

FCC PART 15.247
TEST REPORT

For

Ringway Tech(Jiangsu) Co.,Ltd.

No. 101 West Hanjiang Road, Changzhou, Jiangsu, China

FCC ID:OCDAB5301A01

Report Type: Original Report	Product Name: Bluetooth module
Report Number:	RSA240108001-00A
Report Date:	2024-04-05
Reviewed By:	Jenny Yang
Approved By:	Kyle Xu
Prepared By:	Bay Area Compliance Laboratories Corp. (Kunshan) No.248 Chenghu Road, Kunshan, Jiangsu Province, China Tel: +86-512-86175000 Fax: +86-512-88934268 www.baclcorp.com.cn

Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Kunshan). This report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, or any agency of the U.S.Government.

TABLE OF CONTENTS

REPORT REVISION HISTORY.....	4
GENERAL INFORMATION.....	5
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	5
OBJECTIVE	5
TEST METHODOLOGY	5
MEASUREMENT UNCERTAINTY	6
TEST FACILITY	6
SYSTEM TEST CONFIGURATION.....	7
DESCRIPTION OF TEST CONFIGURATION	7
EUT EXERCISE SOFTWARE	7
SPECIAL ACCESSORIES	7
EQUIPMENT MODIFICATIONS	7
SUPPORT EQUIPMENT LIST AND DETAILS	8
EXTERNAL I/O CABLE.....	8
BLOCK DIAGRAM OF TEST SETUP	8
TEST EQUIPMENT LIST	10
SUMMARY OF TEST RESULTS	11
FCC §15.203 – ANTENNA REQUIREMENT	12
APPLICABLE STANDARD	12
ANTENNA CONNECTOR CONSTRUCTION	12
FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS	13
APPLICABLE STANDARD	13
TEST SYSTEM SETUP.....	13
EMI TEST RECEIVER SETUP.....	13
TEST PROCEDURE	14
TEST RESULTS SUMMARY	14
TEST DATA: SEE APPENDIX	14
FCC §15.205, §15.209 & §15.247(d) – RADIATED EMISSIONS.....	15
APPLICABLE STANDARD	15
TEST SYSTEM SETUP.....	15
EMI TEST RECEIVER SETUP.....	16
TEST PROCEDURE	16
TEST RESULTS SUMMARY	17
TEST DATA: SEE APPENDIX	17
FCC §15.247(a) (1)-CHANNEL SEPARATION TEST	18
APPLICABLE STANDARD	18
TEST PROCEDURE	18
TEST DATD: SEE APPENDIX	18
FCC §15.247(a) (1) – 20 dB EMISSION BANDWIDTH.....	19
APPLICABLE STANDARD	19
TEST PROCEDURE	19
TEST DATD: SEE APPENDIX	19
FCC §15.247(a) (1) (iii)-QUANTITY OF HOPPING CHANNEL TEST	20
APPLICABLE STANDARD	20
TEST PROCEDURE	20
TEST DATD: SEE APPENDIX	20

FCC §15.247(a) (1) (iii) - TIME OF OCCUPANCY (DWELL TIME)	21
APPLICABLE STANDARD	21
TEST PROCEDURE	21
TEST DATD: SEE APPENDIX	21
FCC §15.247(b) (1) - PEAK OUTPUT POWER MEASUREMENT	22
APPLICABLE STANDARD	22
TEST PROCEDURE	22
TEST DATD: SEE APPENDIX	22
FCC §15.247(d) - BAND EDGES TESTING	23
APPLICABLE STANDARD	23
TEST PROCEDURE	23
TEST DATD: SEE APPENDIX	23
EUT PHOTOGRAPHS	24
TEST SETUP PHOTOGRAPHS	25
APPENDIX - TEST DATA	26
ENVIRONMENTAL CONDITIONS & TEST INFORMATION	26
AC LINE CONDUCTED EMISSIONS	27
RADIATED EMISSIONS & RESTRICTED BANDS EMISSIONS	29
CHANNEL SEPARATION TEST	48
20 dB BANDWIDTH TEST	53
QUANTITY OF HOPPING CHANNEL TEST	58
TIME OF OCCUPANCY (DWELL TIME).....	60
PEAK OUTPUT POWER MEASUREMENT.....	66
BAND EDGES.....	72

REPORT REVISION HISTORY

Number of Revisions	Report No.	Version	Issue Date	Description
0	RSHA240108001-00A	R1V1	2024-04-05	Initial Release

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant:	Ringway Tech(Jiangsu) Co.,Ltd.
Product Name:	Bluetooth module
Tested Model:	AB5301A01
Power Supply:	DC 3~5V
Maximum Output Power:	GFSK:-1.23 dBm $\pi/4$ -DQPSK:0.96 dBm 8DPSK:1.39 dBm
RF Function:	Classic BT
Operating Band/Frequency:	2402-2480 MHz
Channel Number:	79
Channel Separation:	1 MHz
Modulation Type:	GFSK, $\pi/4$ -DQPSK, 8DPSK
Antenna Type:	Ceramic Antenna
★Maximum Antenna Gain:	2.5 dBi

Note: The maximum antenna gain was declared by the manufacturer.

All measurement and test data in this report was gathered from production sample serial number: RSHA240108001-1 (Assigned by the BACL (Kunshan). The EUT supplied by the applicant was received on 2024-01-08.)

Objective

This test report is prepared for *Ringway Tech(Jiangsu) Co.,Ltd.* in accordance with Part 2-Subpart J, Part 15-Subparts A and C of the Federal Communication Commissions rules.

The tests were performed in order to determine Compliance with FCC Part 15, Subpart C, section 15.203, 15.205, 15.207, 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 and 558074 D01 15.247 Meas Guidance v05r02.

Measurement Uncertainty

Item		Uncertainty
AC Power Lines Conducted Emissions		3.19dB
RF conducted test with spectrum		0.9dB
RF Output Power with Power meter		0.5dB
Radiated emission	9 kHz~150 kHz	3.8dB
	150 kHz~30 MHz	3.4dB
	30MHz~1GHz	6.11dB
	1GHz~6GHz	4.45dB
	6GHz~18GHz	5.23dB
	18GHz~40GHz	5.65dB
Occupied Bandwidth		0.5kHz
Temperature		1.0°C
Humidity		6%

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the No.248 Chenghu Road, Kunshan, Jiangsu Province, China.

Bay Area Compliance Laboratories Corp. (Kunshan) is accredited in accordance with ISO/IEC 17025:2017 by NVLAP (Lab code: 600338-0), and the lab has been recognized as the FCC accredited lab under the KDB 974614 D01, the FCC Designation No. : CN5055.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

Channel list:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	40	2442
1	2403	...	...
...	...	...	...
...	...	78	2480
39	2441	/	/

EUT was tested with Channel 0, 39 and 78.

EUT Exercise Software

RF Test Tool: BT_Tool.exe

★Power level: Default

Note: The power level was declared by the applicant.

Special Accessories

No special accessory.

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

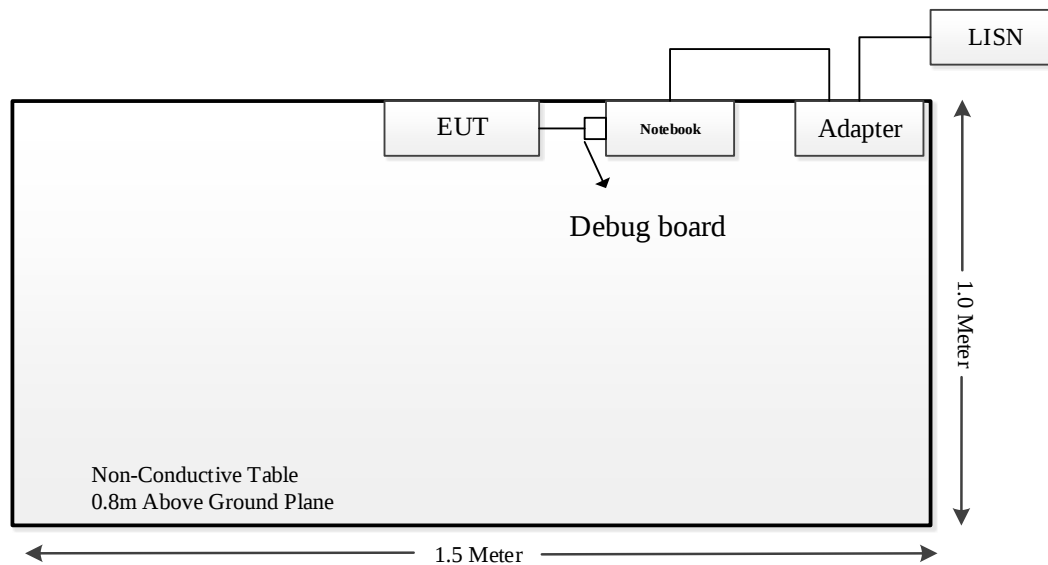
Manufacturer	Description	Model	Serial Number
Unknown	Adapter	Unknown	Unknown
Unknown	Debug board	Unknown	Unknown
Lenovo	Notebook	Y700P	PF2B7PL5

External I/O Cable

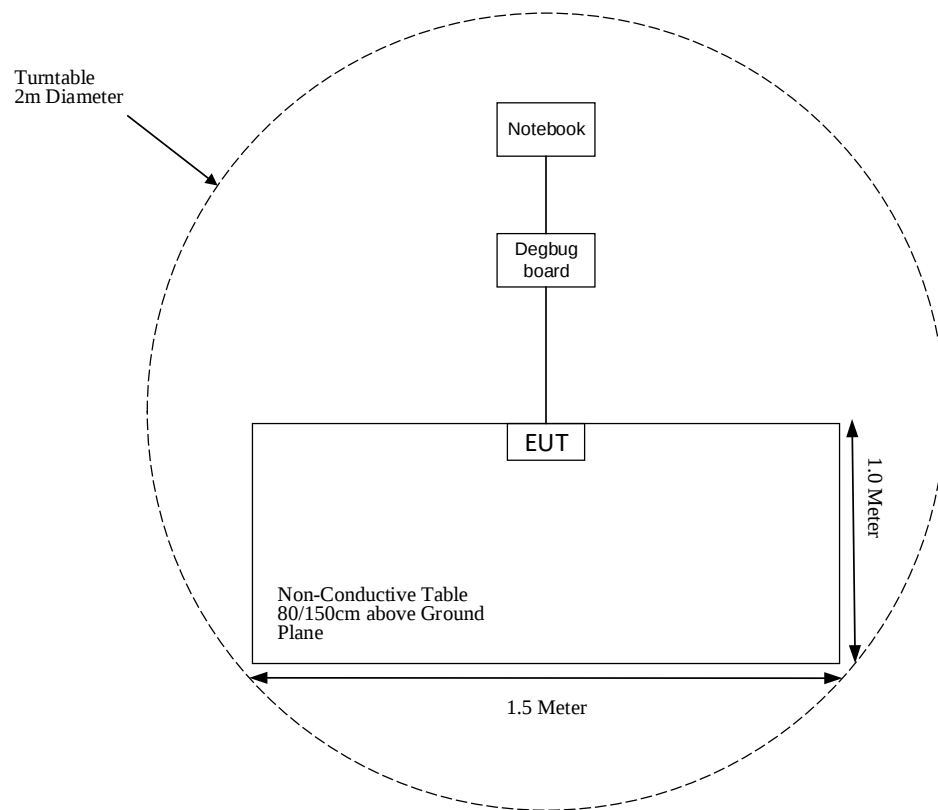
Cable Description	Length (m)	From Port	To
Power Cable 1	2.0	LISN	Adapter
USB cable	5.0	Debug board	Notebook
Data Cable	0.1	EUT	Debug board

Block Diagram of Test Setup

For Conducted Emissions:



For Radiated Emissions(Below 1GHz & Above 1 GHz):



TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test (Chamber #1)					
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2023-05-23	2024-05-22
Sunol Sciences	Broadband Antenna	JB3	A090314-1	2023-11-11	2024-11-10
ETS-LINDGREN	Loop Antenna	6512	108100	2023-11-09	2024-11-08
Sonoma Instrument	Pre-amplifier	310N	171205	2023-05-23	2024-05-22
Narda	6 dB Attenuator	773-6	10690812-2-1	2023-11-11	2024-11-10
Rohde & Schwarz	Auto Test Software	EMC32	100361	N/A	N/A
MICRO-COAX	Coaxial Cable	Cable-8	008	2023-05-23	2024-05-22
MICRO-COAX	Coaxial Cable	Cable-9	009	2023-05-23	2024-05-22
Radiated Emission Test (Chamber #2)					
Rohde & Schwarz	EMI Test Receiver	ESU40	100207/040	2023-05-19	2024-05-18
ETS-LINDGREN	Horn Antenna	3115	9311-4159	2023-12-02	2024-12-01
ETS-LINDGREN	Horn Antenna	3116	2516	2023-12-08	2024-12-07
A.H.Systems,inc	Amplifier	2641-1 (PAM-0118P)	512	2023-05-23	2024-05-22
MICRO-TRONICS	Band Reject Filter	BRM50702	G024	2023-08-05	2024-08-04
SELECTOR	Amplifier	EM18G40G	60726	2023-05-23	2024-05-22
Narda	Attenuator	10dB	010	2023-08-15	2024-08-14
Rohde & Schwarz	Auto test Software	EMC32	100361	N/A	N/A
MICRO-COAX	Coaxial Cable	Cable-6	006	2023-05-23	2024-05-22
MICRO-COAX	Coaxial Cable	Cable-11	011	2023-05-23	2024-05-22
MICRO-COAX	Coaxial Cable	Cable-12	012	2023-05-23	2024-05-22
RF Conducted Test					
Rohde & Schwarz	Signal Analyzer	FSV40	101116	2023-05-23	2024-05-22
Narda	Attenuator	10dB	010	2023-08-15	2024-08-14
Conducted Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESR	101746	2023-05-23	2024-05-22
Rohde & Schwarz	LISN	ENV216	101115	2023-05-23	2024-05-22
Audix	Test Software	e3	V9	N/A	N/A
Rohde & Schwarz	Pulse Limiter	ESH3-Z2	0357.8810.54	2023-05-23	2024-05-22
MICRO-COAX	Coaxial Cable	Cable-15	015	2023-05-23	2024-05-22

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

SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliant
§15.207(a)	AC Line Conducted Emissions	Compliant
§15.205, §15.209 & §15.247(d)	Radiated Emissions & Restricted Bands Emissions	Compliant
§15.247(a)(1)	20 dB Emission Bandwidth	Compliant
§15.247(a)(1)	Channel Separation Test	Compliant
§15.247(a)(1)(iii)	Time of Occupancy (Dwell Time)	Compliant
§15.247(a)(1)(iii)	Quantity of hopping channel Test	Compliant
§15.247(b)(1)	Peak Output Power Measurement	Compliant
§15.247(d)	Band edges	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 a Ceramic for Bluetooth, and the antenna gain is 2.5 dBi, which permanently attached to EUT, fulfill the requirement of this section. Please refer to the EUT photos.

