Peak level+ Duty Cycle Corrected Factor

Through observe the test plots below, the maximum hops in 100ms period is 6times (the second high signals from other channel), the worst case duty cycle as below:
Duty cycle = Ton/100ms = 1.4007*6/100=0.08404
Duty Cycle Corrected Factor = 20lg (Duty cycle) = 20lg0.08404 = -21.51

Duty Cycle（100ms）	
Duty Cycle（1s）	

Listed with the worst harmonic margin test plot:

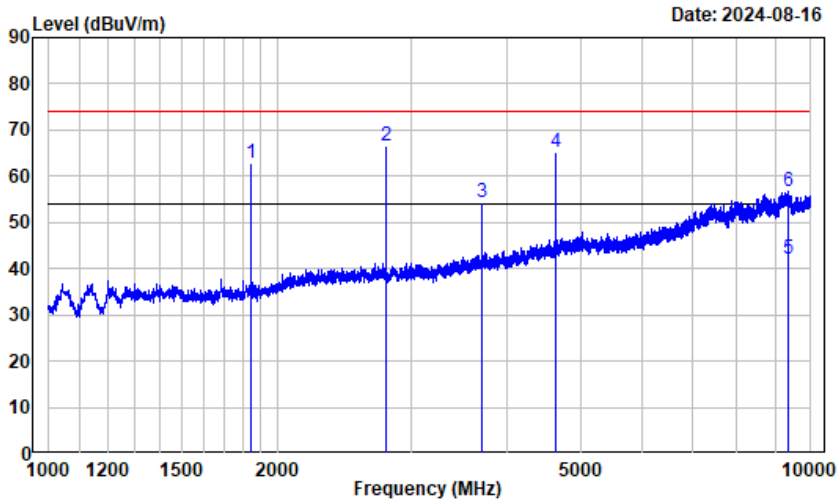
Horizontal	
1-10GHz	

Condition : Horizontal
Project No.: 2401V84620E-RF
Tester : Sadow Tan
Note : FHSS_925

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	1850.000	-6.29	68.25	61.96	74.00	-12.04	Peak
2	2775.000	-2.46	67.87	65.41	74.00	-8.59	Peak
3	3700.000	-1.54	54.90	53.36	74.00	-20.64	Peak
4	4625.000	0.99	60.89	61.88	74.00	-12.12	Peak
5	9946.000	12.05	30.28	42.33	54.00	-11.67	Average
6	9946.000	12.05	44.58	56.63	74.00	-17.37	Peak

Vertical

1-10GHz



Condition : Vertical
Project No.: 2401V84620E-RF
Tester : Sadow Tan
Note : FHSS_925

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	1850.000	-6.29	69.21	62.92	74.00	-11.08	Peak
2	2775.000	-2.46	69.04	66.58	74.00	-7.42	Peak
3	3700.000	-1.54	55.79	54.25	74.00	-19.75	Peak
4	4625.000	0.99	64.35	65.34	74.00	-8.66	Peak
5	9350.875	11.73	30.34	42.07	54.00	-11.93	Average
6	9350.875	11.73	45.12	56.85	74.00	-17.15	Peak

ANT B:

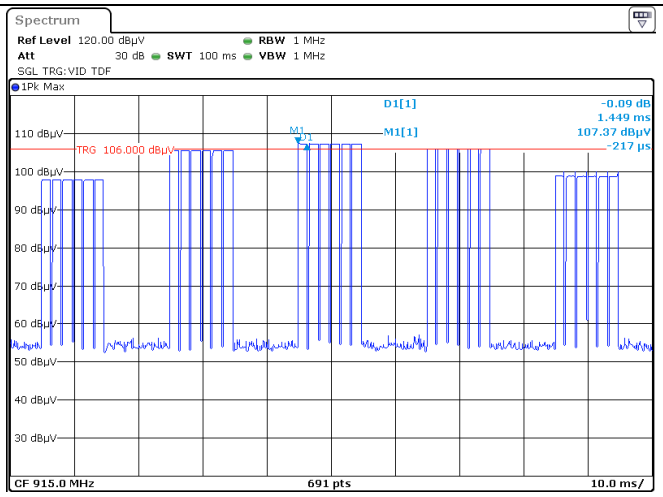
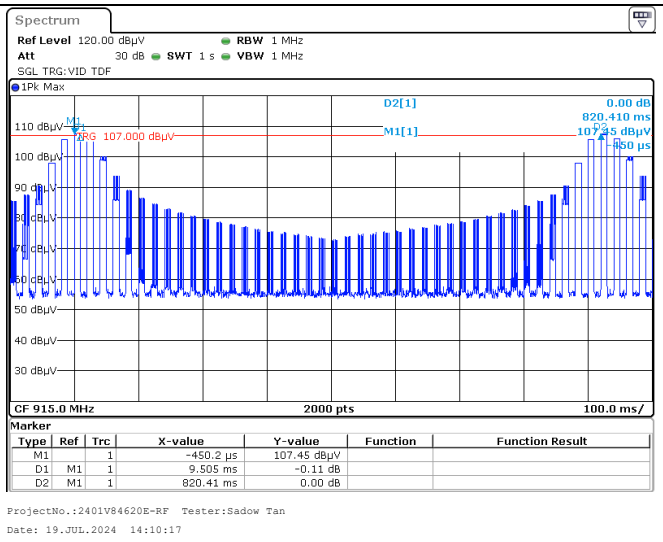
Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/AV					
Low Channel(905MHz)							
1810.00	70.84	PK	H	-6.50	64.34	74	-9.66
1810.00	67.52	PK	V	-6.50	61.02	74	-12.98
2715.00	63.13	PK	H	-2.49	60.64	74	-13.36
2715.00	61.97	PK	V	-2.49	59.48	74	-14.52
3620.00	54.59	PK	H	-1.94	52.65	74	-21.35
3620.00	54.74	PK	V	-1.94	52.80	74	-21.20
4525.00	51.58	PK	H	1.19	52.77	74	-21.23
4525.00	50.85	PK	V	1.19	52.04	74	-21.96
Middle Channel(915MHz)							
1830.00	68.08	PK	H	-6.40	61.68	74	-12.32
1830.00	64.80	PK	V	-6.40	58.40	74	-15.60
2745.00	67.04	PK	H	-2.49	64.55	74	-9.45
2745.00	66.56	PK	V	-2.49	64.07	74	-9.93
3660.00	56.33	PK	H	-1.84	54.49	74	-19.51
3660.00	57.30	PK	V	-1.84	55.46	74	-18.54
4575.00	51.92	PK	H	1.29	53.21	74	-20.79
4575.00	51.09	PK	V	1.29	52.38	74	-21.62
High Channel(925MHz)							
1850.00	63.60	PK	H	-6.29	57.31	74	-16.69
1850.00	62.55	PK	V	-6.29	56.26	74	-17.74
2775.00	69.19	PK	H	-2.46	66.73	74	-7.27
2775.00	67.45	PK	V	-2.46	64.99	74	-9.01
3700.00	56.51	PK	H	-1.54	54.97	74	-19.03
3700.00	56.35	PK	V	-1.54	54.81	74	-19.19
4625.00	52.80	PK	H	0.99	53.79	74	-20.21
4625.00	51.52	PK	V	0.99	52.51	74	-21.49

Field Strength of Average							
Frequency (MHz)	Peak Measurement @3m (dBµV/m)	Polar (H/V)	Duty Cycle Correction Factor (dB)	Corrected Amplitude (dBµV/m)	FCC Part 15.247/RSS-247		
					Limit (dBµV/m)	Margin (dB)	Comment
Low Channel(905MHz)							
1810.00	64.34	H	-21.22	43.12	54	-10.88	Harmonic
1810.00	61.02	V	-21.22	39.80	54	-14.20	Harmonic
2715.00	60.64	H	-21.22	39.42	54	-14.58	Harmonic
2715.00	59.48	V	-21.22	38.26	54	-15.74	Harmonic
3620.00	52.65	H	-21.22	31.43	54	-22.57	Harmonic
3620.00	52.8	V	-21.22	31.58	54	-22.42	Harmonic
4525.00	52.77	H	-21.22	31.55	54	-22.45	Harmonic
4525.00	52.04	V	-21.22	30.82	54	-23.18	Harmonic
Middle Channel(915MHz)							
1830.00	61.68	H	-21.22	40.46	54	-13.54	Harmonic
1830.00	58.40	V	-21.22	37.18	54	-16.82	Harmonic
2745.00	64.55	H	-21.22	43.33	54	-10.67	Harmonic
2745.00	64.07	V	-21.22	42.85	54	-11.15	Harmonic
3660.00	54.49	H	-21.22	33.27	54	-20.73	Harmonic
3660.00	55.46	V	-21.22	34.24	54	-19.76	Harmonic
4575.00	53.21	H	-21.22	31.99	54	-22.01	Harmonic
4575.00	52.38	V	-21.22	31.16	54	-22.84	Harmonic
High Channel(925MHz)							
1850.00	57.31	H	-21.22	36.09	54	-17.91	Harmonic
1850.00	56.26	V	-21.22	35.04	54	-18.96	Harmonic
2775.00	66.73	H	-21.22	45.51	54	-8.49	Harmonic
2775.00	64.99	V	-21.22	43.77	54	-10.23	Harmonic
3700.00	54.97	H	-21.22	33.75	54	-20.25	Harmonic
3700.00	54.81	V	-21.22	33.59	54	-20.41	Harmonic
4625.00	53.79	H	-21.22	32.57	54	-21.43	Harmonic
4625.00	52.51	V	-21.22	31.29	54	-22.71	Harmonic