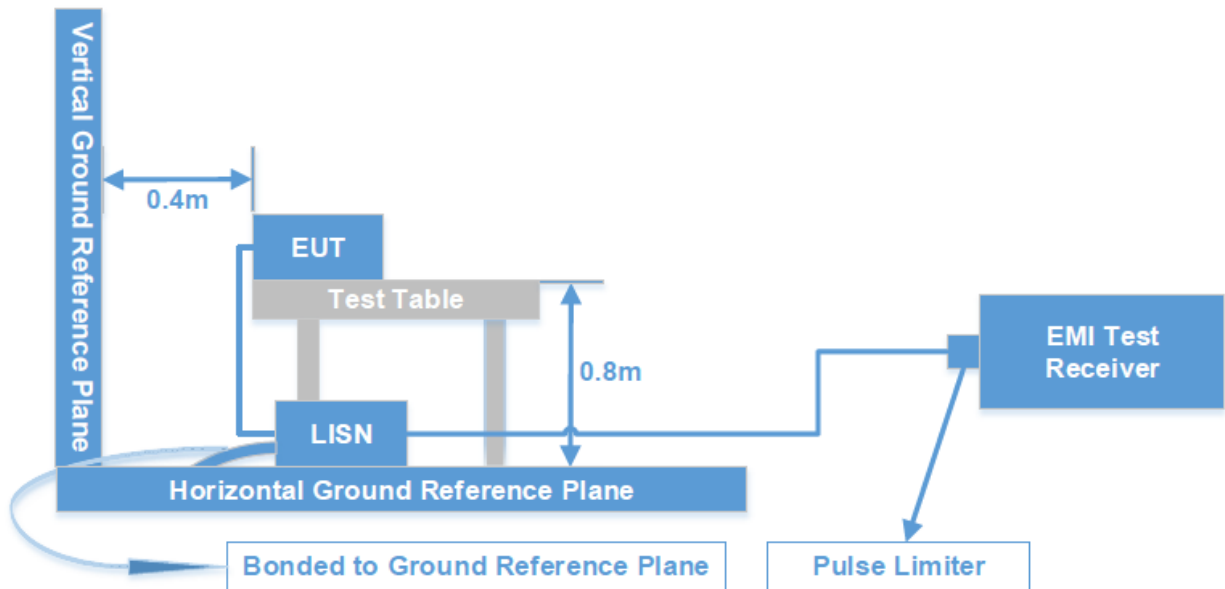
Result: Compliant.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC §15.207(a)

Test System Setup



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

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	RBW	VBW
150 kHz - 30 MHz	9 kHz	30 kHz

Test Procedure

ANSI C63.10-2013 clause 6.2

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

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

If the maximum peak value of the emissions is below the average limit, the QP value and average value measurement will not need to be performed and only record the maximum peak measured value to meet the requirements.

Level & Over Limit Calculation

The Level is calculated by adding LISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation from the Meter Reading. The basic equation is as follows:

$$\begin{aligned}\text{Factor (dB)} &= \text{LISN VDF (dB)} + \text{Cable Loss (dB)} + \text{Transient Limiter Attenuation (dB)} \\ \text{Level (dB}\mu\text{V)} &= \text{Read level (dB}\mu\text{V)} + \text{Factor (dB)}\end{aligned}$$

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 above the limit. The equation for Over Limit calculation is as follows:

$$\text{Over Limit (dB)} = \text{Level (dB}\mu\text{V)} - \text{Limit (dB}\mu\text{V)}$$

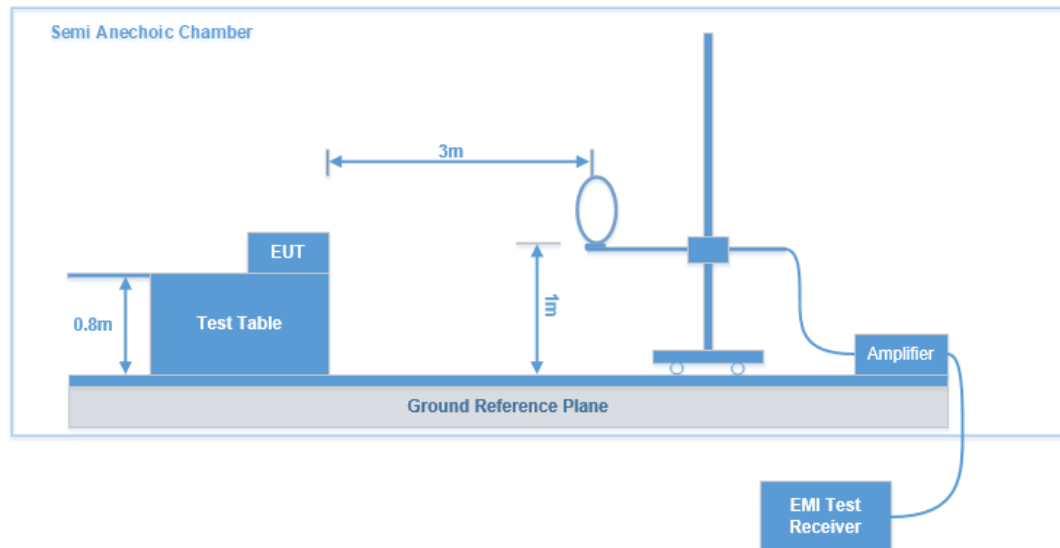
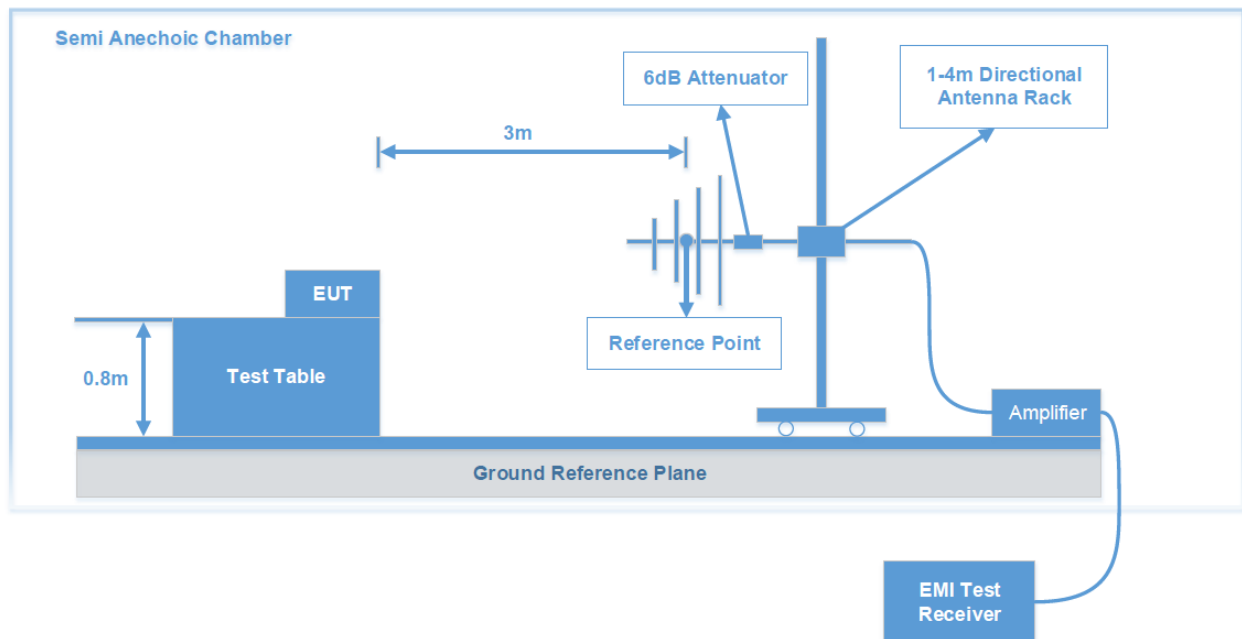
Test Results Summary

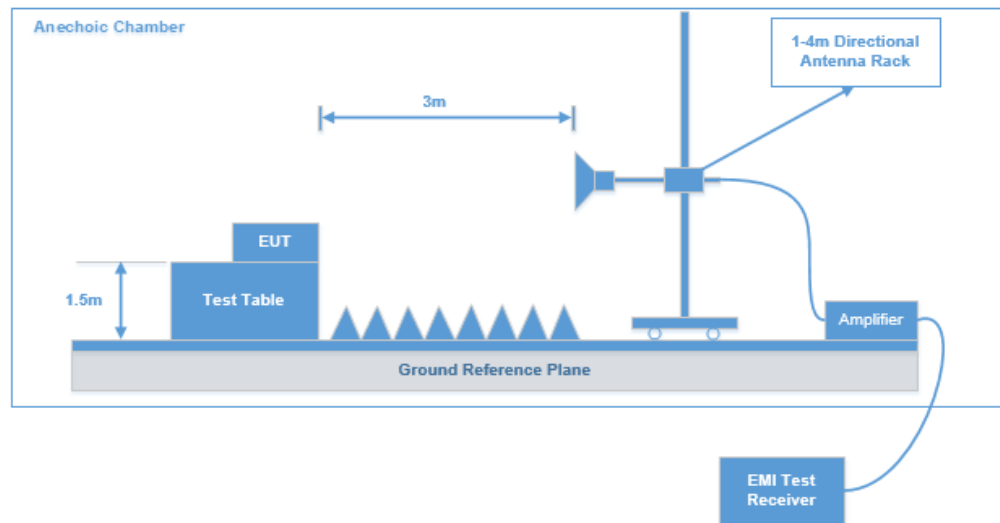
According to the recorded data in following table, the EUT complied with the FCC Part 15.207.

Test Data: See Appendix

FCC §15.205, §15.209 & §15.247(d) – RADIATED EMISSIONS**Applicable Standard**

FCC §15.205; §15.209; §15.247(d)

Test System Setup**9kHz~30MHz:****30MHz~1 GHz:**

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 Setup

The system was investigated from 9 kHz to 25 GHz.

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

Frequency Range	RBW	VBW	IF B/W	Detector
9 kHz - 150 kHz	200 Hz	1 kHz	200 Hz	QP/Average
150 kHz - 30 MHz	9 kHz	30 kHz	9 kHz	QP/ Average
30 MHz - 1000 MHz	100 kHz	300 kHz	/	Peak
	/	/	120 kHz	QP
Above 1GHz	1MHz	3 MHz	/	Peak
	1MHz	3 MHz	/	Average

Test Procedure

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

If the measured peak level of the emissions that the measuring receiver reading level plus corrected factor is at least 6 dB below the QP emission limit, there's no need to record the measured QP level of the emissions in the report.

For 9 kHz-30MHz test, the lowest height of the magnetic antenna shall be 1 m above the ground and three antenna orientations (parallel, perpendicular, and ground-parallel) shall be measured.

Corrected Amplitude & Margin Calculation

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

Corrected Amplitude (dB μ V/m) = Meter Reading (dB μ V) + Antenna Factor (dB/m) + Cable Loss (dB) - Amplifier Gain (dB)

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin (dB) = Limit (dB μ V/m) – Corrected Amplitude (dB μ V/m)

Note: The QuasiPeak (dB μ V/m), MaxPeak (dB μ V/m), Average (dB μ V/m) which shown in the data table are all Corrected Amplitude.

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.209 and 15.247.

Test Data: See Appendix

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

Applicable Standard

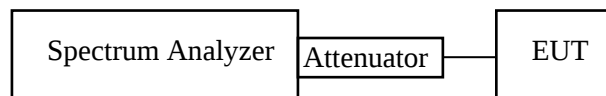
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that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

Test Procedure

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

- a. Span: Wide enough to capture the peaks of two adjacent channels.
- b. RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.
- c. Video (or average) bandwidth (VBW) $\geq$ RBW.
- d. Sweep: Auto.
- e. Detector function: Peak.
- f. Trace: Max hold.
- g. Allow the trace to stabilize.

Use the marker-delta function to determine the separation between the peaks of the adjacent channels.



Test Datd: See Appendix

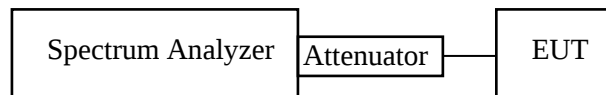
FCC §15.247(a) (1) – 20 dB EMISSION BANDWIDTH

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

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.



Test Datd: See Appendix

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

Applicable Standard

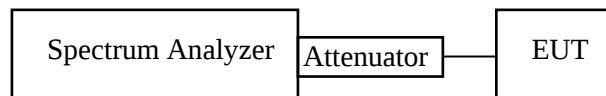
Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress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

Test Procedure

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

- a. Span: The frequency band of operation. Depending on the number of channels the device supports, it may be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.
- b. RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.
- c. VBW $\geq$ RBW.
- d. Sweep: Auto.
- e. Detector function: Peak.
- f. Trace: Max hold.
- g. Allow the trace to stabilize.

It might prove necessary to break the span up into subranges to show clearly all of the hopping frequencies.



Test Datd: See Appendix

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

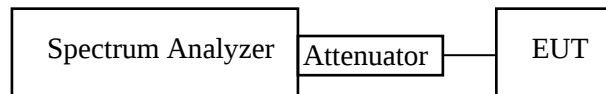
Applicable Standard

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

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

- a Span: Zero span, centered on a hopping channel.
- b RBW shall be $\leq$ channel spacing and where possible RBW should be set $\geq 1 / T$, where T is the expected dwell time per channel.
- c Sweep: As necessary to capture the entire dwell time per hopping channel; where possible use a video trigger and trigger delay so that the transmitted signal starts a little to the right of the start of the plot. The trigger level might need slight adjustment to prevent triggering when the system hops on an adjacent channel; a second plot might be needed with a longer sweep time to show two successive hops on a channel.
- d Detector function: Peak.
- e Trace: Max hold.



Test Datd: See Appendix

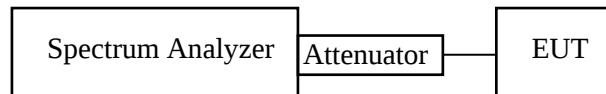
FCC §15.247(b) (1) - PEAK OUTPUT POWER MEASUREMENT

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

- a. Use the following spectrum analyzer settings:
 - 1) Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel.
 - 2) RBW > 20 dB bandwidth of the emission being measured.
 - 3) VBW $\geq$ RBW.
 - 4) Sweep: Auto.
 - 5) Detector function: Peak.
 - 6) Trace: Max hold.
- b. Allow trace to stabilize.
- c. Use the marker-to-peak function to set the marker to the peak of the emission.
- d. The indicated level is the peak output power, after any corrections for external attenuators and cables.
- e. A plot of the test results and setup description shall be included in the test report.



Test Datd: See Appendix

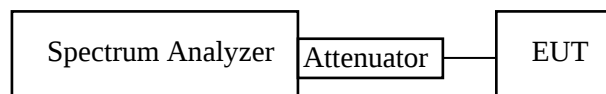
FCC §15.247(d) - BAND EDGES TESTING

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

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 Datd: See Appendix

EUT PHOTOGRAPHS

Please refer to the attachment EXHIBIT A - EUT EXTERNAL PHOTOGRAPHS and EXHIBIT B - EUT INTERNAL PHOTOGRAPHS.

TEST SETUP PHOTOGRAPHS

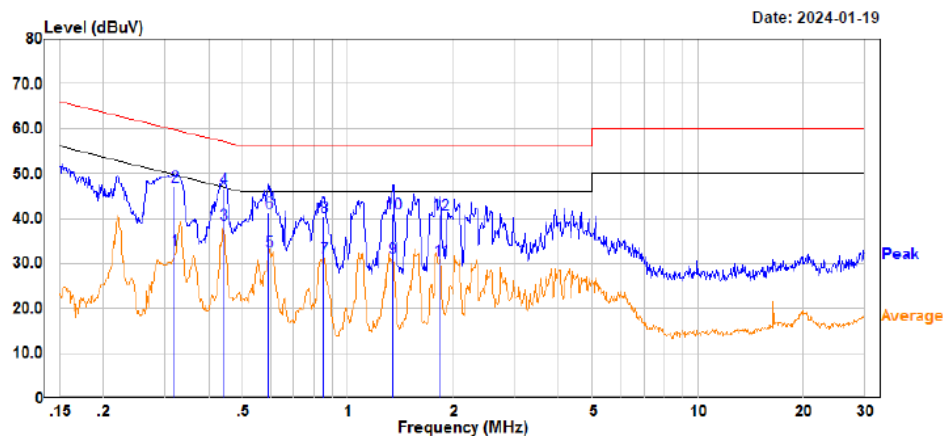
Please refer to the attachment EXHIBIT C - TEST SETUP PHOTOGRAPHS.