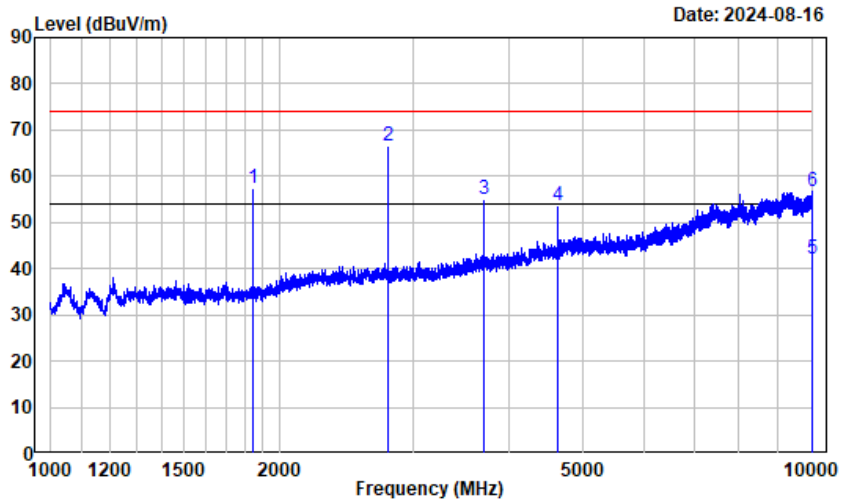
Note:

Corrected. Amplitude = Factor + Reading
Margin = Corrected. Amplitude - Limit
Average level= Peak level+ Duty Cycle Corrected Factor

Through observe the test plots below, the maximum hops in 100ms period is 6times (the second high signals from other channel), the worst case duty cycle as below:
Duty cycle = Ton/100ms = 1.449*6/100=0.08694
Duty Cycle Corrected Factor = 20lg (Duty cycle) = 20lg0.08694 = -21.22

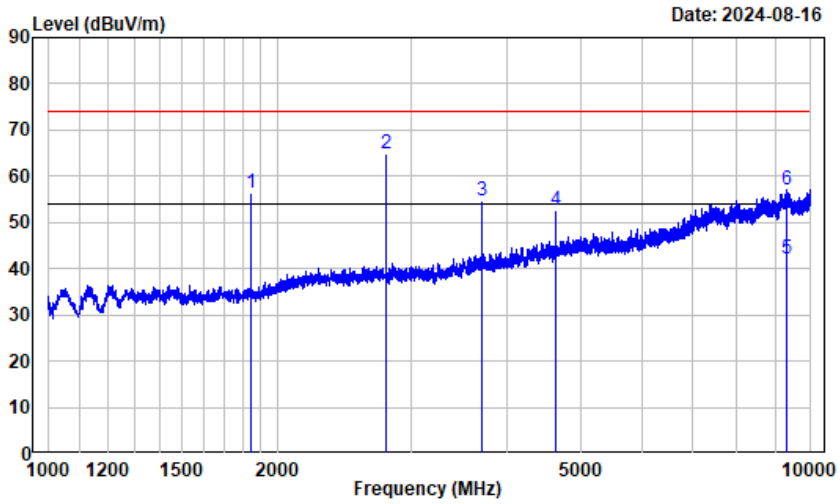
Duty Cycle (100ms)	
Duty Cycle (1s)	

Listed with the worst harmonic margin test plot

Horizontal	
1-10GHz	 Condition : Horizontal Project No.: 2401V84620E-RF Tester : Sadow Tan Note : FHSS_925 Freq / Factor / Read Level / Level / Limit Line / Over Limit / Remark MHz / dB/m / dBuV / dBuV/m / dBuV/m / dB 1 1850.000 -6.29 63.60 57.31 74.00 -16.69 Peak 2 2775.000 -2.46 69.19 66.73 74.00 -7.27 Peak 3 3700.000 -1.54 56.51 54.97 74.00 -19.03 Peak 4 4625.000 0.99 52.80 53.79 74.00 -20.21 Peak 5 9992.125 12.25 29.85 42.10 54.00 -11.90 Average 6 9992.125 12.25 44.61 56.86 74.00 -17.14 Peak

Vertical

1-10GHz



Condition : Vertical
Project No.: 2401V84620E-RF
Tester : Sadow Tan
Note : FHSS_925

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	1850.000	-6.29	62.55	56.26	74.00	-17.74	Peak
2	2775.000	-2.46	67.45	64.99	74.00	-9.01	Peak
3	3700.000	-1.54	56.35	54.81	74.00	-19.19	Peak
4	4625.000	0.99	51.52	52.51	74.00	-21.49	Peak
5	9294.625	11.80	30.44	42.24	54.00	-11.76	Average
6	9294.625	11.80	45.33	57.13	74.00	-16.87	Peak

FCC §15.247(a) (1) & RSS-247 § 5.1 (b)-CHANNEL SEPARATION TEST

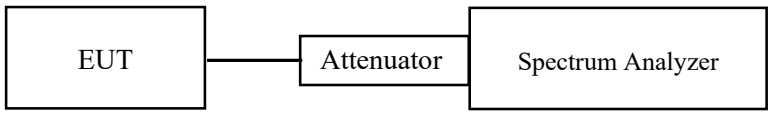
Applicable Standard

Frequency hopping systems (FHSs) 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

According to ANSI C63.10-2013 section 7.8.2

1. Set the EUT in transmitting mode, maxhold the channel and in Operating mode, RBW was start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel, VBW≥ RBW max-hold the channel.
2. Set the adjacent channel of the EUT and maxhold another trace.
3. Measure the channel separation.



Test Data

Environmental Conditions

Temperature:	24~27 ℃
Relative Humidity:	50~57 %
ATM Pressure:	101.0 kPa

The testing was performed by Rainbow Zhu on 2024-08-16.

EUT operation mode: Transmitting

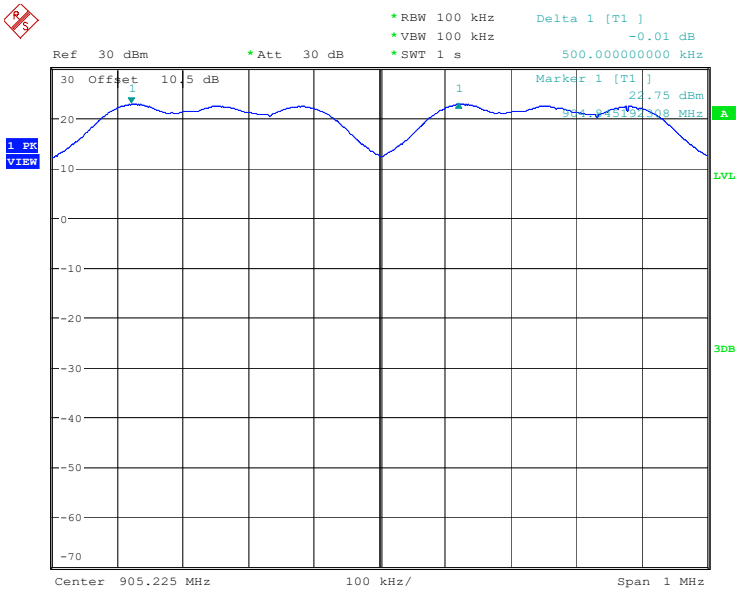
Test Result: Compliant.

Note: According to frequency table in page 7 and inverstigating the hopping channel test in page 47, the minimum channel separation is the worst case which were recorded as below:

Test Mode	Antenna	Test Channel	Channel Separation (MHz)	Limits (MHz)
GFSK	ANTA	Hop	0.500	0.331
GFSK	ANTB	Hop	0.505	0.331
Note: Limit ≥ 20 dB bandwidth				

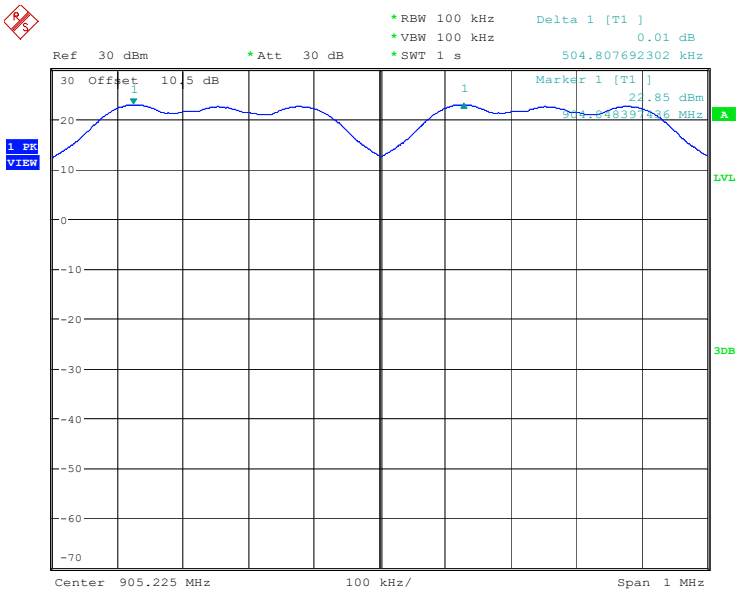
Please refer to the below plots:

ANTA_Hop



ProjectNo.:2401V84620E-RF Tester:Rainbow Zhu
Date: 16.AUG.2024 13:57:36

ANTB_Hop



ProjectNo.:2401V84620E-RF Tester:Rainbow Zhu
Date: 16.AUG.2024 15:07:08

FCC §15.247(a) (1) (i) & RSS-GEN § 6.7 & RSS-247 § 5.1 (a) (c)–99% OCCUPIED BANDWIDTH & 20 dB EMISSION BANDWIDTH

Applicable Standard

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

The occupied bandwidth or the "99% emission bandwidth" is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained. The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs.

In some cases, the "20 dB bandwidth" is required, which is defined as the frequency range between two points, one at the lowest frequency below and one at the highest frequency above the carrier frequency, at which the maximum power level of the transmitted emission is attenuated 20 dB below the maximum in-band power level of the modulated signal, where the two points are on the outskirts of the in-band emission.

Test Procedure

According to ANSI C63.10-2013 section 7.8.7

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

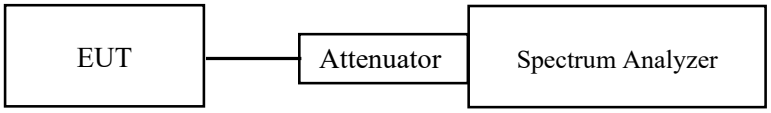
The following conditions shall be observed for measuring the occupied bandwidth and 20 dB bandwidth:
• The transmitter shall be operated at its maximum carrier power measured under normal test conditions.

• 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 resolution bandwidth (RBW) shall be in the range of 1% to 5% of the actual occupied / 20 dB bandwidth and the video bandwidth (VBW) shall not be smaller than three times the RBW value. Video averaging is not permitted.

Note: It may be necessary to repeat the measurement a few times until the RBW and VBW are in compliance with the above requirement.
For the 99% emission bandwidth, the trace data points are recovered and directly summed in linear power level terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached, and that frequency recorded. The process is repeated for the highest frequency data points (starting at the highest frequency, at the right side of the span, and going down in frequency). This frequency is then recorded. The difference between the two recorded frequencies is the occupied bandwidth (or the 99% emission bandwidth).



Test Data

Environmental Conditions

Temperature:	24~27℃
Relative Humidity:	50~57 %
ATM Pressure:	101.0 kPa

The testing was performed by Rainbow Zhu on 2024-08-01.

EUT operation mode: Transmitting

Test Result: Compliant.

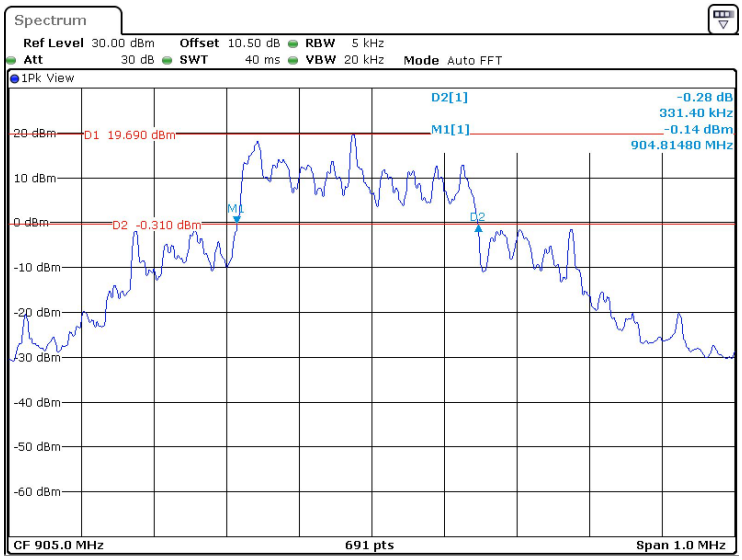
Mode	Channel	Frequency (MHz)	99% Occupied Bandwidth (kHz)	20 dB Emission Bandwidth (kHz)	Limit(kHz)
ANT A					
GFSK	Low	905	442.84	331.40	250< BW_{20dB} ≤ 500
	Middle	915	442.84	331.40	250< BW_{20dB} ≤ 500
	High	925	441.39	331.40	250< BW_{20dB} ≤ 500
ANT B					
GFSK	Low	905	437.05	331.40	250< BW_{20dB} ≤ 500
	Middle	915	438.49	331.40	250< BW_{20dB} ≤ 500
	High	925	437.05	331.40	250< BW_{20dB} ≤ 500

Please refer to the below plots:

ANT A:

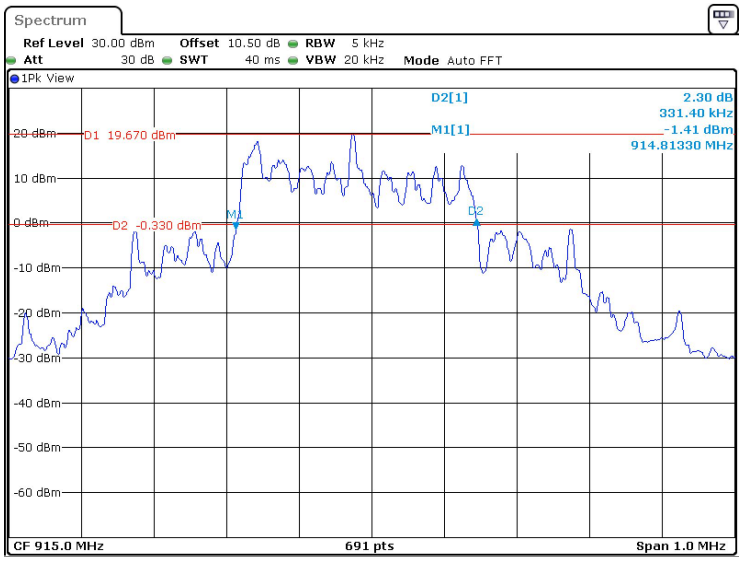
20 dB Emission Bandwidth

Low Channel



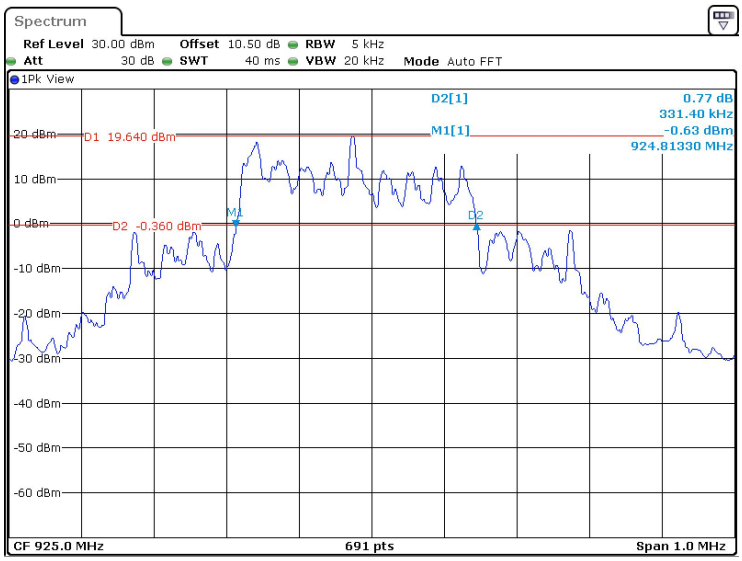
ProjectNo.:2401V84620E-RF Tester:Rainbow Zhu
Date: 1.AUG.2024 15:54:46