APPENDIX - TEST DATA

Environmental Conditions & Test Information

Test Item:	AC LINE CONDUCTED EMISSIONS	RADIATED EMISSIONS			CHANNEL SEPARATION TEST	20 DB BANDWID TH TEST
		9kHz - 1GHz	1 GHz - 18 GHz	18 GHz - 25 GHz		
Test Date:	2024-01-19	2024-01-22	2024-02-04 to 2024-04-03	2024-03-07	2024-02-27	2024-02-23
Temperature:	21.0 °C	16.2 °C	20.3 °C	16.8 °C	16.5 °C	16.0 °C
Relative Humidity:	25 %	44 %	52 %	48 %	45 %	46 %
ATM Pressure:	102.4 kPa	103.5 kPa	100.2-101.5kPa	101.8 kPa	102.7kPa	102.8kPa
Test Result:	Pass	Pass	Pass	Pass	Pass	Pass
Test Engineer:	Aaron Sun	Joe Zhang	Peter Wang	Peter Wang	Jenny Yang	Jenny Yang

Test Item:	OCCUPIED BANDWIDTH	Quantity Of Hopping Channel Test	Time Of Occupancy (Dwell Time)	PEAK OUTPUT POWER MEASUREMENT	BAND EDGES TESTING
Test Date:	2024-02-23	2024-02-27	2024-02-27	2024-02-23	2024-02-23 to 2024-02-27
Temperature:	16.0 °C	16.5 °C	16.5 °C	16.0 °C	16.0-16.5 °C
Relative Humidity:	46 %	45 %	45 %	46 %	45-46 %
ATM Pressure:	102.8kPa	102.7kPa	102.7kPa	102.8kPa	102.7-102.8kPa
Test Result:	Pass	Pass	Pass	Pass	Pass
Test Engineer:	Jenny Yang	Jenny Yang	Jenny Yang	Jenny Yang	Jenny Yang

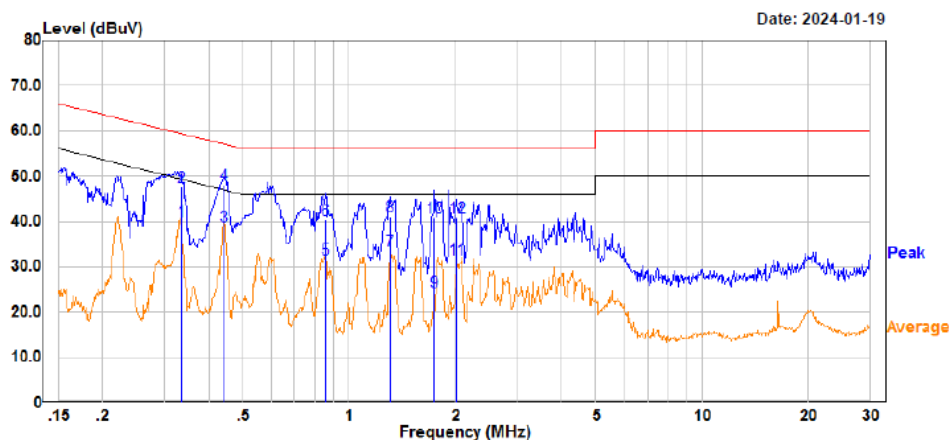
AC LINE CONDUCTED EMISSIONS*EUT operation mode: Transmitting in 8DPSK Mode low channel (maximum output power mode)***AC 120V/60 Hz, Line**

Trace: 1

Site : CE
Condition : FCC PART 15C
Model : DET:Peak
Model : AB5301A01
Voltage : 120V/60Hz
Phase : L
Mode : BT
Test Equipment : ENV216,ESR
Temperature : 21.0°C
Humidity : 25%
Atmospheric pressure: 102.4kPa
Test Engineer : Aaron

		Read		Limit	Over	
	Freq	Level	Factor	Level	Line	Limit
	MHz	dBuV		dBuV	dBuV	dB
1	0.320	13.21	20.02	33.23	49.71	-16.48
2	0.320	27.21	20.02	47.23	59.71	-12.48
3	0.440	18.59	20.09	38.68	47.06	-8.38
4	0.440	26.49	20.09	46.58	57.06	-10.48
5	0.594	12.50	20.09	32.59	46.00	-13.41
6	0.594	21.30	20.09	41.39	56.00	-14.61
7	0.854	11.30	19.89	31.19	46.00	-14.81
8	0.854	20.60	19.89	40.49	56.00	-15.51
9	1.344	11.20	19.94	31.14	46.00	-14.86
10	1.344	21.10	19.94	41.04	56.00	-14.96
11	1.840	10.50	20.15	30.65	46.00	-15.35
12	1.840	20.70	20.15	40.85	56.00	-15.15

AC 120V/60 Hz, Neutral



Site : CE
Condition : FCC PART 15C
: DET:Peak
Model : AB5301A01
Voltage : 120V/60Hz
Phase : N
Mode : BT
Test Equipment : ENV216,ESR
Temperature : 21.0°C
Humidity : 25%
Atmospheric pressure: 102.4kPa
Test Engineer : Aaron

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.335	19.99	20.04	40.03	49.33	-9.30	Average
2	0.335	27.59	20.04	47.63	59.33	-11.70	QP
3	0.442	18.90	20.09	38.99	47.02	-8.03	Average
4	0.442	27.90	20.09	47.99	57.02	-9.03	QP
5	0.858	11.79	19.89	31.68	46.00	-14.32	Average
6	0.858	20.39	19.89	40.28	56.00	-15.72	QP
7	1.305	13.70	19.92	33.62	46.00	-12.38	Average
8	1.305	21.20	19.92	41.12	56.00	-14.88	QP
9	1.742	4.20	20.12	24.32	46.00	-21.68	Average
10	1.742	20.80	20.12	40.92	56.00	-15.08	QP
11	2.013	11.40	20.21	31.61	46.00	-14.39	Average
12	2.013	20.70	20.21	40.91	56.00	-15.09	QP

RADIATED EMISSIONS & RESTRICTED BANDS EMISSIONS

EUT operation mode: Transmitting

After pre-scan in the X, Y and Z axes of orientation, the worst case is below:

9 kHz-30 MHz (Transmitting in maximum output power mode 8DPSK low channel)

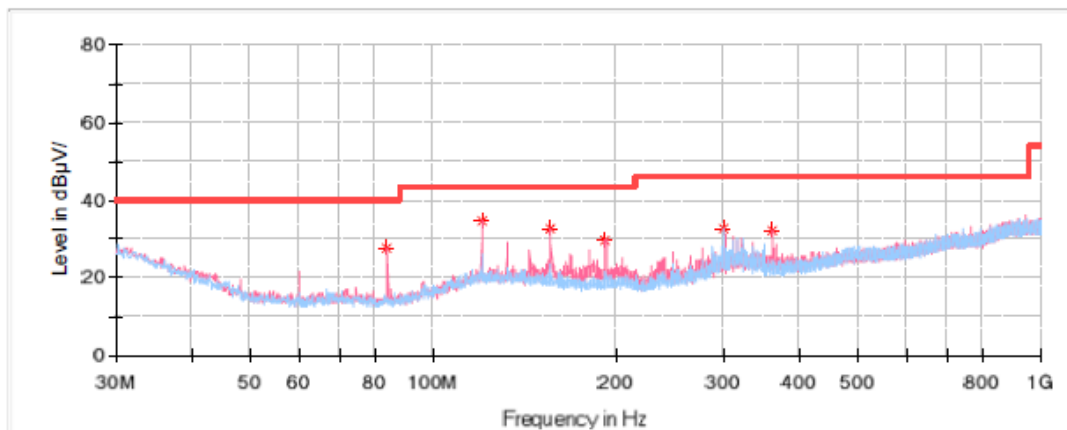
The amplitude of spurious emissions attenuated more than 20 dB below the limit was not be recorded.

30 MHz - 1 GHz (Transmitting in maximum output power 8DPSK mode):

Low Channel: 2402 MHz

Common Information

Project No:	RSHA240108001
EUT Model:	AB5301A01
Test Mode:	BT
Standard:	FCC Part 15.247 & FCC Part 15.205 & Part 15.209
Test Equipment:	ESCI, JB3, 310N
Temperature:	16.2°C
Humidity:	44%
Barometric Pressure:	103.5kPa
Test Engineer:	Joe Zhang
Test Date:	2024/1/22

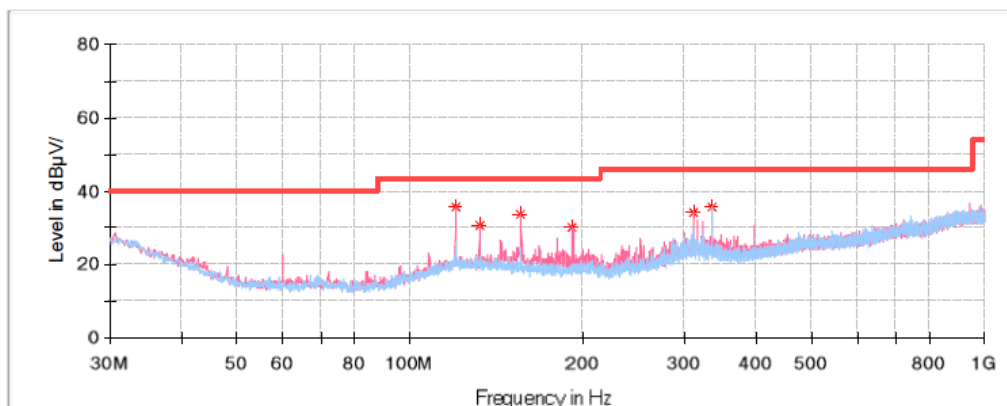


Critical Freqs

Frequency (MHz)	MaxPeak (dBμ V/m)	Limit (dBμ V/m)	Margin (dB)	Pol	Corr. (dB/m)
83.956250	27.88	40.00	12.12	V	-17.4
119.967500	34.62	43.50	8.88	V	-11.2
155.978750	32.70	43.50	10.80	V	-12.4
191.990000	29.70	43.50	13.80	V	-12.8
300.145000	32.79	46.00	13.21	H	-11.0
359.921250	32.13	46.00	13.87	V	-9.5

Middle Channel: 2441 MHz**Common Information**

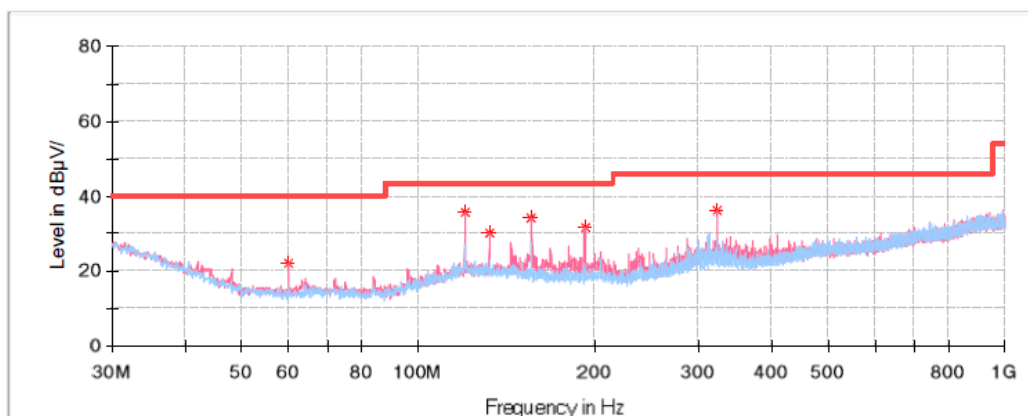
Project No:	RSHA240108001
EUT Model:	AB5301A01
Test Mode:	BT
Standard:	FCC Part 15.247 & FCC Part 15.205 & Part 15.209
Test Equipment:	ESCI, JB3, 310N
Temperature:	16.2°C
Humidity:	44%
Barometric Pressure:	103.5kPa
Test Engineer:	Joe Zhang
Test Date:	2024/1/22

**Critical Freqs**

Frequency (MHz)	MaxPeak (dBμ V/m)	Limit (dBμ V/m)	Margin (dB)	Pol	Corr. (dB/m)
119.967500	35.50	43.50	8.00	V	-11.2
131.971250	30.50	43.50	13.00	V	-11.4
155.978750	33.79	43.50	9.71	V	-12.4
191.990000	30.22	43.50	13.28	V	-12.8
312.027500	34.40	46.00	11.60	V	-10.7
336.277500	35.94	46.00	10.06	H	-10.1

High Channel:2480 MHz**Common Information**

Project No: RSHA240108001
EUT Model: AB5301A01
Test Mode: BT
Standard: FCC Part 15.247 & FCC Part 15.205 & Part 15.209
Test Equipment: ESCI、JB3、310N
Temperature: 16.2℃
Humidity: 44%
Barometric Pressure: 103.5kPa
Test Engineer: Joe Zhang
Test Date: 2024/1/22

**Critical_Freqs**

Frequency (MHz)	MaxPeak (dBμ V/m)	Limit (dBμ V/m)	Margin (dB)	Pol	Corr. (dB/m)
59.948750	22.31	40.00	17.69	V	-17.5
119.967500	35.90	43.50	7.60	V	-11.2
131.971250	30.37	43.50	13.13	V	-11.4
155.978750	34.29	43.50	9.21	V	-12.4
192.111250	31.48	43.50	12.02	V	-12.8
324.152500	36.17	46.00	9.83	V	-10.4

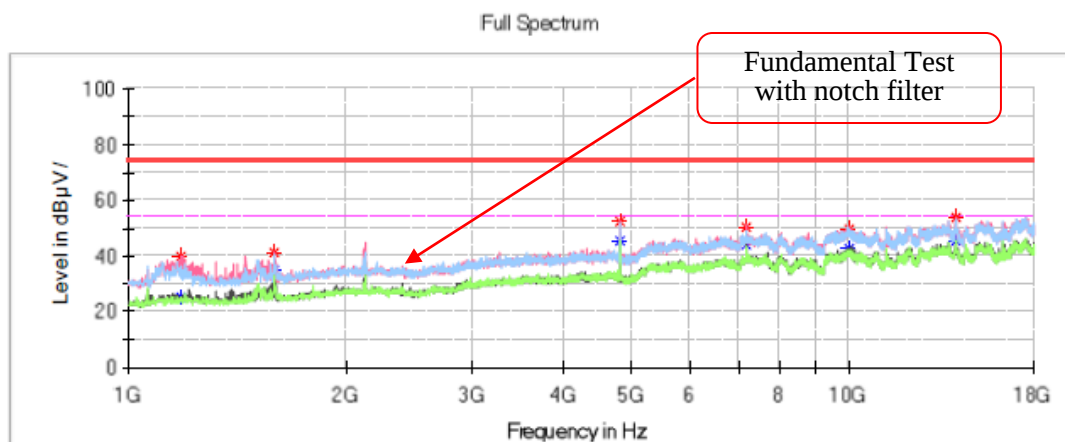
1 GHz - 18 GHz:

GFSK:

Low Channel: 2402 MHz

Common Information

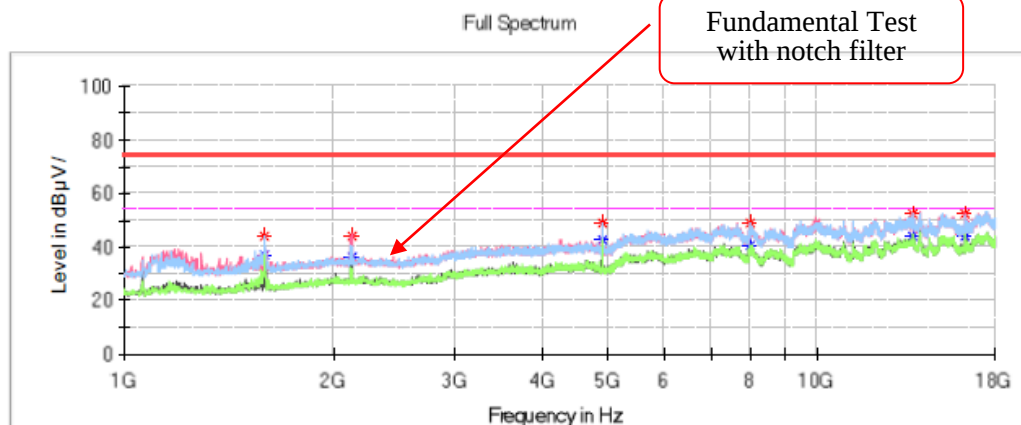
Project No.:	RSHA240108001
EUT Model:	AB5301A01
Test Mode:	BT
Standard:	FCC Part 15.247 & FCC Part 15.205 & FCC Part 15.209
Test Equipment:	ESU40、3115、2641-1
Temperature:	20.3℃
Humidity:	52%
Atmospheric pressure:	101.5KPa
Test Engineer:	Peter Wang
Test Date:	2024/2/4

**Critical Freqs**

Frequency (MHz)	MaxPeak (dB μ V/m)	Average (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Pol	Corr. (dB/m)
1183.600000	---	25.33	54.00	28.67	V	-14.9
1183.600000	39.55	---	74.00	34.45	V	-14.9
1593.300000	---	35.04	54.00	18.96	V	-13.3
1593.300000	41.51	---	74.00	32.49	V	-13.3
4802.900000	---	45.69	54.00	8.31	V	-2.2
4802.900000	52.72	---	74.00	21.28	V	-2.2
7205.000000	---	43.97	54.00	10.03	V	4.0
7205.000000	50.66	---	74.00	23.34	V	4.0
9991.300000	---	42.40	54.00	11.60	V	7.8
9991.300000	49.78	---	74.00	24.22	V	7.8
14001.600000	---	45.64	54.00	8.36	V	10.5
14001.600000	53.76	---	74.00	20.24	V	10.5

Middle Channel: 2441 MHz**Common Information**

Project No.:	RSHA240108001
EUT Model:	AB5301A01
Test Mode:	BT
Standard:	FCC Part 15.247 & FCC Part 15.205 & FCC Part 15.209
Test Equipment:	ESU40、3115、2641-1
Temperature:	20.3℃
Humidity:	52%
Atmospheric pressure:	101.5KPa
Test Engineer:	Peter Wang
Test Date	2024/2/4

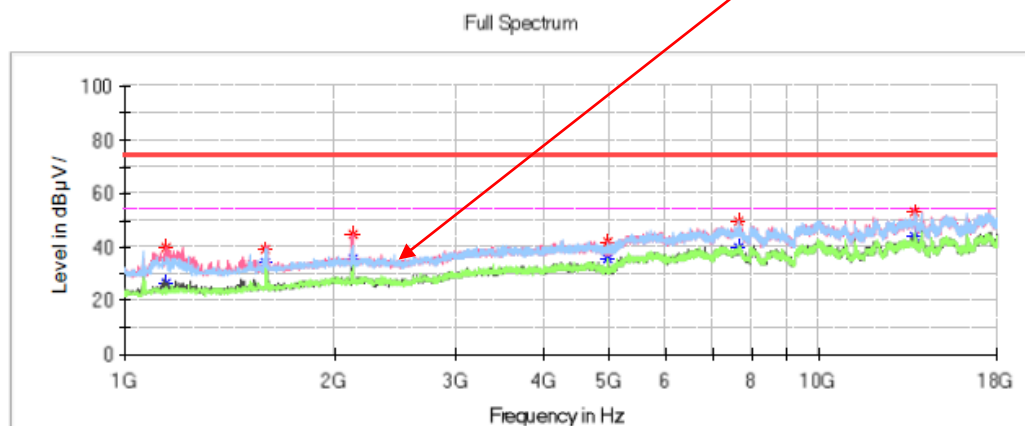
**Critical Freqs**

Frequency (MHz)	MaxPeak (dB μ V/m)	Average (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Pol	Corr. (dB/m)
1595.000000	43.75	---	74.00	30.25	H	-13.3
1595.000000	---	36.98	54.00	17.02	H	-13.3
2128.800000	44.25	---	74.00	29.75	V	-10.4
2128.800000	---	36.69	54.00	17.31	V	-10.4
4881.100000	---	42.74	54.00	11.26	H	-1.8
4881.100000	48.97	---	74.00	25.03	H	-1.8
8004.000000	---	40.53	54.00	13.47	H	3.8
8004.000000	49.21	---	74.00	24.79	H	3.8
13678.600000	---	44.34	54.00	9.66	V	10.8
13678.600000	52.68	---	74.00	21.32	V	10.8
16303.400000	---	44.24	54.00	9.76	V	9.7
16303.400000	52.33	---	74.00	21.67	V	9.7

High Channel: 2480 MHz**Common Information**

Project No.:	RSHA240108001
EUT Model:	AB5301A01
Test Mode:	BT
Standard:	FCC Part 15.247 & FCC Part 15.205 & FCC Part 15.209
Test Equipment:	ESU40、3115、2641-1
Temperature:	20.3℃
Humidity:	52%
Atmospheric pressure:	101.5KPa
Test Engineer:	Peter Wang
Test Date:	2024/2/4

Fundamental Test
with notch filter

**Critical Freqs**

Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
1149.600000	39.76	---	74.00	34.24	V	-15.0
1149.600000	---	26.77	54.00	27.23	V	-15.0
1596.700000	---	34.49	54.00	19.51	V	-13.3
1596.700000	39.17	---	74.00	34.83	V	-13.3
2130.500000	44.54	---	74.00	29.46	V	-10.4
2130.500000	---	35.87	54.00	18.13	V	-10.4
4959.300000	---	35.86	54.00	18.14	V	-1.4
4959.300000	42.13	---	74.00	31.87	V	-1.4
7645.300000	---	39.99	54.00	14.01	H	4.1
7645.300000	49.33	---	74.00	24.67	H	4.1
13676.900000	---	44.23	54.00	9.77	V	10.8
13676.900000	52.87	---	74.00	21.13	V	10.8

Band Edge:

Left Side

Common Information

Project No.:

EUT Model:

Test Mode:

Standard:

Test Equipment:

Temperature:

Humidity:

Atmospheric pressure:

Test Engineer:

Test Date

RSHA240108001

AB5301A01

BT

FCC Part 15.247 & FCC Part 15.205 & FCC Part 15.209

ESU40,3115,2641-1

20.3℃

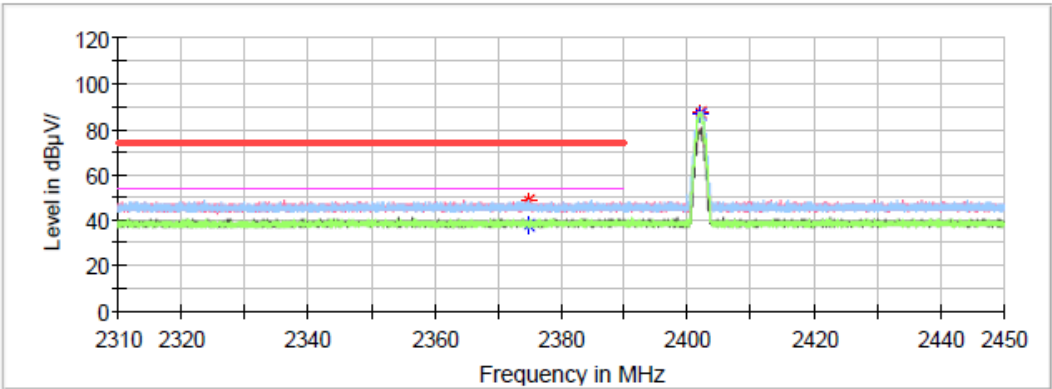
52%

100.2KPa

Peter Wang

2024/4/3

Full Spectrum



Critical Freqs

Frequency (MHz)	MaxPeak (dB μ V/m)	Average (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Pol	Corr. (dB/m)
2374.792000	---	38.11	54.00	15.89	H	0.0
2374.792000	48.60	---	74.00	25.40	H	0.0

Right Side

Common Information

Project No.:

EUT Model:

Test Mode:

Standard:

Test Equipment:

Temperature:

Humidity:

Atmospheric pressure:

Test Engineer:

Test Date

RSHA240108001

AB5301A01

BT

FCC Part 15.247 & FCC Part 15.205 & FCC Part 15.209

ESU40,3115, 2641-1

20.3℃

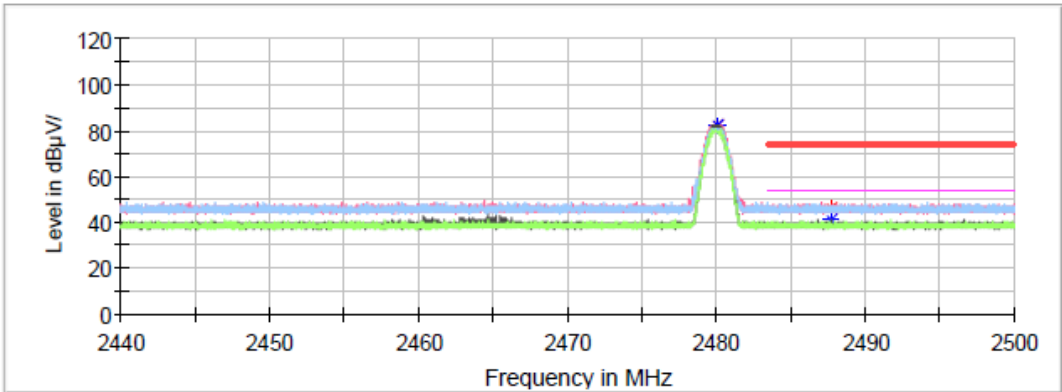
52%

100.2KPa

Peter Wang

2024/4/3

Full Spectrum



Critical Freqs

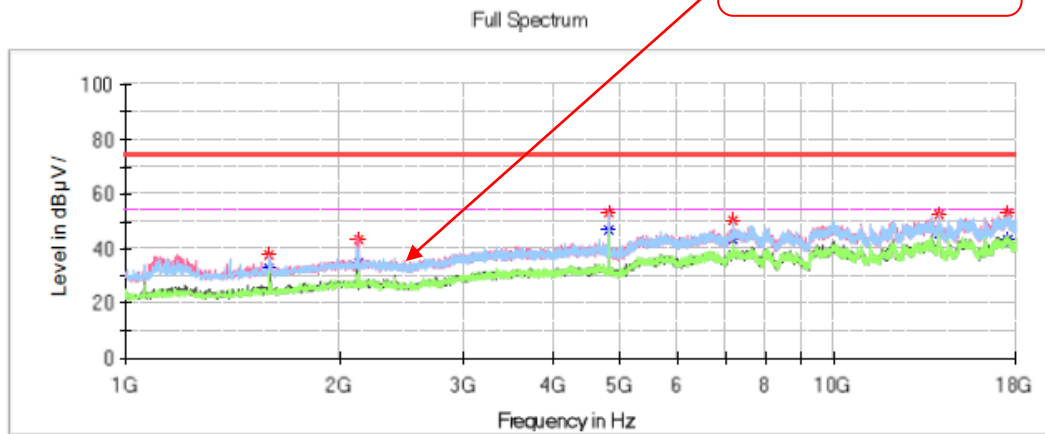
Frequency (MHz)	MaxPeak (dB μ V/m)	Average (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Pol	Corr. (dB/m)
2487.658000	46.13	---	74.00	27.87	V	0.2
2487.658000	---	40.99	54.00	13.01	V	0.2

$\pi/4$ -DQPSK:

Low Channel: 2402 MHz

Common Information

Project No.:	RSHA240108001
EUT Model:	AB5301A01
Test Mode:	BT
Standard:	FCC Part 15.247 & FCC Part 15.205 & Part 15.209
Test Equipment:	ESU40、3115、2641-1
Temperature:	20.3℃
Humidity:	52%
Atmospheric pressure:	101.5KPa
Test Engineer:	Peter Wang
Test Date	2024/2/4

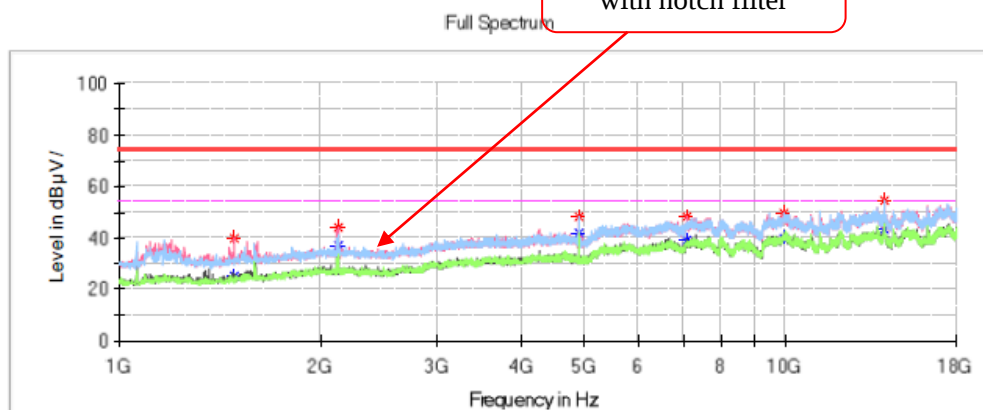
Fundamental Test
with notch filter**Critical Freqs**

Frequency (MHz)	MaxPeak (dB μ V/m)	Average (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Pol	Corr. (dB/m)
1593.300000	---	32.70	54.00	21.30	V	-13.3
1593.300000	37.92	---	74.00	36.08	V	-13.3
2130.500000	---	35.18	54.00	18.82	V	-10.4
2130.500000	43.36	---	74.00	30.64	V	-10.4
4802.900000	52.80	---	74.00	21.20	H	-2.2
4802.900000	---	47.10	54.00	6.90	H	-2.2
7205.000000	---	43.35	54.00	10.65	V	4.0
7205.000000	50.54	---	74.00	23.46	V	4.0
14001.600000	---	45.32	54.00	8.68	H	10.5
14001.600000	52.52	---	74.00	21.48	H	10.5
17602.200000	---	43.53	54.00	10.47	H	13.2
17602.200000	52.82	---	74.00	21.18	H	13.2

Middle Channel: 2441 MHz**Common Information**

Project No.: RSHA240108001
EUT Model: AB5301A01
Test Mode: BT
Standard: FCC Part 15.247 & FCC Part 15.205 & Part 15.209
Test Equipment: ESU40、3115、2641-1
Temperature: 20.3℃
Humidity: 52%
Atmospheric pressure: 101.5KPa
Test Engineer: Peter Wang
Test Date: 2024/2/4

Fundamental Test
with notch filter

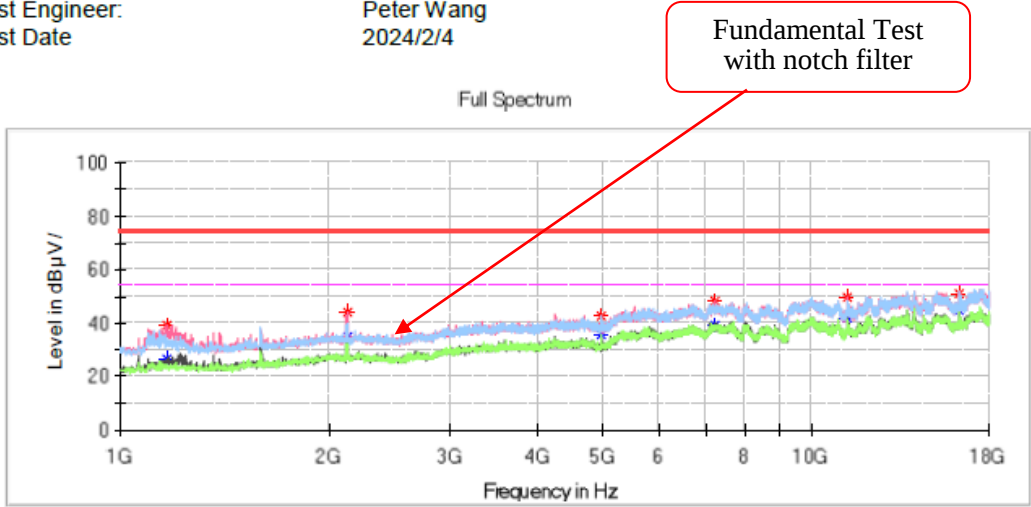
**Critical Freqs**

Frequency (MHz)	MaxPeak (dB μ V/m)	Average (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Pol	Corr. (dB/m)
1487.900000	---	25.36	54.00	28.64	V	-14.0
1487.900000	39.80	---	74.00	34.20	V	-14.0
2127.100000	---	37.29	54.00	16.71	V	-10.4
2127.100000	44.09	---	74.00	29.91	V	-10.4
4881.100000	---	42.04	54.00	11.96	H	-1.8
4881.100000	48.25	---	74.00	25.75	H	-1.8
7084.300000	---	38.82	54.00	15.18	V	3.9
7084.300000	48.04	---	74.00	25.96	V	3.9
9919.900000	---	39.93	54.00	14.07	V	7.6
9919.900000	49.60	---	74.00	24.40	V	7.6
14011.800000	---	43.51	54.00	10.49	H	10.5
14011.800000	54.47	---	74.00	19.53	H	10.5