Middle Channel



ProjectNo.:2401V84620E-RF Tester:Rainbow Zhu
Date: 1.AUG.2024 15:57:54

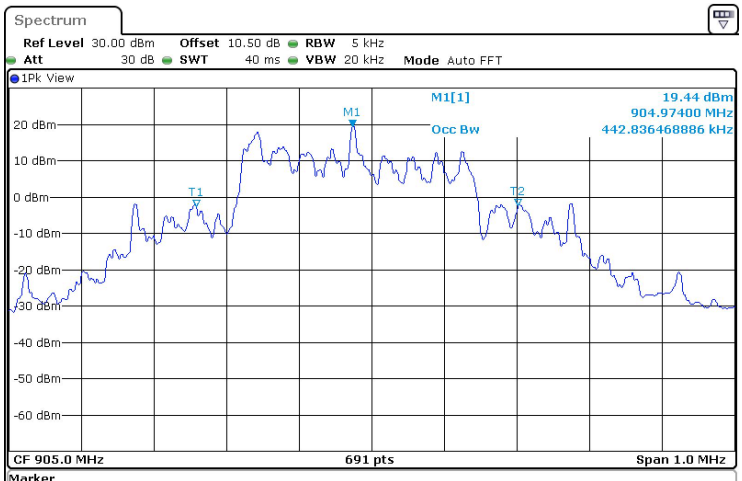
High Channel



ProjectNo.:2401V84620E-RF Tester:Rainbow Zhu
Date: 1.AUG.2024 16:00:39

99% Occupied Bandwidth

Low Channel

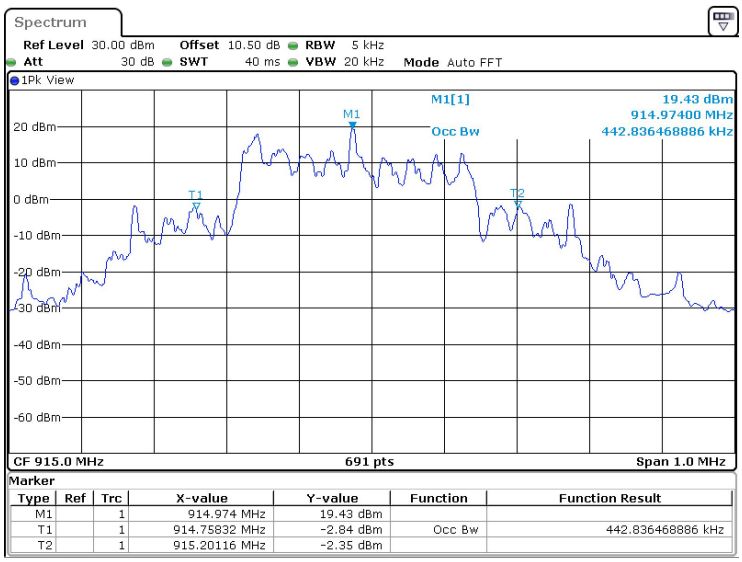


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	904.974 MHz	19.44 dBm		
T1		1	904.75832 MHz	-2.76 dBm	Occ Bw	442.836468886 kHz
T2		1	905.20116 MHz	-2.51 dBm		

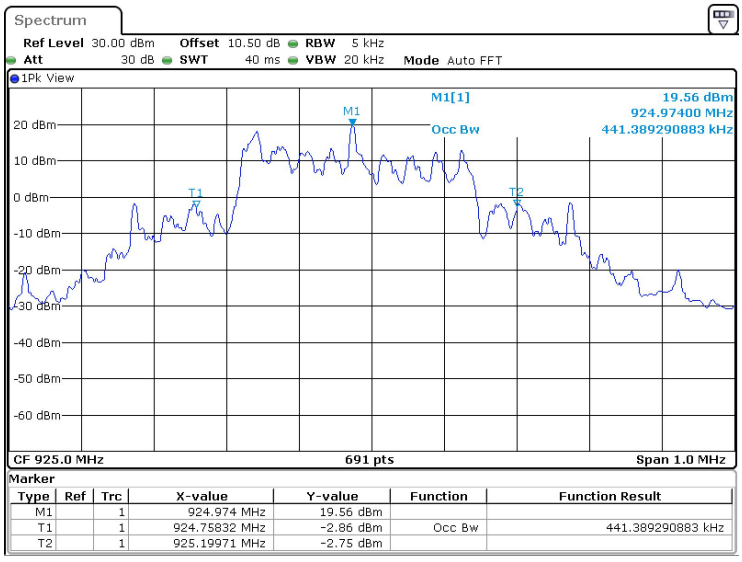
ProjectNo.:2401V84620E-RF Tester:Rainbow Zhu
Date: 1.AUG.2024 16:03:44

Middle Channel



ProjectNo.:2401V84620E-RF Tester:Rainbow Zhu
Date: 1.AUG.2024 16:04:27

High Channel

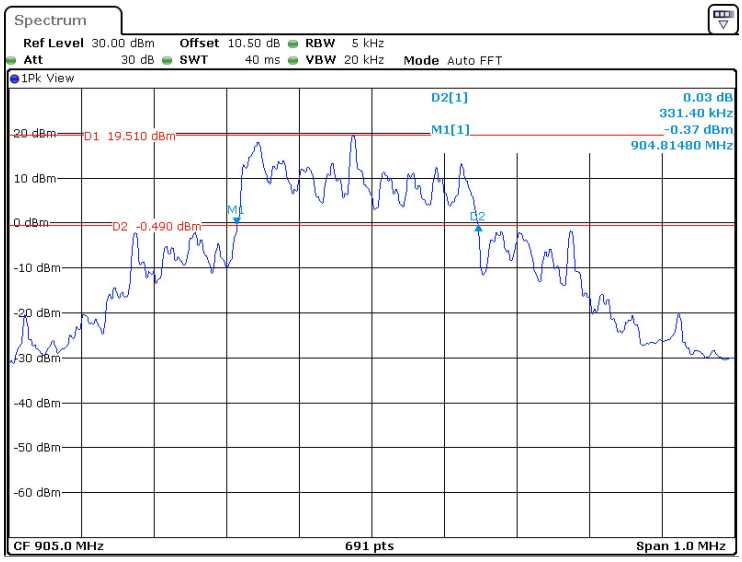


ProjectNo.:2401V84620E-RF Tester:Rainbow Zhu
Date: 1.AUG.2024 16:02:39

ANT B:

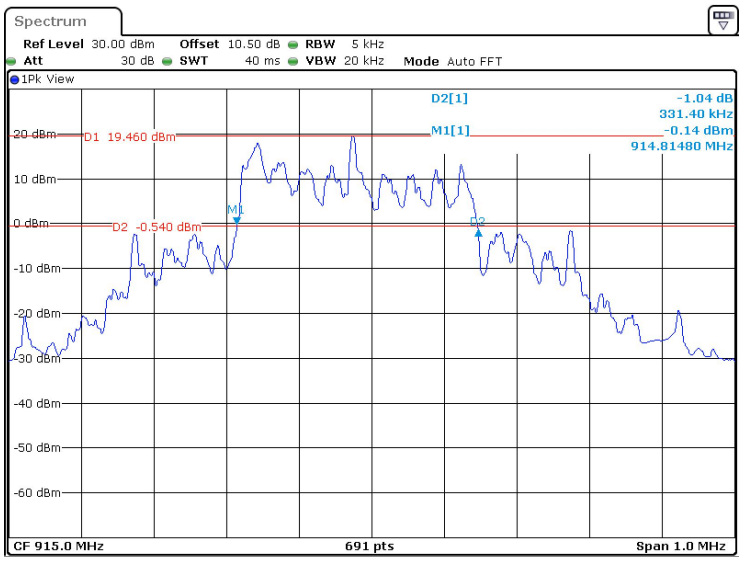
20 dB Emission Bandwidth

Low Channel



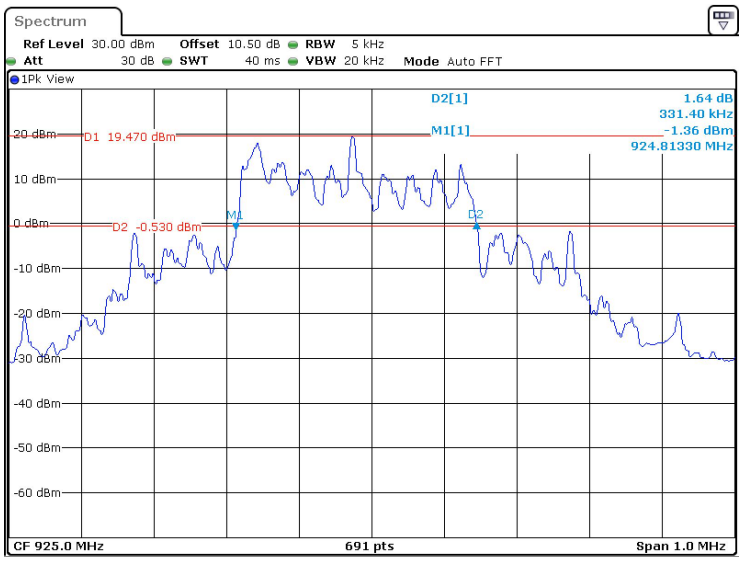
ProjectNo.:2401V84620E-RF Tester:Rainbow Zhu
Date: 1.AUG.2024 16:55:40