High Channel: 2480 MHz

Common Information

Project No.:	RSHA240108001
EUT Model:	AB5301A01
Test Mode:	BT
Standard:	FCC Part 15.247 & FCC Part 15.205 & Part 15.209
Test Equipment:	ESU40、3115、2641-1
Temperature:	20.3℃
Humidity:	52%
Atmospheric pressure:	101.5KPa
Test Engineer:	Peter Wang
Test Date	2024/2/4



Critical Freqs

Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
1168.300000	---	26.66	54.00	27.34	V	-15.0
1168.300000	39.39	---	74.00	34.61	V	-15.0
2130.500000	---	35.16	54.00	18.84	V	-10.4
2130.500000	44.16	---	74.00	29.84	V	-10.4
4959.300000	---	35.44	54.00	18.56	H	-1.4
4959.300000	43.00	---	74.00	31.00	H	-1.4
7247.500000	---	39.15	54.00	14.85	V	4.0
7247.500000	48.00	---	74.00	26.00	V	4.0
11201.700000	---	42.13	54.00	11.87	V	6.7
11201.700000	49.45	---	74.00	24.55	V	6.7
16301.700000	51.32	---	74.00	22.68	H	9.7
16301.700000	---	44.69	54.00	9.31	H	9.7

Band Edge:

Left Side

Common Information

Project No.:

EUT Model:

Test Mode:

Standard:

Test Equipment:

Temperature:

Humidity:

Atmospheric pressure:

Test Engineer:

Test Date

RSHA240108001

AB5301A01

BT

FCC Part 15.247 & FCC Part 15.205 & FCC Part 15.209

ESU40,3115, 2641-1

20.3℃

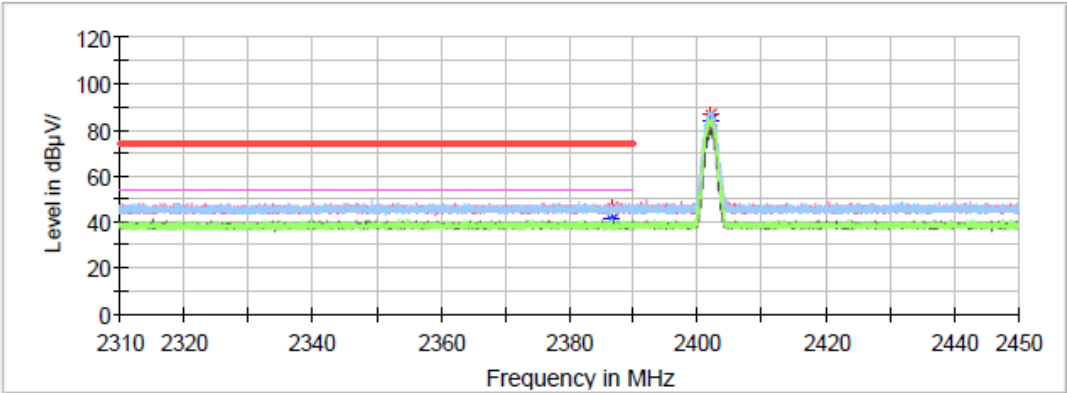
52%

100.2KPa

Peter Wang

2024/4/3

Full Spectrum



Critical Freqs

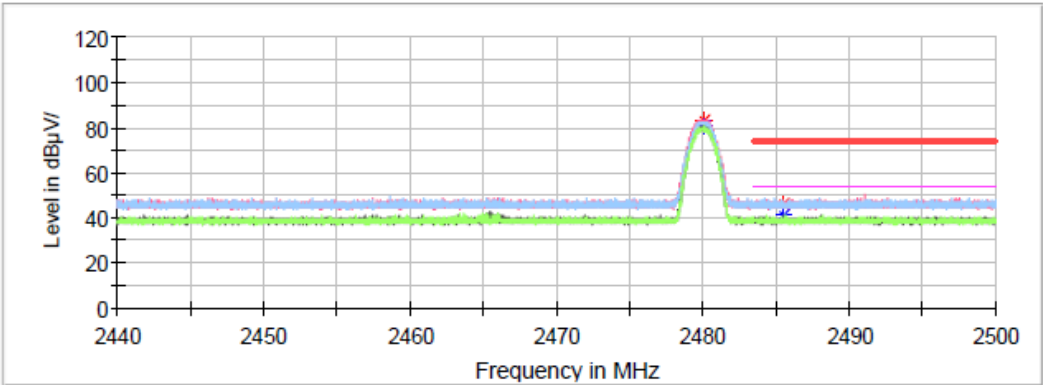
Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
2386.706000	46.06	---	74.00	27.94	H	0.1
2386.706000	---	41.37	54.00	12.63	H	0.1

Right Side

Common Information

Project No.:	RSHA240108001
EUT Model:	AB5301A01
Test Mode:	BT
Standard:	FCC Part 15.247 & FCC Part 15.205 & FCC Part 15.209
Test Equipment:	ESU40,3115, 2641-1
Temperature:	20.3℃
Humidity:	52%
Atmospheric pressure:	100.2KPa
Test Engineer:	Peter Wang
Test Date	2024/4/3

Full Spectrum

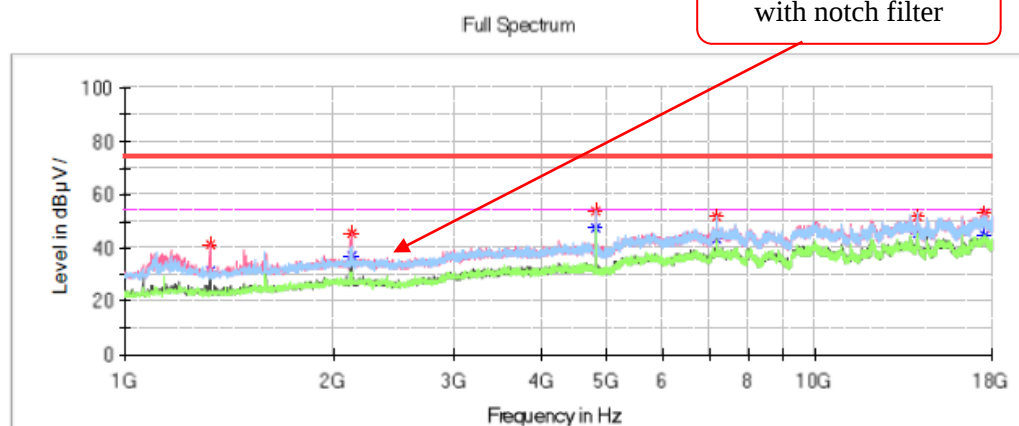


Critical Freqs

Frequency (MHz)	MaxPeak (dB μ V/m)	Average (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Pol	Corr. (dB/m)
2485.552000	45.83	---	74.00	28.17	V	0.2
2485.552000	---	40.88	54.00	13.12	V	0.2

8DPSK:**Low Channel: 2402 MHz****Common Information**

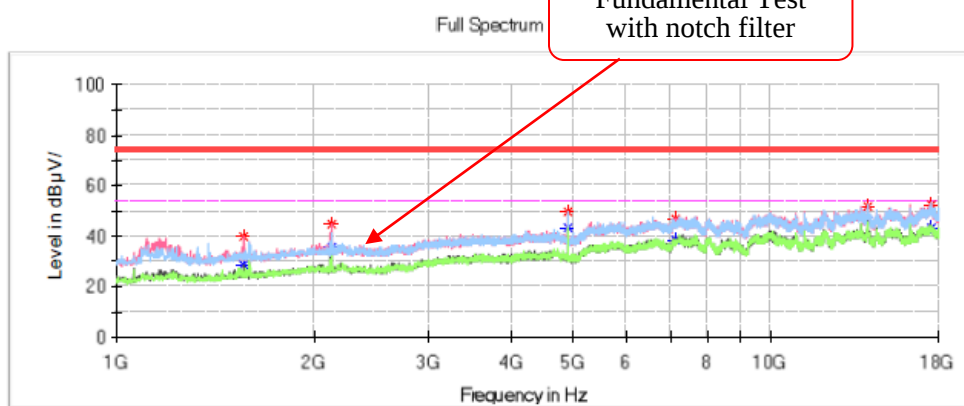
Project No.: RSHA240108001
EUT Model: AB5301A01
Test Mode: BT
Standard: FCC Part 15.247 & FCC Part 15.205 & FCC Part 15.209
Test Equipment: ESU40、3115、2641-1
Temperature: 20.3℃
Humidity: 52%
Atmospheric pressure: 101.5KPa
Test Engineer: Peter Wang
Test Date: 2024/2/4

**Critical Freqs**

Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
1326.400000	---	31.68	54.00	22.32	V	-14.5
1326.400000	41.58	---	74.00	32.42	V	-14.5
2128.800000	45.17	---	74.00	28.83	V	-10.4
2128.800000	---	36.78	54.00	17.22	V	-10.4
4802.900000	53.95	---	74.00	20.05	H	-2.2
4802.900000	---	47.26	54.00	6.74	H	-2.2
7205.000000	51.70	---	74.00	22.30	H	4.0
7205.000000	---	43.58	54.00	10.42	H	4.0
14001.600000	---	45.12	54.00	8.88	V	10.5
14001.600000	51.97	---	74.00	22.03	V	10.5
17571.600000	---	44.45	54.00	9.55	H	13.3
17571.600000	53.23	---	74.00	20.77	H	13.3

Middle Channel: 2441 MHz**Common Information**

Project No.: RSHA240108001
EUT Model: AB5301A01
Test Mode: BT
Standard: FCC Part 15.247 & FCC Part 15.205 & FCC Part 15.209
Test Equipment: ESU40, 3115, 2641-1
Temperature: 20.3°C
Humidity: 52%
Atmospheric pressure: 101.5KPa
Test Engineer: Peter Wang
Test Date: 2024/2/4

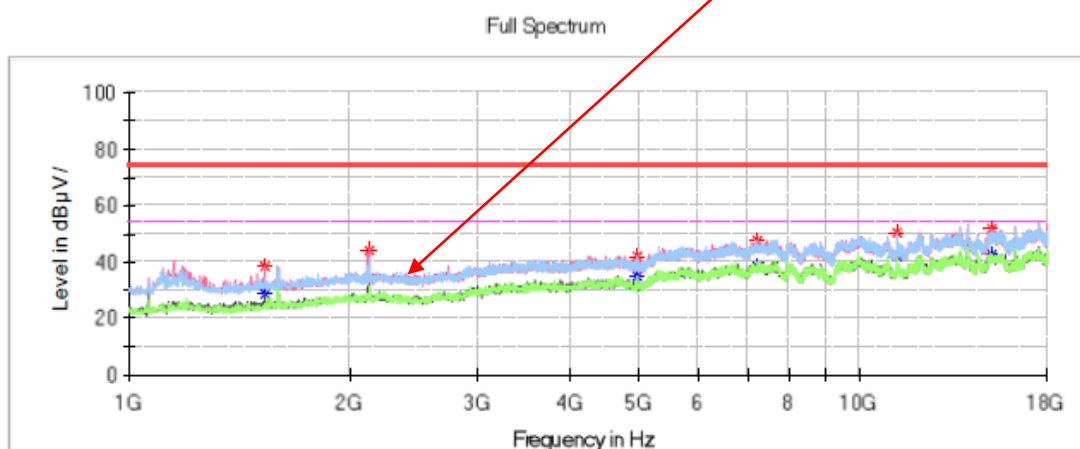
**Critical_Freqs**

Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
1567.800000	---	28.90	54.00	25.10	V	-13.5
1567.800000	39.55	---	74.00	34.45	V	-13.5
2128.800000	---	35.67	54.00	18.33	V	-10.4
2128.800000	44.52	---	74.00	29.48	V	-10.4
4881.100000	49.65	---	74.00	24.35	H	-1.8
4881.100000	---	43.54	54.00	10.46	H	-1.8
7159.100000	---	38.40	54.00	15.60	V	3.9
7159.100000	46.93	---	74.00	27.07	V	3.9
14005.000000	51.69	---	74.00	22.31	H	10.5
14005.000000	---	46.02	54.00	7.98	H	10.5
17535.900000	---	43.31	54.00	10.69	V	13.5
17535.900000	52.62	---	74.00	21.38	V	13.5

High Channel: 2480 MHz**Common Information**

Project No.:	RSHA240108001
EUT Model:	AB5301A01
Test Mode:	BT
Standard:	FCC Part 15.247 & FCC Part 15.205 & FCC Part 15.209
Test Equipment:	ESU40、3115、2641-1
Temperature:	20.3℃
Humidity:	52%
Atmospheric pressure:	101.5KPa
Test Engineer:	Peter Wang
Test Date	2024/2/4

Fundamental Test
with notch filter

**Critical Freqs**

Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
1535.500000	38.81	---	74.00	35.19	V	-13.7
1535.500000	---	28.45	54.00	25.55	V	-13.7
2128.800000	43.91	---	74.00	30.09	V	-10.4
2128.800000	---	34.00	54.00	20.00	V	-10.4
4959.300000	---	34.87	54.00	19.13	H	-1.4
4959.300000	41.91	---	74.00	32.09	H	-1.4
7232.200000	---	38.63	54.00	15.37	V	4.0
7232.200000	47.35	---	74.00	26.65	V	4.0
11201.700000	---	41.71	54.00	12.29	V	6.7
11201.700000	50.35	---	74.00	23.65	V	6.7
15093.000000	---	43.00	54.00	11.00	V	10.4
15093.000000	52.03	---	74.00	21.97	V	10.4

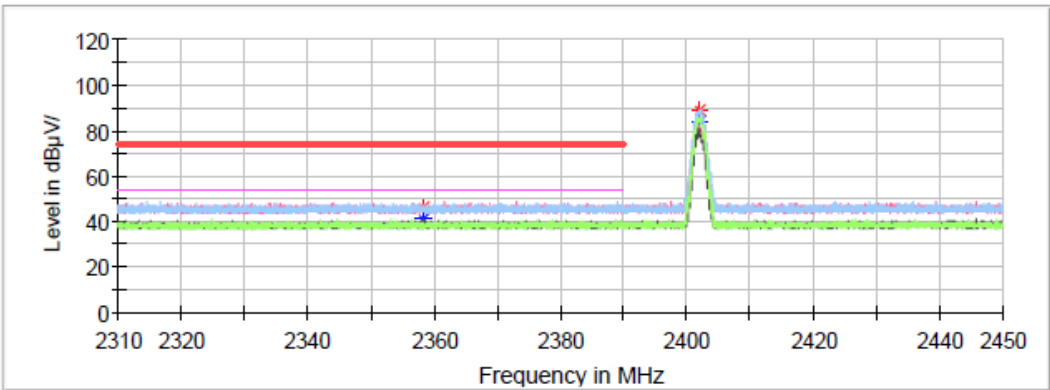
Band Edge:

Left Side

Common Information

Project No.:	RSHA240108001
EUT Model:	AB5301A01
Test Mode:	BT
Standard:	FCC Part 15.247 & FCC Part 15.205 & FCC Part 15.209
Test Equipment:	ESU40,3115, 2641-1
Temperature:	20.3°C
Humidity:	52%
Atmospheric pressure:	100.2KPa
Test Engineer:	Peter Wang
Test Date	2024/4/3

Full Spectrum



Critical Freqs

Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
2358.426000	45.85	---	74.00	28.15	V	0.0
2358.426000	---	40.88	54.00	13.12	V	0.0

Right Side

Common Information

Project No.:

EUT Model:

Test Mode:

Standard:

Test Equipment:

Temperature:

Humidity:

Atmospheric pressure:

Test Engineer:

Test Date

RSHA240108001

AB5301A01

BT

FCC Part 15.247 & FCC Part 15.205 & FCC Part 15.209

ESU40,3115, 2641-1

20.3℃

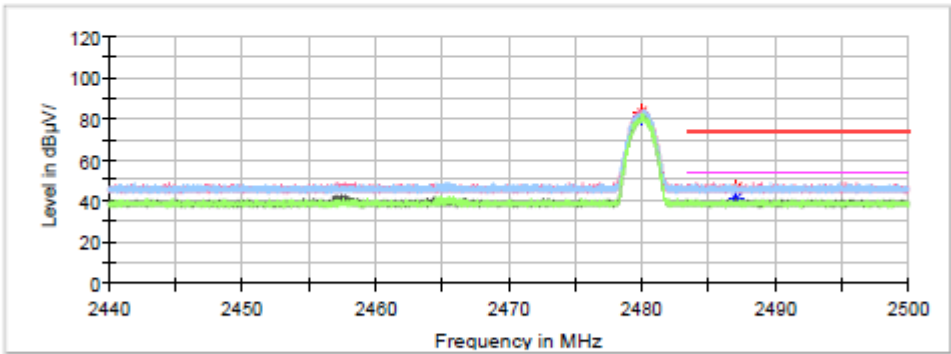
52%

100.2KPa

Peter Wang

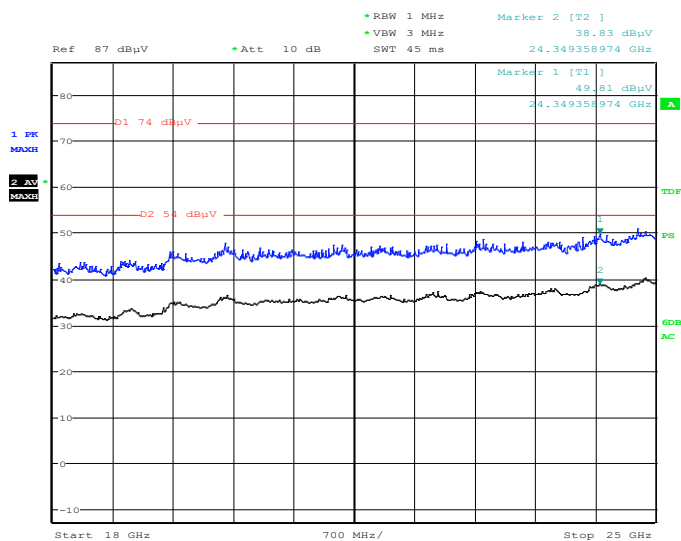
2024/4/3

Full Spectrum



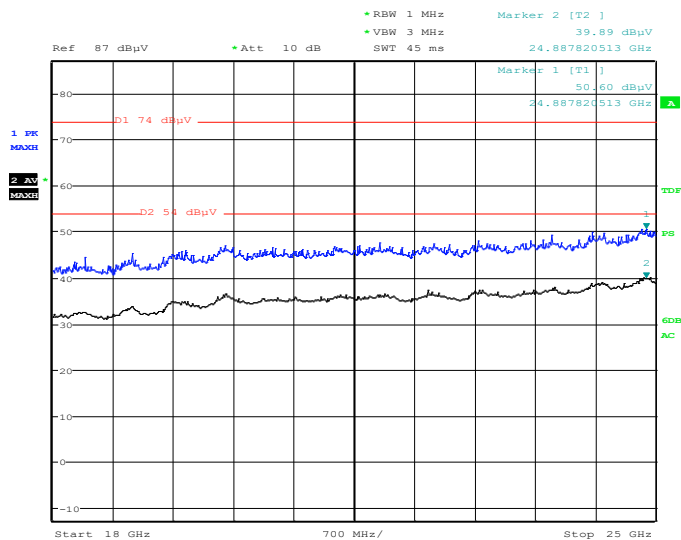
Critical Freqs

Frequency (MHz)	MaxPeak (dB μ V/m)	Average (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Pol	Corr. (dB/m)
2487.010000	---	40.71	54.00	13.29	V	0.2
2487.010000	46.35	---	74.00	27.65	V	0.2

18 GHz - 25 GHz (8DPSK Mode low channel):**Horizontal**

Project No.: RSHA240108001
Date: 7.MAR.2024 14:02:17

Tester: Peter Wang

Vertical

Project No.: RSHA240108001
Date: 7.MAR.2024 13:42:13

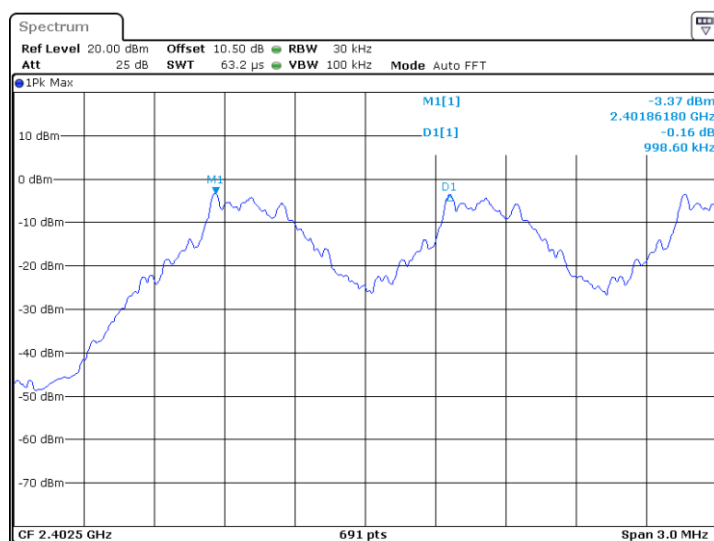
Tester: Peter Wang

Note: The test distance is 3m. The limit is 74dBμV/m(Peak) and 54dBμV/m(Average).

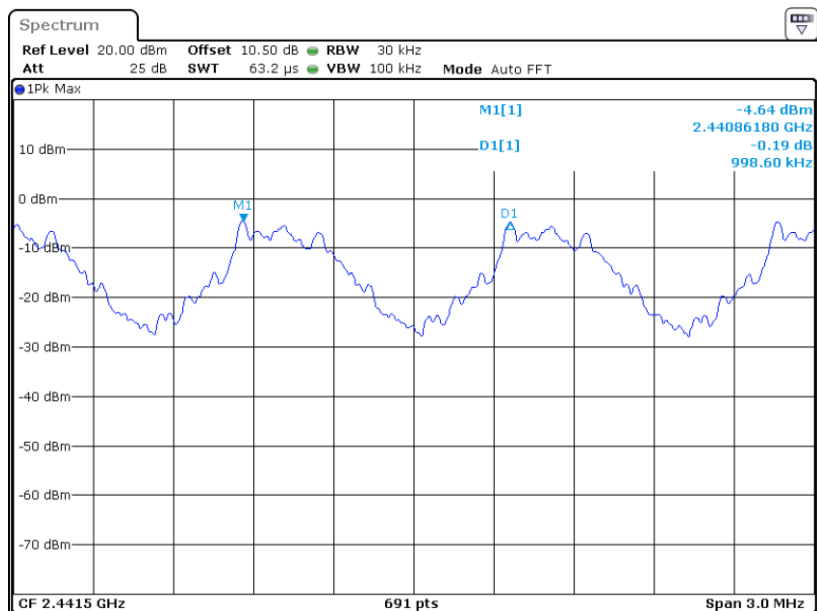
CHANNEL SEPARATION TEST*EUT operation mode: Transmitting*

Mode	Channel	Channel frequency (MHz)	Result (MHz)	Limit (MHz)
GFSK	Low	2402-2403	0.999	0.65
	Middle	2441-2442	0.999	0.65
	High	2480-2479	0.999	0.65
$\pi/4$ DQPSK	Low	2402-2403	0.999	0.88
	Middle	2441-2442	1.003	0.88
	High	2480-2479	0.999	0.88
8DPSK	Low	2402-2403	1.003	0.86
	Middle	2441-2442	1.003	0.86
	High	2480-2479	0.999	0.86

Note: Limit = 20 dB bandwidth*2/3

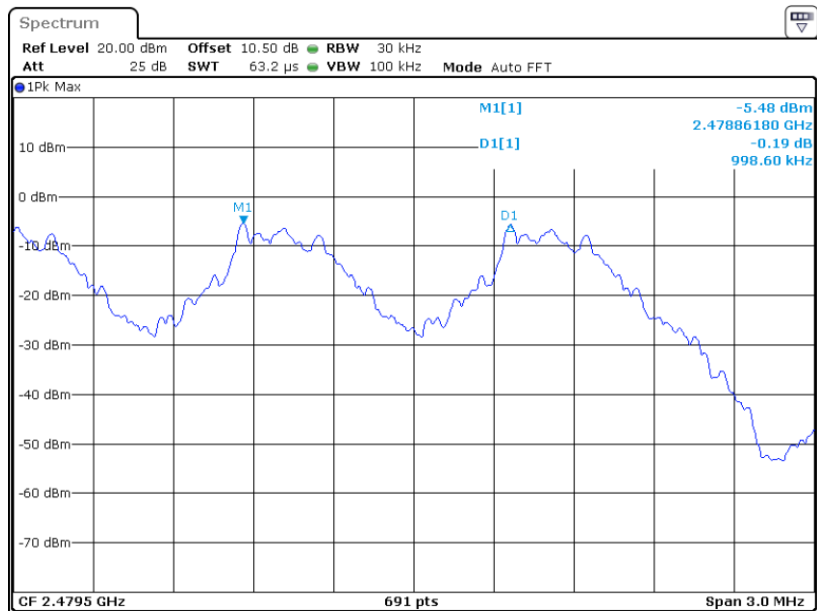
BDR (GFSK): Low Channel

BDR (GFSK): Middle Channel



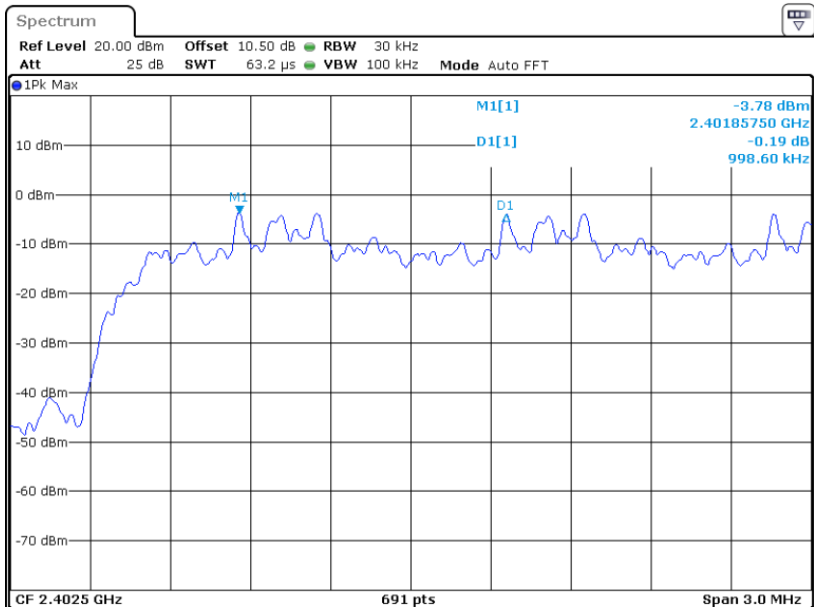
Project No.: RSHA240108001 Tester: Jenny Yang
Date: 27.FEB.2024 14:47:08

BDR (GFSK): High Channel



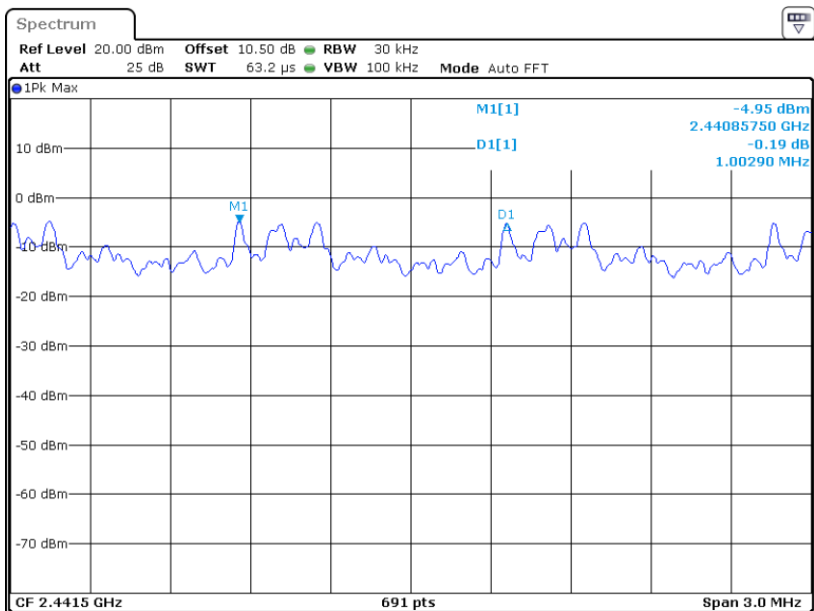
Project No.: RSHA240108001 Tester: Jenny Yang
Date: 27.FEB.2024 14:50:22

EDR ($\pi/4$ -DQPSK): Low Channel



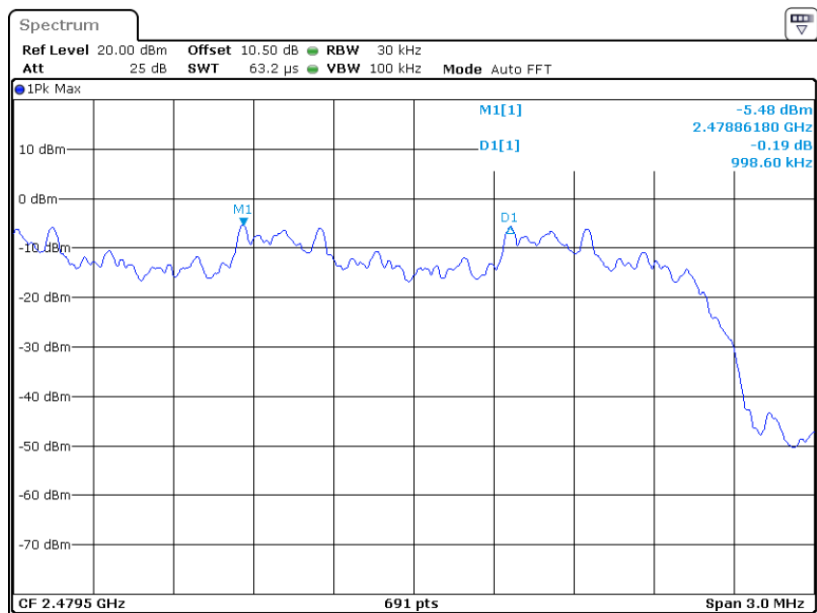
Project No.: RSHA240108001 Tester: Jenny Yang
 Date: 27.FEB.2024 15:02:16

EDR ($\pi/4$ -DQPSK): Middle Channel



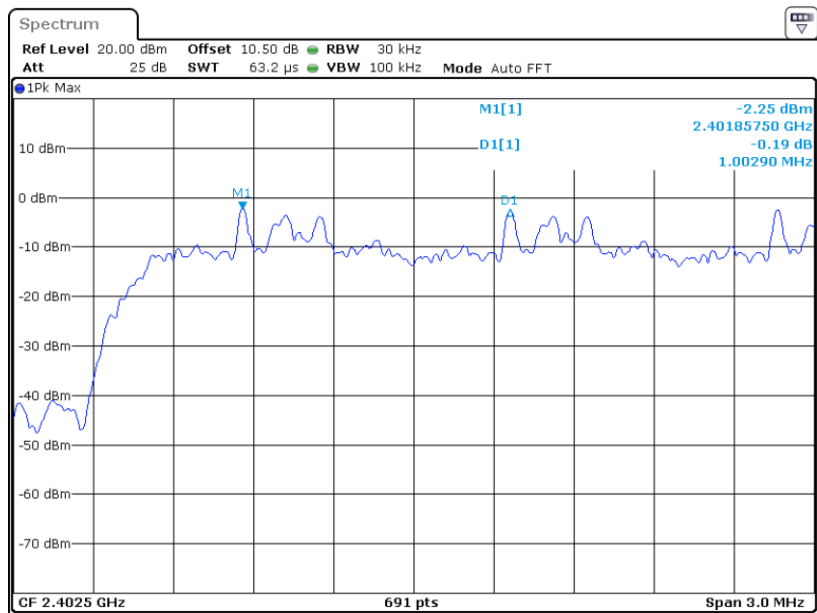
Project No.: RSHA240108001 Tester: Jenny Yang
 Date: 27.FEB.2024 14:59:56