Middle Channel



ProjectNo.:2401V84620E-RF Tester:Rainbow Zhu
Date: 1.AUG.2024 17:02:00

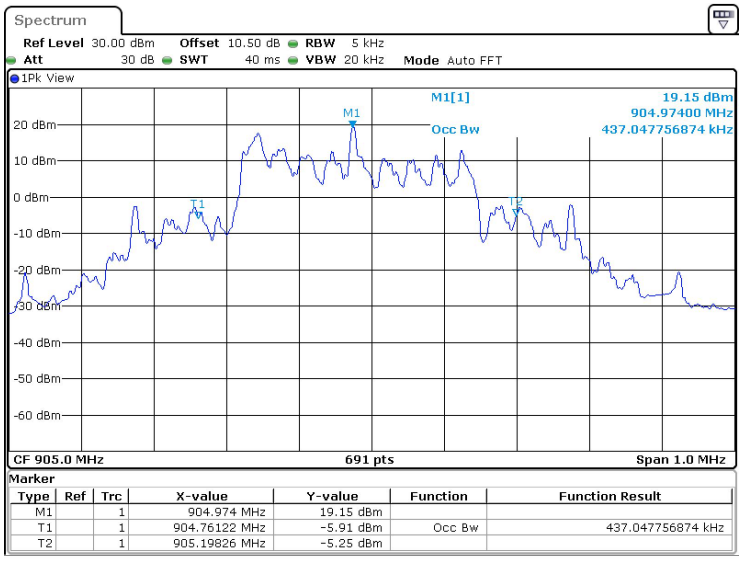
High Channel



ProjectNo.:2401V84620E-RF Tester:Rainbow Zhu
Date: 1.AUG.2024 17:04:03

99% Occupied Bandwidth

Low Channel

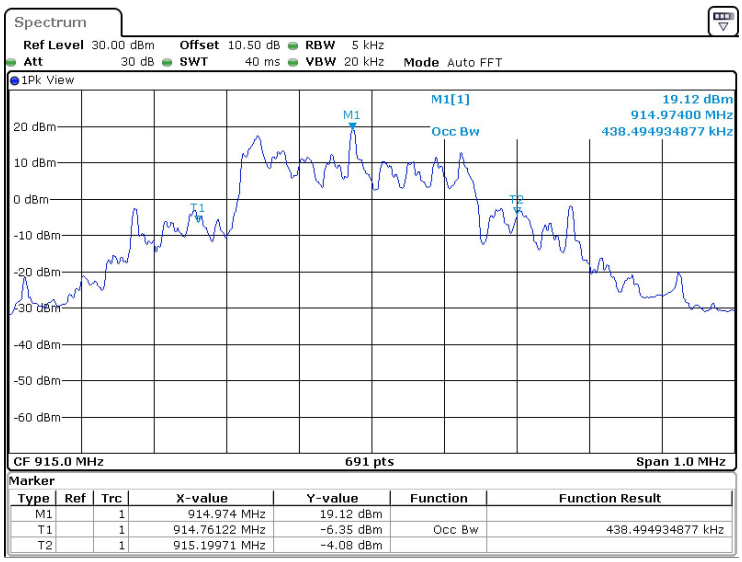


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	904.974 MHz	19.15 dBm		
T1		1	904.76122 MHz	-5.91 dBm	Occ Bw	437.047756874 kHz
T2		1	905.19826 MHz	-5.25 dBm		

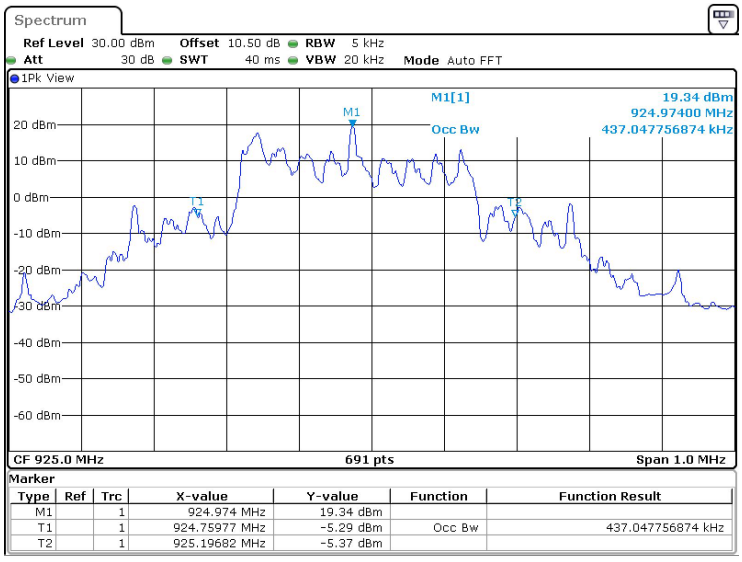
ProjectNo.:2401V84620E-RF Tester:Rainbow Zhu
Date: 1.AUG.2024 17:06:46

Middle Channel



ProjectNo.:2401V84620E-RF Tester:Rainbow Zhu
Date: 1.AUG.2024 17:07:24

High Channel



ProjectNo.:2401V84620E-RF Tester:Rainbow Zhu
Date: 1.AUG.2024 17:05:57

FCC §15.247(a) (1) (i) & RSS-247 § 5.1 (c)-QUANTITY OF HOPPING CHANNEL TEST

Applicable Standard

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

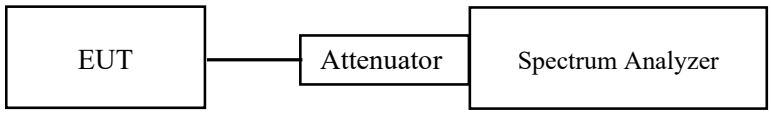
Test Procedure

According to ANSI C63.10-2013 section 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:	24~27 ℃
Relative Humidity:	50~57 %
ATM Pressure:	101.0 kPa

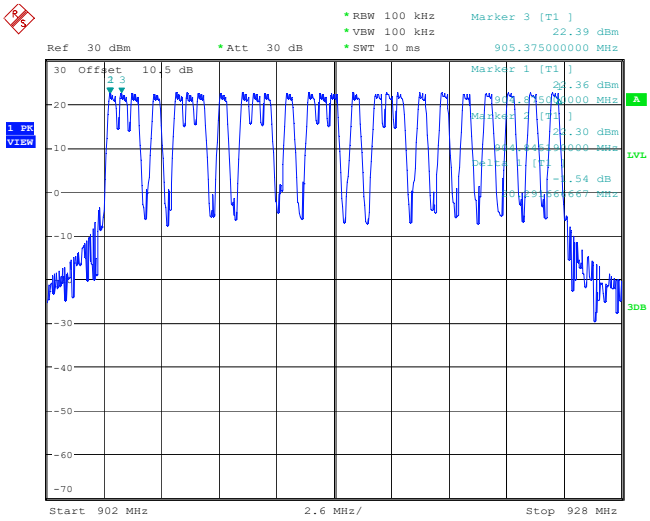
The testing was performed by Rainbow Zhu on 2024-08-16.

EUT operation mode: Transmitting

Test Result: Compliant.

Antenna	Frequency Range (MHz)	Number of Hopping Channel (CH)	Limit (CH)
ANTA	902-928	26	25 ≤ Nch < 50
ANTB	902-928	26	25 ≤ Nch < 50

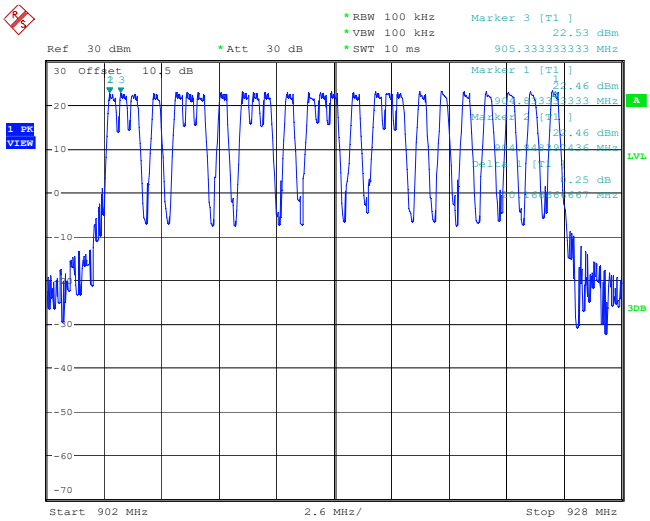
ANT A, Hop



ProjectNo.:2401V84620E-RF Tester:Rainbow Zhu

Date: 16.AUG.2024 14:08:30

ANT B, Hop



ProjectNo.:2401V84620E-RF Tester:Rainbow Zhu

Date: 16.AUG.2024 15:12:43

FCC §15.247(a) (1) (i) & RSS-247 § 5.1 (c) - TIME OF OCCUPANCY (DWELL TIME)

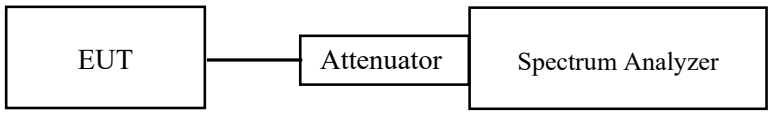
Applicable Standard

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period.

Test Procedure

According to ANSI C63.10-2013 section 7.8.4

1. The EUT was worked in channel hopping.
2. Set the RBW to: 10kHz.
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:	24~27 ℃
Relative Humidity:	50~57 %
ATM Pressure:	101.0 kPa

The testing was performed by Rainbow Zhu from 2024-07-22 to 2024-08-16.