EDR ($\pi/4$ -DQPSK): High Channel

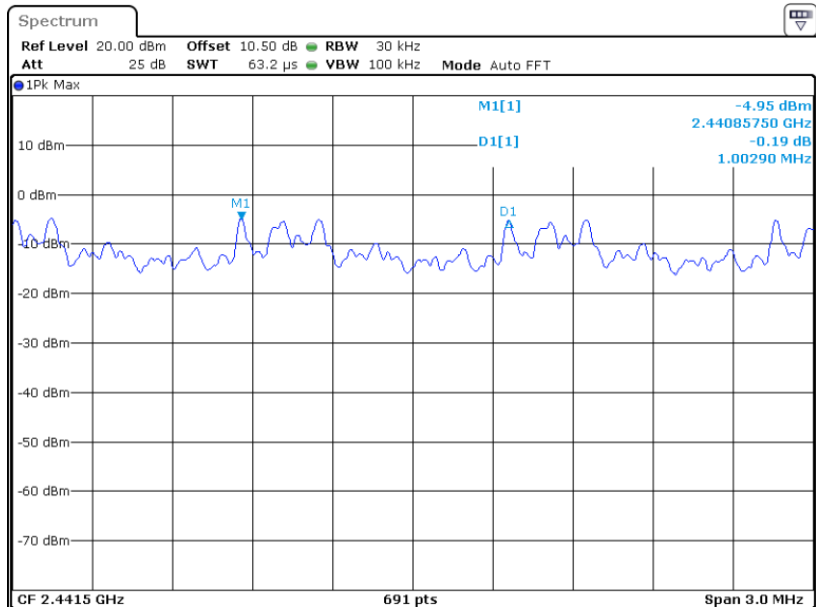


Project No.: RSHA240108001 Tester: Jenny Yang
Date: 27.FEB.2024 14:58:00

EDR (8DPSK): Low Channel

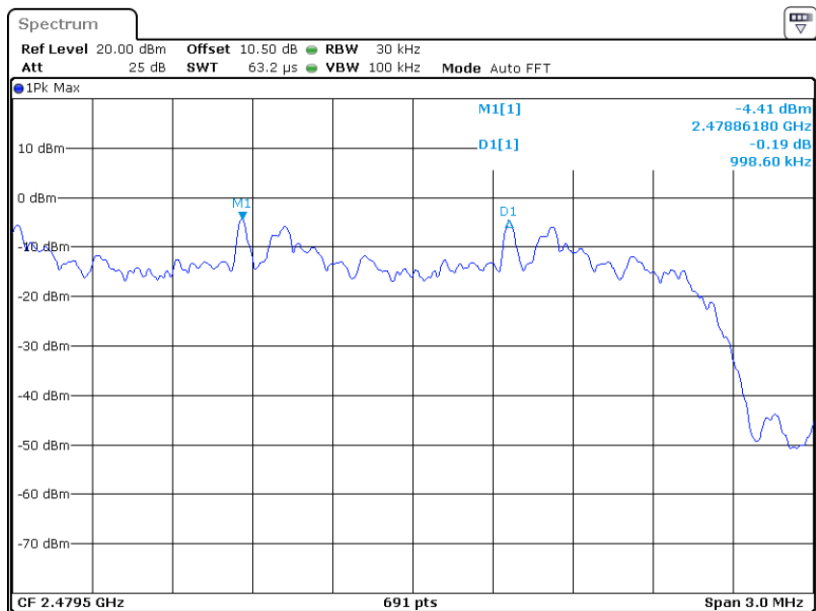


Project No.: RSHA240108001 Tester: Jenny Yang
Date: 27.FEB.2024 15:03:06

EDR (8DPSK): Middle Channel

Project No.: RSHA240108001 Tester: Jenny Yang

Date: 27.FEB.2024 14:59:56

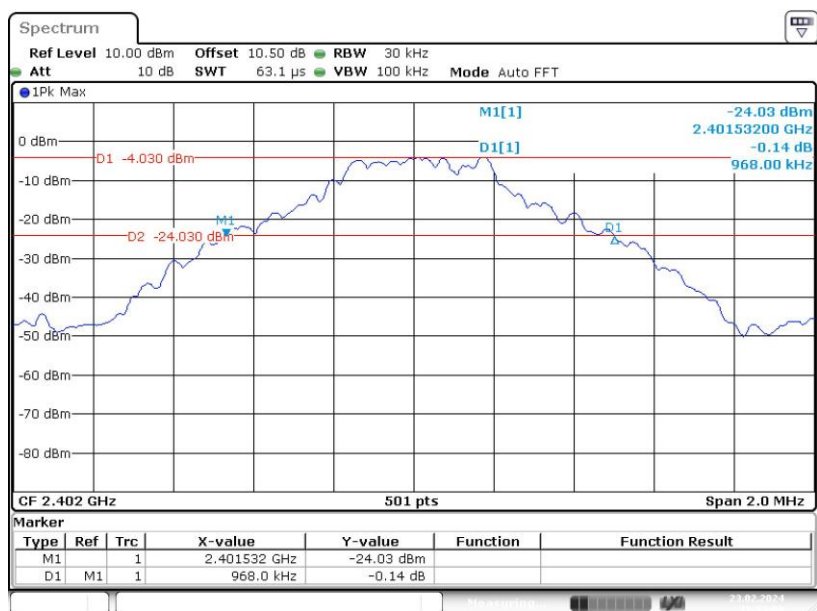
EDR (8DPSK): High Channel

Project No.: RSHA240108001 Tester: Jenny Yang

Date: 27.FEB.2024 15:06:52

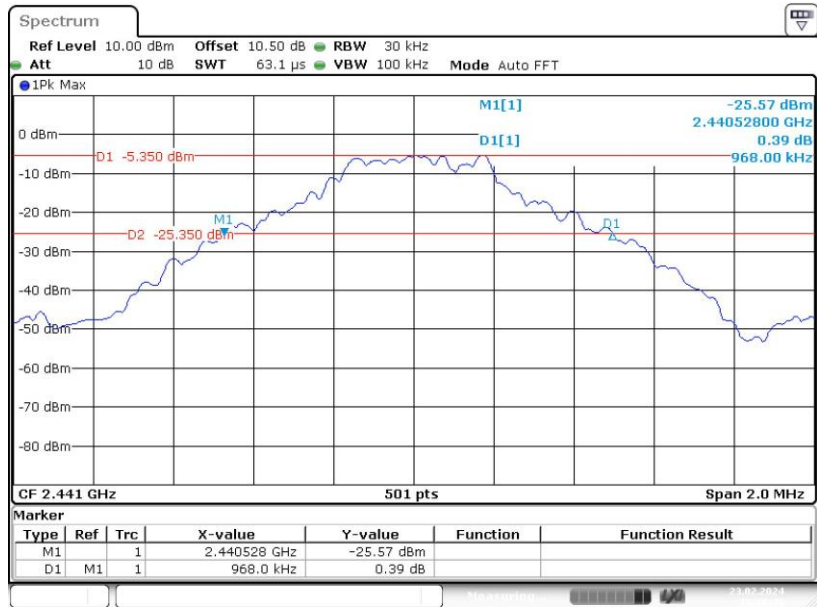
20 dB BANDWIDTH TEST*EUT operation mode: Transmitting*

Mode	Channel	Frequency (MHz)	20 dB Emission Bandwidth (MHz)
BDR (GFSK)	Low	2402	0.968
	Middle	2441	0.968
	High	2480	0.968
EDR ($\pi/4$-DQPSK)	Low	2402	1.320
	Middle	2441	1.324
	High	2480	1.324
EDR (8DPSK)	Low	2402	1.288
	Middle	2441	1.292
	High	2480	1.292

BDR (GFSK): Low Channel

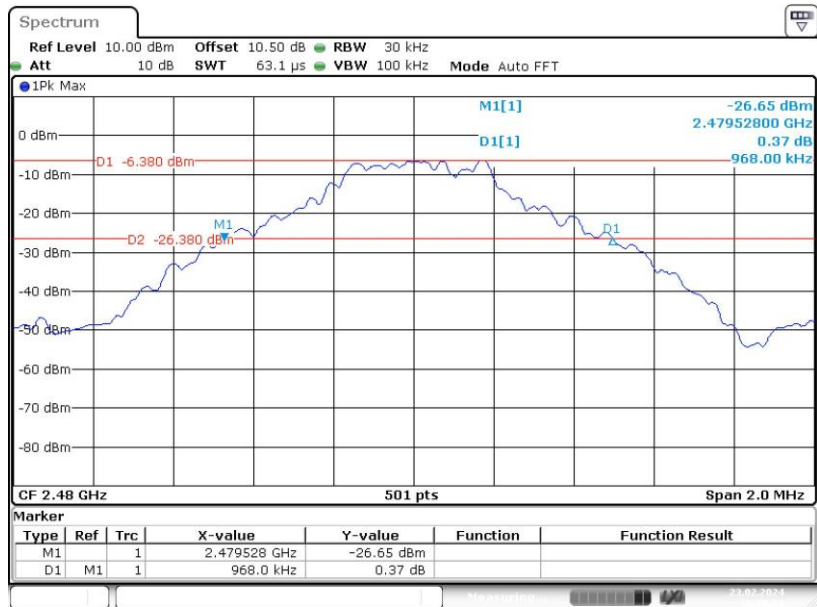
ProjectNo.: RSHA240108001 Tester: Jenny Yang
Date: 23.FEB.2024 16:34:08

BDR (GFSK): Middle Channel



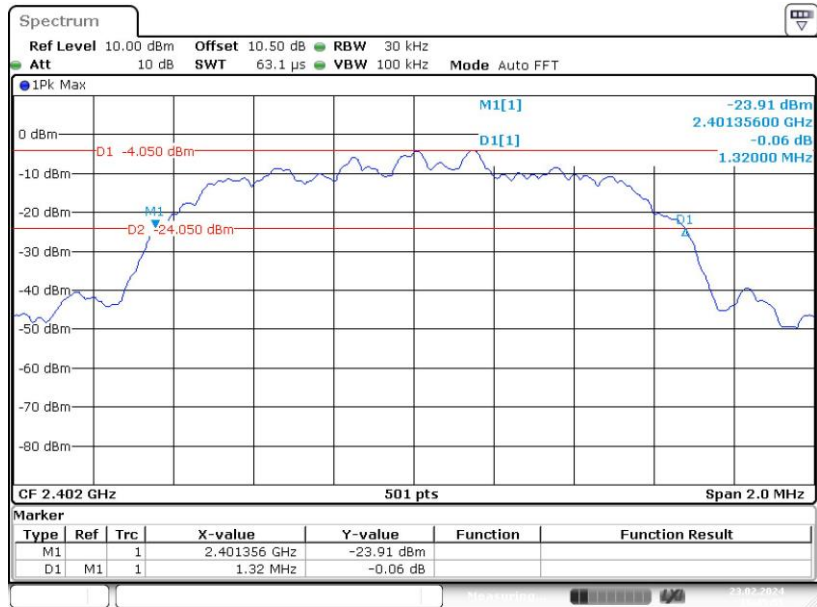
ProjectNo.: RSHA240108001 Tester: Jenny Yang
Date: 23.FEB.2024 16:36:47