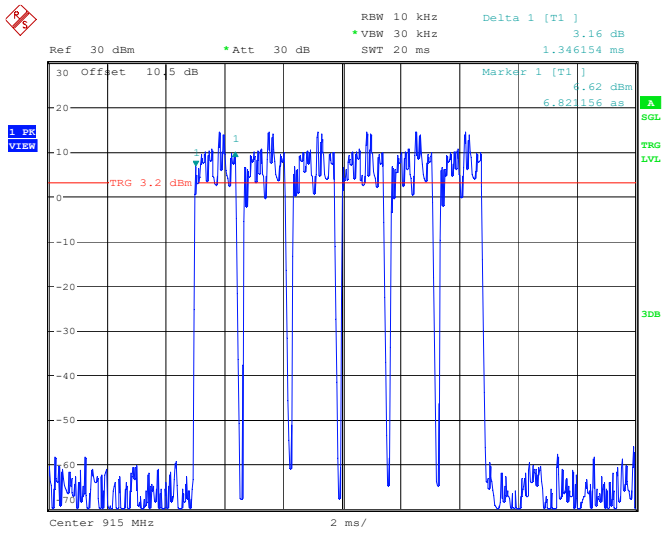
EUT operation mode: Transmitting

Test Result: Compliant.

Antenna	Test Frequency (MHz)	Pulse width (ms)	Observation time (s)	Hopping Numbers in Observation time	Dwell Time (s)	Limit (s)
ANTA	Hop_915	8.076	10	20	0.162	0.400
ANTB	Hop_915	8.076	10	20	0.162	0.400
Note: Observation time= 10s, Dwell Time = Pulse Width × Hopping Numbers in Observation time Pulse Width = Pulse Time* Pulse Number =1.346ms*6= 8.076ms						

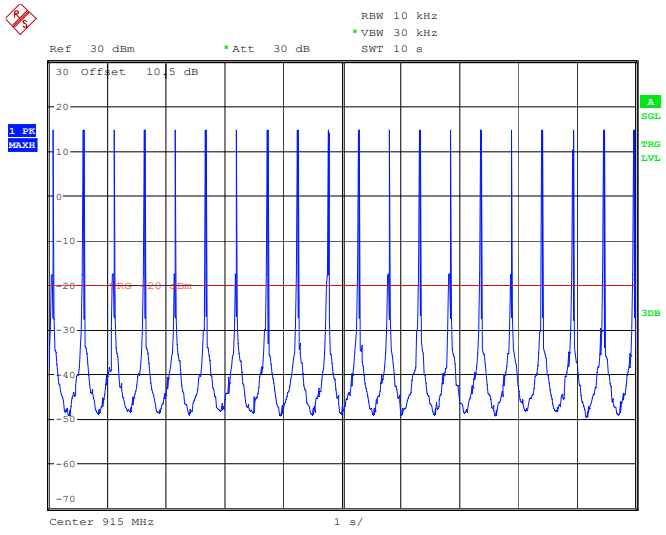
ANT A:

Pulse Time: 1.346ms & Maximum Pulse number in one hop: 6



ProjectNo.:2401V84620E-RF Tester:Rainbow Zhu
Date: 16.AUG.2024 11:56:45

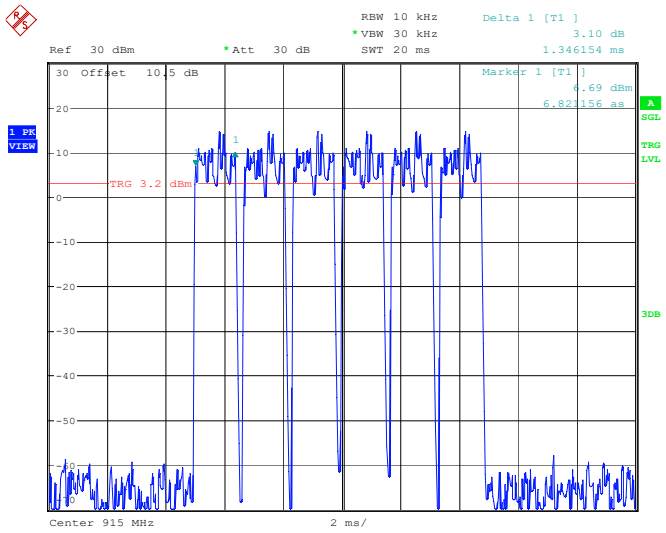
Hopping Numbers in 10s



ProjectNo.:2401V84620E-RF Tester:Rainbow Zhu
Date: 22.JUL.2024 15:56:09

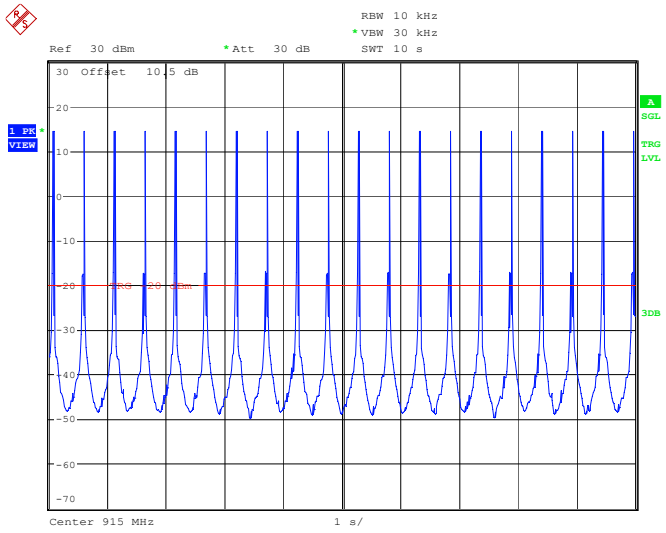
ANT B:

Pulse Time: 1.346ms & Maximum Pulse number in one hop: 6



ProjectNo.:2401V84620E-RF Tester:Rainbow Zhu
Date: 16.AUG.2024 11:59:29

Hopping Numbers in 10s



ProjectNo.:2401V84620E-RF Tester:Rainbow Zhu
Date: 24.JUL.2024 09:45:00

FCC §15.247(b) (2) & RSS-247§ 5.4(a) - PEAK OUTPUT POWER MEASUREMENT

Applicable Standard

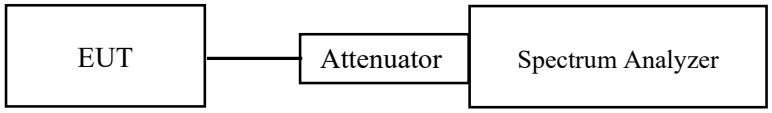
According to §15.247(b) (2), For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.

According to RSS-247 § 5.4(a)For FHSs operating in the band 902-928 MHz, the maximum peak conducted output power shall not exceed 1.0 W, and the e.i.r.p. shall not exceed 4 W if the hopset uses 50 or more hopping channels; the maximum peak conducted output power shall not exceed 0.25 W and the e.i.r.p. shall not exceed 1 W if the hopset uses less than 50 hopping channels.

Test Procedure

According to ANSI C63.10-2013 section 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:	24~27 ℃
Relative Humidity:	50~57 %
ATM Pressure:	101.0 kPa

The testing was performed by Rainbow Zhu from 2024-07-22 to 2024-07-23.

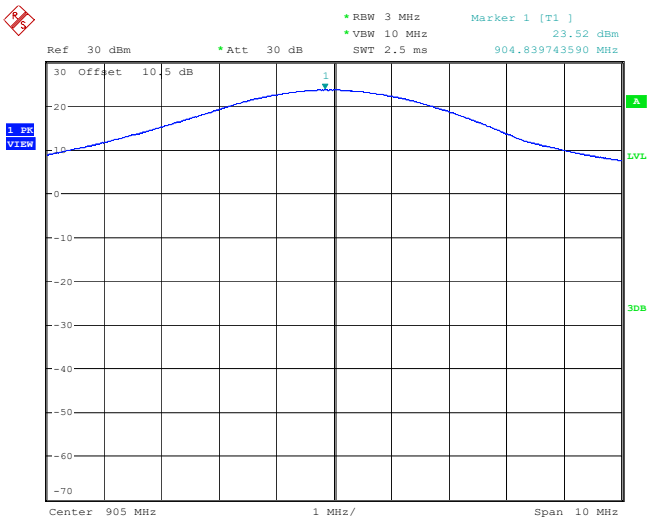
EUT operation mode: Transmitting

Test Result: Compliant.

Mode	Channel	Frequency (MHz)	Peak Output Power (dBm)	Limit (dBm)
ANT A				
GFSK	Low	905	23.52	24
	Middle	915	23.53	24
	High	925	23.75	24
ANT B				
Mode	**Channel**	**Frequency (MHz)**	**Peak Output Power (dBm)**	**Limit (dBm)**
GFSK	Low	905	23.57	24
	Middle	915	23.71	24
	High	925	23.87	24
Note: EIRP Limit for RSS-247:30dBm The antenna gain=0dBi, the maximum EIRP= 23.87dBm<30dBm				

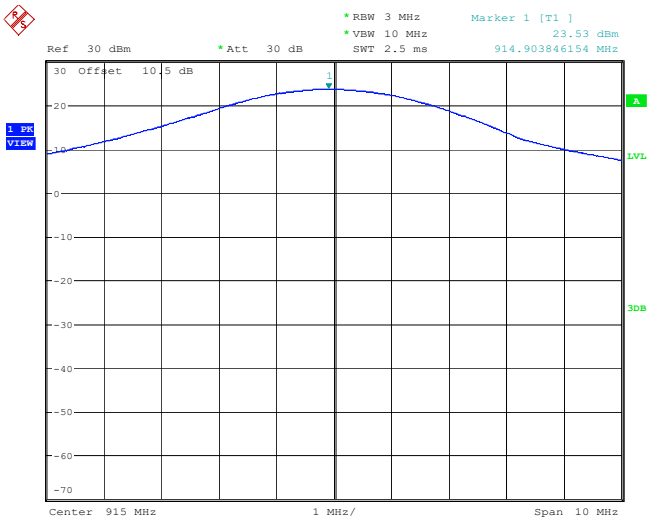
ANT A:

Low Channel



ProjectNo.:2401V84620E-RF Tester:Rainbow Zhu
Date: 22.JUL.2024 10:17:40

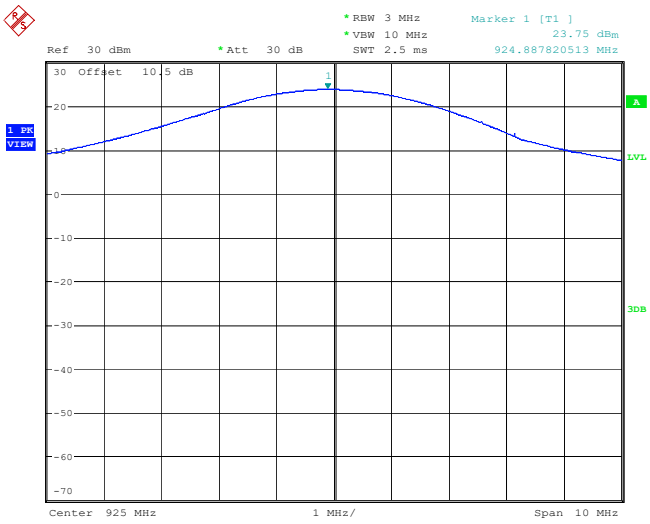
Middle Channel



ProjectNo.:2401V84620E-RF Tester:Rainbow Zhu

Date: 22.JUL.2024 10:01:48

High Channel

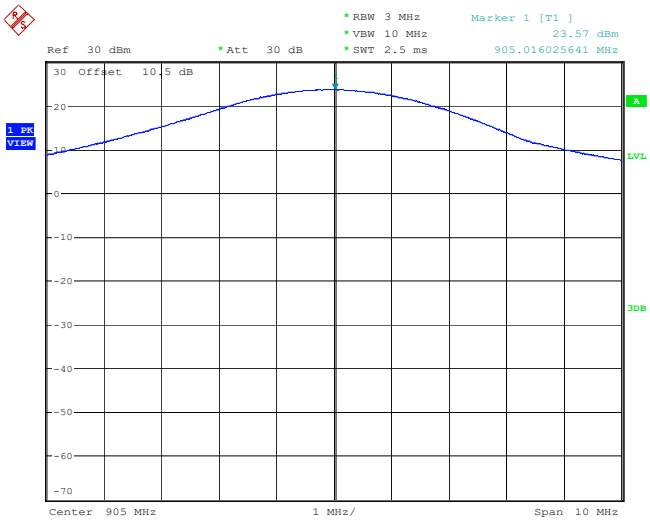


ProjectNo.:2401V84620E-RF Tester:Rainbow Zhu

Date: 22.JUL.2024 10:14:18

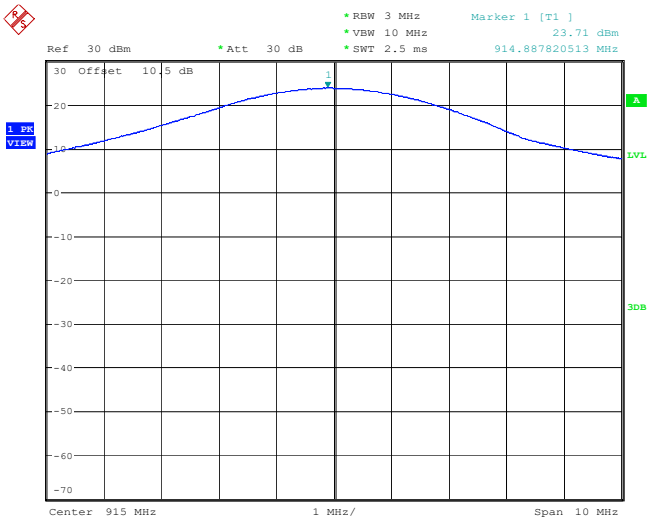
ANT B:

Low Channel



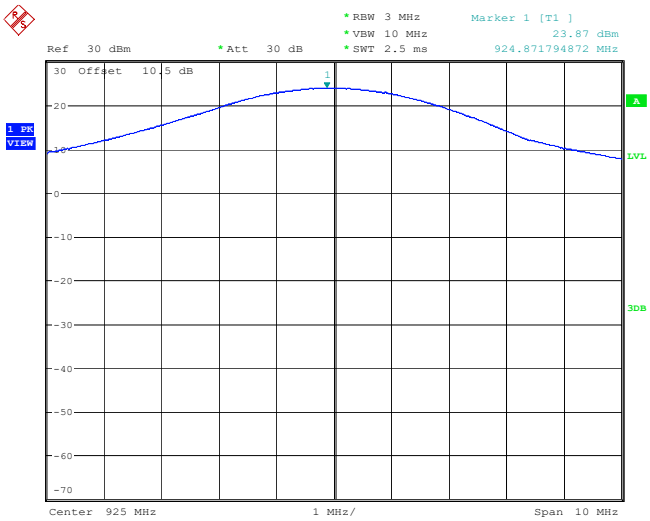
ProjectNo.:2401V84620E-RF Tester:Rainbow Zhu
Date: 23.JUL.2024 17:19:04

Middle Channel



ProjectNo.:2401V84620E-RF Tester:Rainbow Zhu
Date: 23.JUL.2024 17:21:00

High Channel



ProjectNo.:2401V84620E-RF Tester:Rainbow Zhu

Date: 23.JUL.2024 17:22:56

FCC §15.247(d) & RSS-247 § 5.5 - BAND EDGES TESTING

Applicable Standard

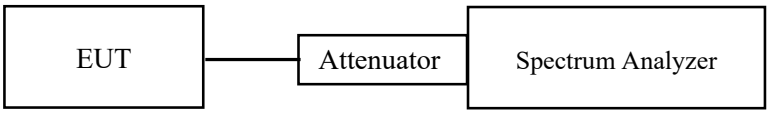
According to FCC §15.247(d) & RSS-247 § 5.5.

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)) & RSS-Gen.

Test Procedure

According to ANSI C63.10-2013 section 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:	24~25 ℃
Relative Humidity:	55 %
ATM Pressure:	101.0 kPa

The testing was performed by Rainbow Zhu on 2024-08-12.

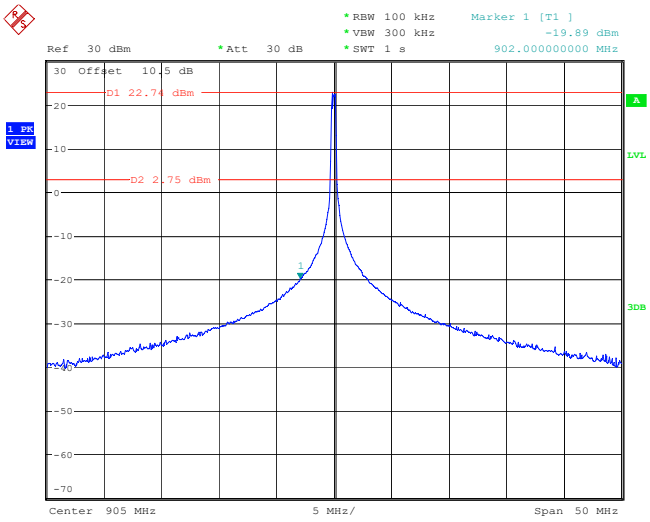
EUT operation mode: Transmitting

Test Result: Compliant.

Conducted Band Edge Result:

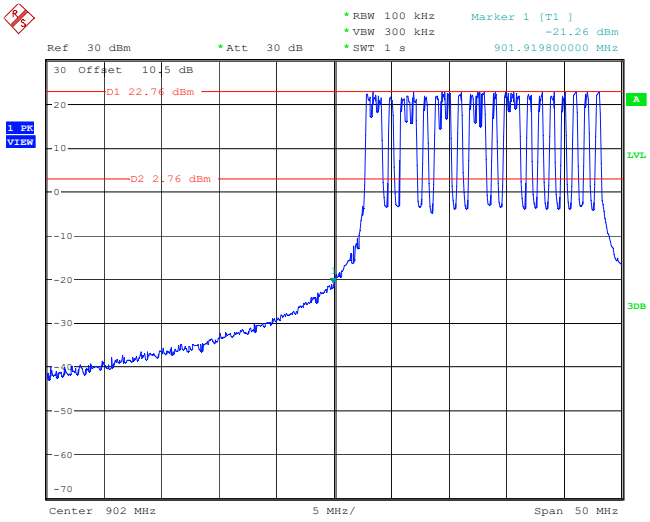
ANT A:

GFSK_Low Channel



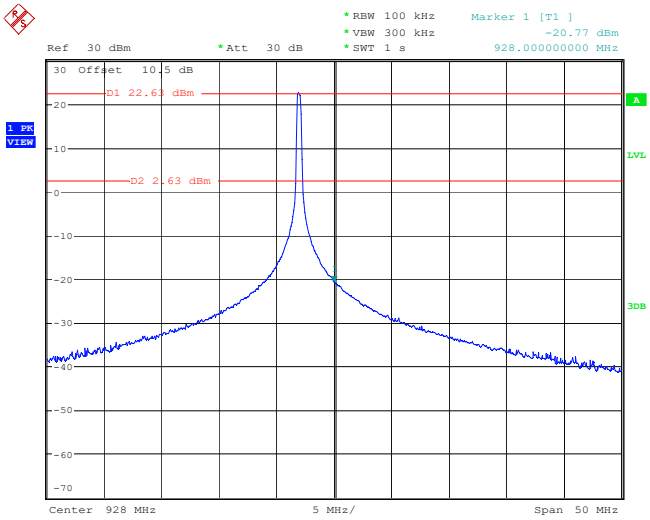
ProjectNo.:2401V84620E-RF Tester:Rainbow Zhu
Date: 12.AUG.2024 11:26:55

GFSK_Hop_Low Channel



ProjectNo.:2401V84620E-RF Tester:Rainbow Zhu
Date: 12.AUG.2024 11:19:55

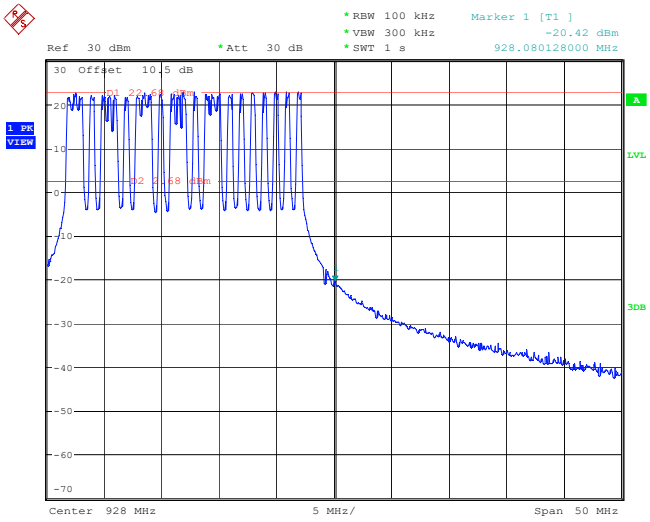
GFSK_High Channel



ProjectNo.:2401V84620E-RF Tester:Rainbow Zhu

Date: 12.AUG.2024 11:29:10

GFSK_Hop_High Channel

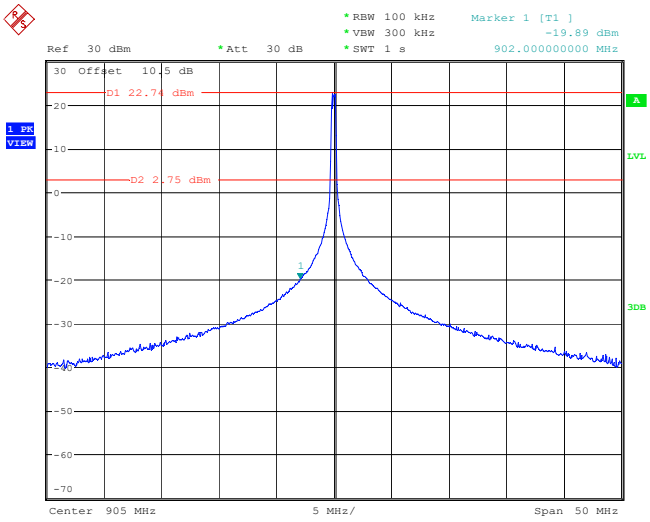


ProjectNo.:2401V84620E-RF Tester:Rainbow Zhu

Date: 12.AUG.2024 11:24:36

ANT B:

GFSK_Low Channel



ProjectNo.:2401V84620E-RF Tester:Rainbow Zhu
Date: 12.AUG.2024 11:26:55

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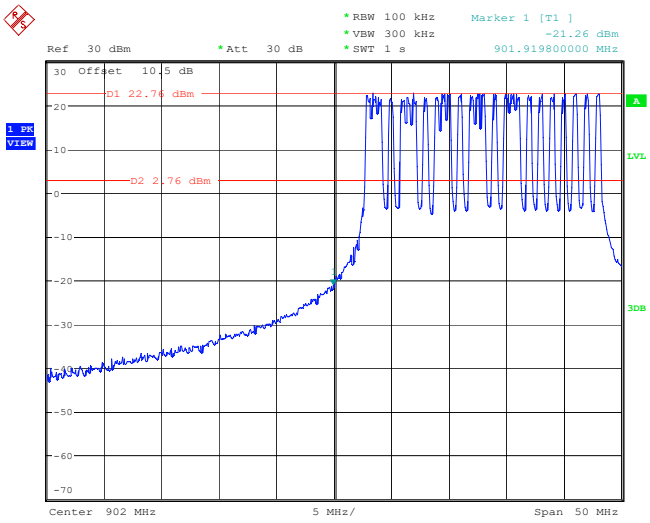

ProjectNo.:2401V84620E-RF Tester:Rainbow Zhu
Date: 12.AUG.2024 11:19:55

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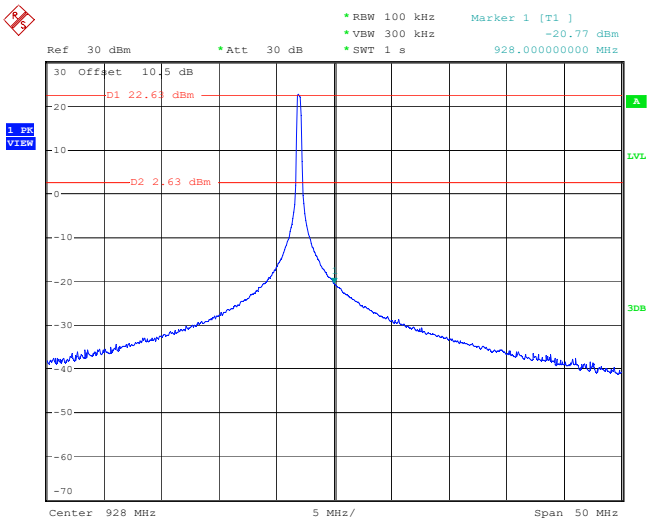
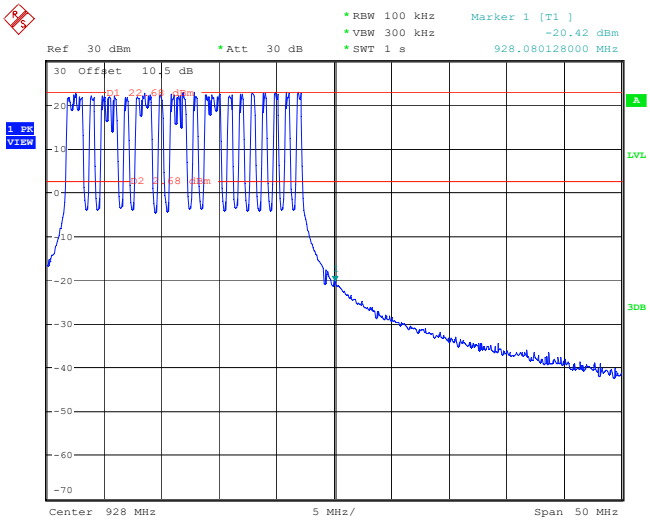


ProjectNo.:2401V84620E-RF Tester:Rainbow Zhu
Date: 12.AUG.2024 11:29:10

GFSK_Hop_High Channel



ProjectNo.:2401V84620E-RF Tester:Rainbow Zhu
Date: 12.AUG.2024 11:24:36

EUT PHOTOGRAPHS

Please refer to the attachment 2401V84620E-RF External photo and 2401V84620E-RF Internal photo.

TEST SETUP PHOTOGRAPHS

Please refer to the attachment 2401V84620E-RFB Test Setup photo.

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