BDR (GFSK): High Channel



ProjectNo.: RSHA240108001 Tester: Jenny Yang
Date: 23.FEB.2024 16:38:34

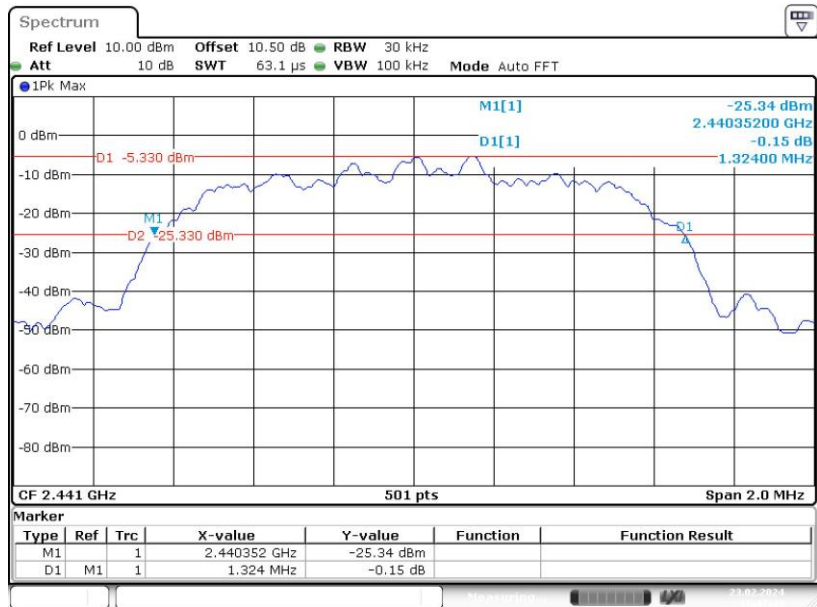
EDR ($\pi/4$ -DQPSK): Low Channel



ProjectNo.: RSHA240108001 Tester: Jenny Yang

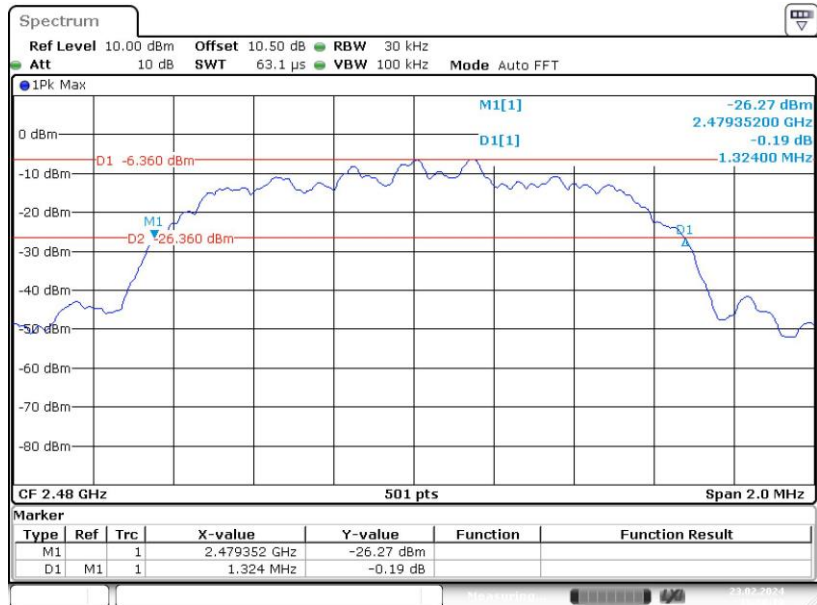
Date: 23.FEB.2024 16:45:55

EDR($\pi/4$ -DQPSK): Middle Channel



ProjectNo.: RSHA240108001 Tester: Jenny Yang

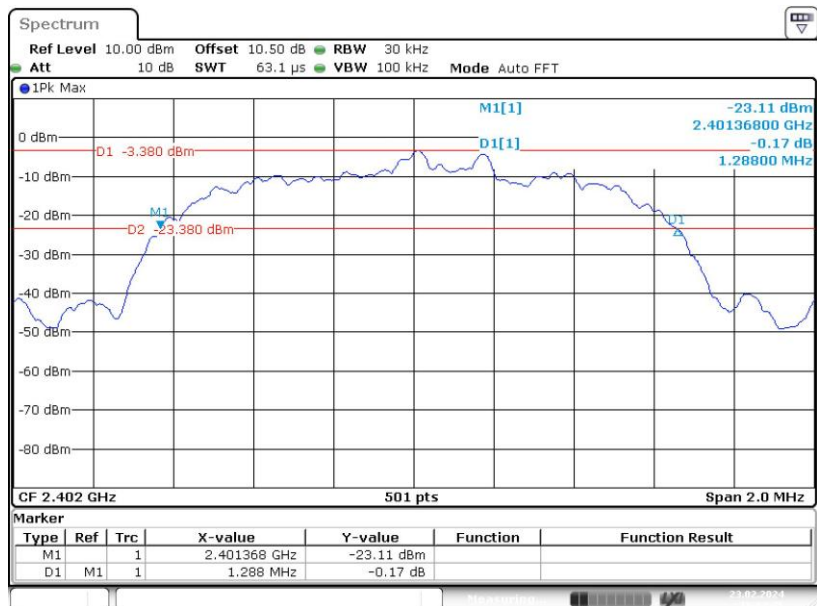
Date: 23.FEB.2024 16:47:50

EDR ($\pi/4$ -DQPSK): High Channel

ProjectNo.: RSHA240108001 Tester: Jenny Yang

Date: 23.FEB.2024 16:50:20

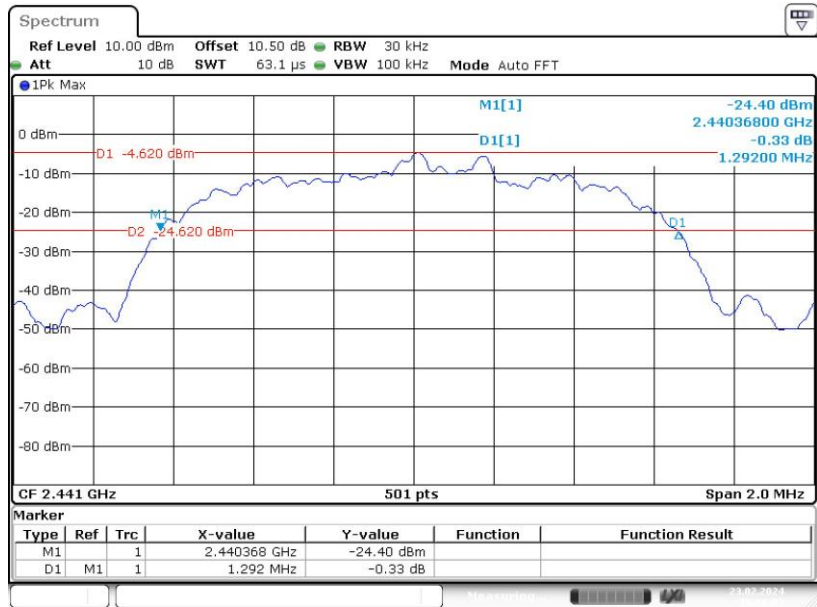
EDR (8DPSK): Low Channel



ProjectNo.: RSHA240108001 Tester: Jenny Yang

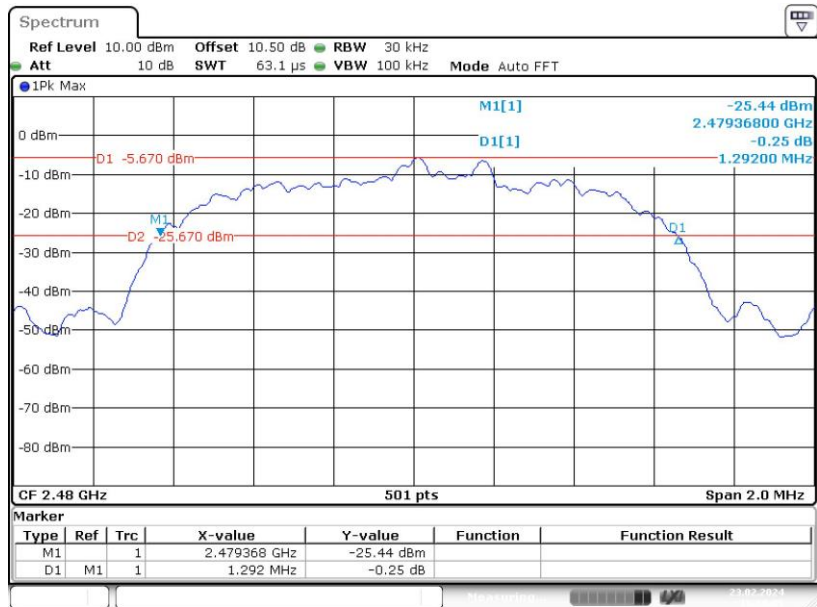
Date: 23.FEB.2024 16:52:26

EDR (8DPSK): Middle Channel



ProjectNo.: RSHA240108001 Tester:Jenny Yang
Date: 23.FEB.2024 16:56:03

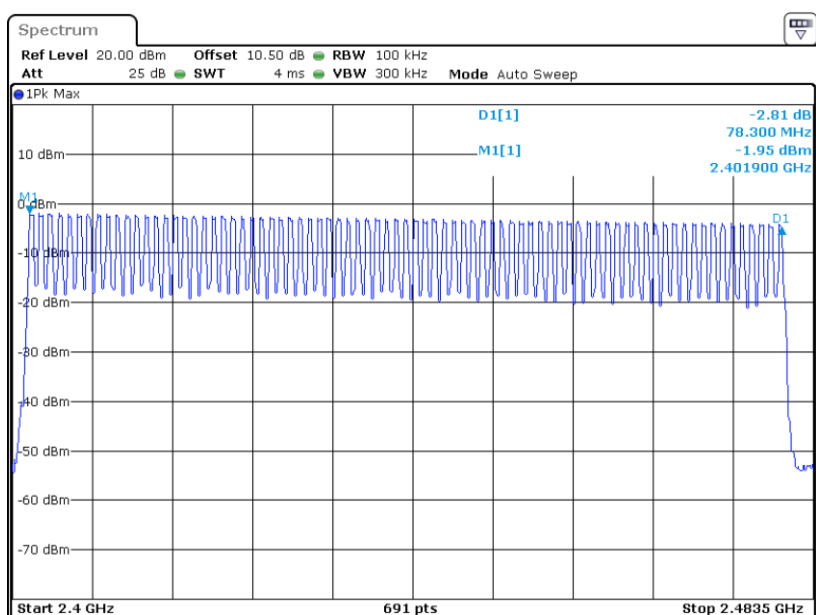
EDR (8DPSK): High Channel



ProjectNo.: RSHA240108001 Tester:Jenny Yang
Date: 23.FEB.2024 16:58:05

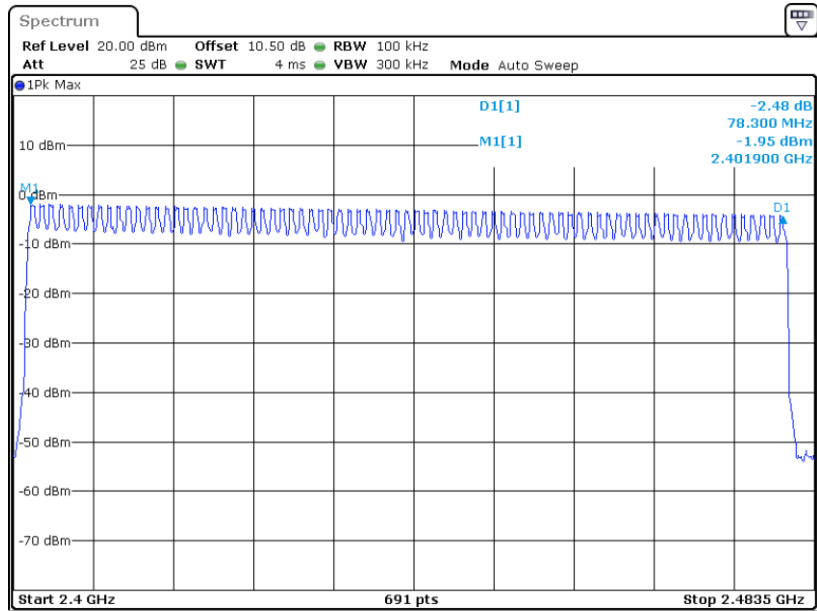
QUANTITY OF HOPPING CHANNEL TEST*EUT operation mode: Hopping*

Mode	Frequency Range (MHz)	Number of Hopping Channel (CH)	Limit (CH)
BDR (GFSK)	2400-2483.5	79	≥15
EDR (π/4-DQPSK)	2400-2483.5	79	≥15
EDR (8DPSK)	2400-2483.5	79	≥15

BDR (GFSK): Number of Hopping Channels

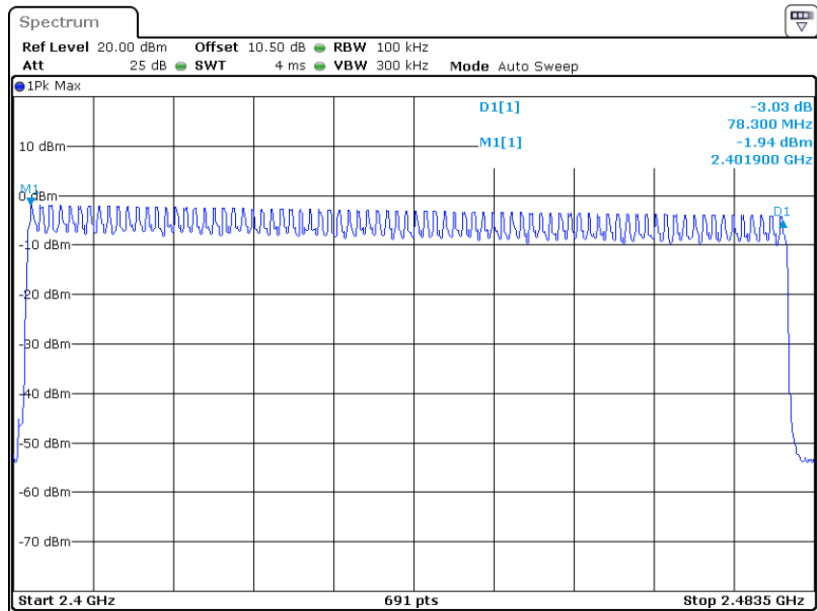
Project No.: RSHA240108001 Tester: Jenny Yang
Date: 27.FEB.2024 15:39:34

EDR ($\pi/4$ -DQPSK): Number of Hopping Channels



Project No.: RSHA240108001 Tester: Jenny Yang
 Date: 27.FEB.2024 15:41:33

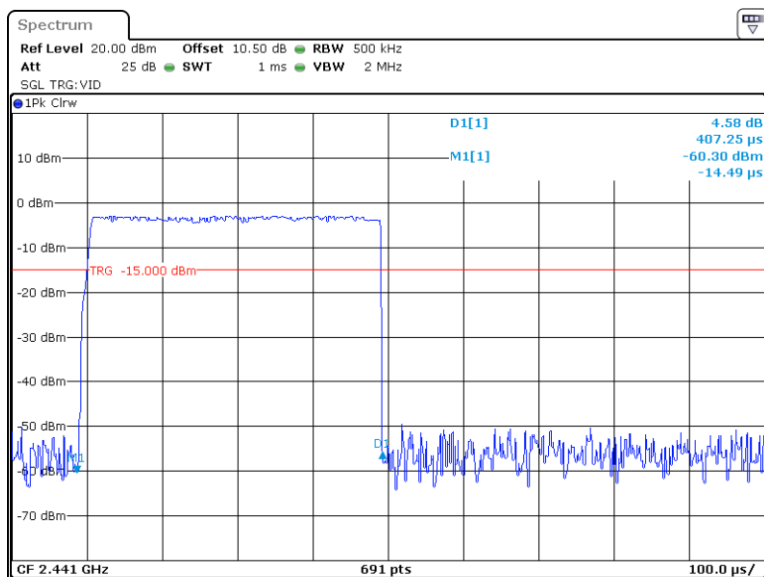
EDR (8DPSK): Number of Hopping Channels



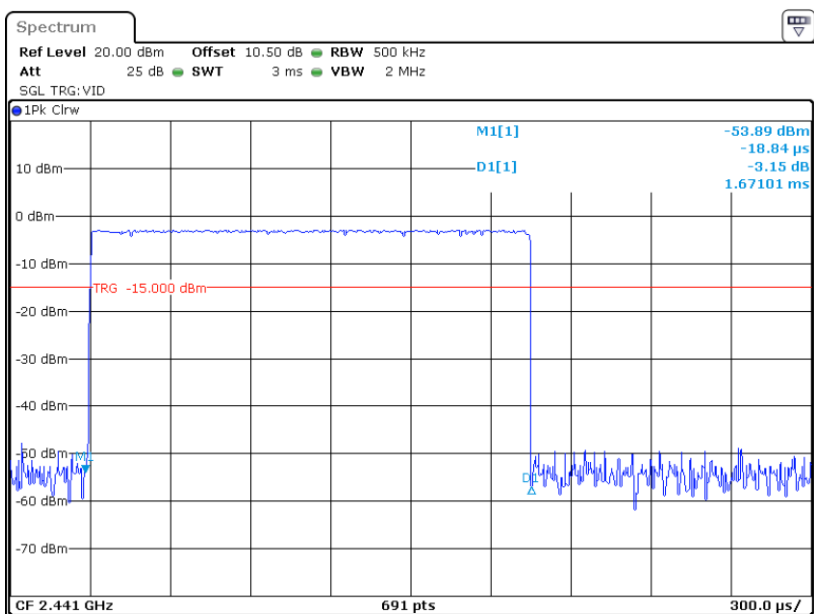
Project No.: RSHA240108001 Tester: Jenny Yang
 Date: 27.FEB.2024 15:44:02

TIME OF OCCUPANCY (DWELL TIME)*EUT operation mode: Hopping*

Mode		Channel	Pulse Width (ms)	Dwell Time (s)	Limit (s)	Result
BDR (GFSK)	DH1	Middle	0.407	0.13	0.4	Pass
		Note: DH1: Dwell time = Pulse time*(1600/2/79)*31.6S				
	DH3	Middle	1.671	0.267	0.4	Pass
		Note: DH3: Dwell time = Pulse time*(1600/4/79)*31.6S				
	DH5	Middle	2.922	0.312	0.4	Pass
		Note: DH5: Dwell time = Pulse time*(1600/6/79)*31.6S				
EDR ($\pi/4$ -DQPSK)	2DH1	Middle	0.413	0.132	0.4	Pass
		Note: 2DH1: Dwell time = Pulse time*(1600/2/79)*31.6S				
	2DH3	Middle	1.675	0.268	0.4	Pass
		Note: 2DH3: Dwell time = Pulse time*(1600/4/79)*31.6S				
	2DH5	Middle	2.933	0.313	0.4	Pass
		Note: 2DH5: Dwell time = Pulse time*(1600/6/79)*31.6S				
EDR (8DPSK)	3DH1	Middle	0.414	0.132	0.4	Pass
		Note:3 DH1: Dwell time = Pulse time*(1600/2/79)*31.6S				
	3DH3	Middle	1.675	0.268	0.4	Pass
		Note: 3DH3: Dwell time = Pulse time*(1600/4/79)*31.6S				
	3DH5	Middle	2.939	0.313	0.4	Pass
		Note: 3DH5: Dwell time = Pulse time*(1600/6/79)*31.6S				

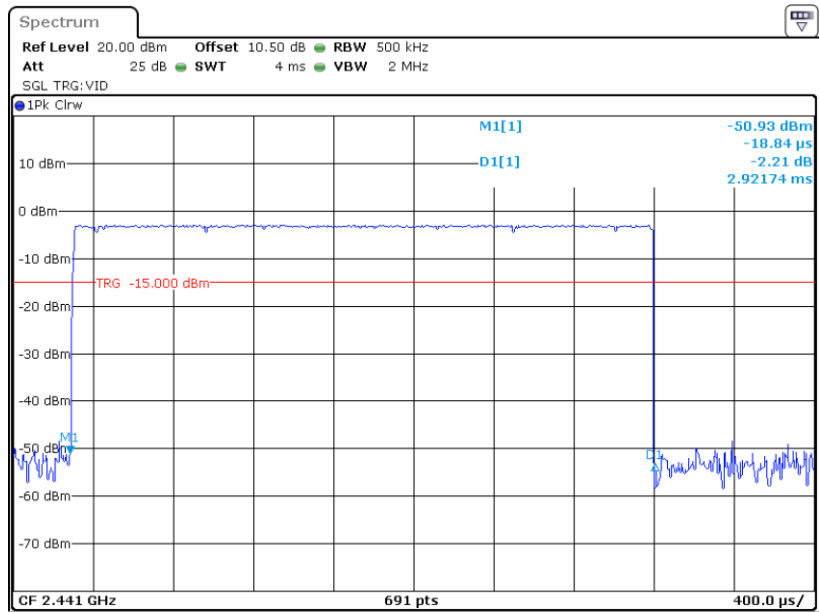
BDR (GFSK): Pulse time, Middle Channel, DH1

Project No.: RSHA240108001 Tester: Jenny Yang
Date: 27.FEB.2024 15:13:17

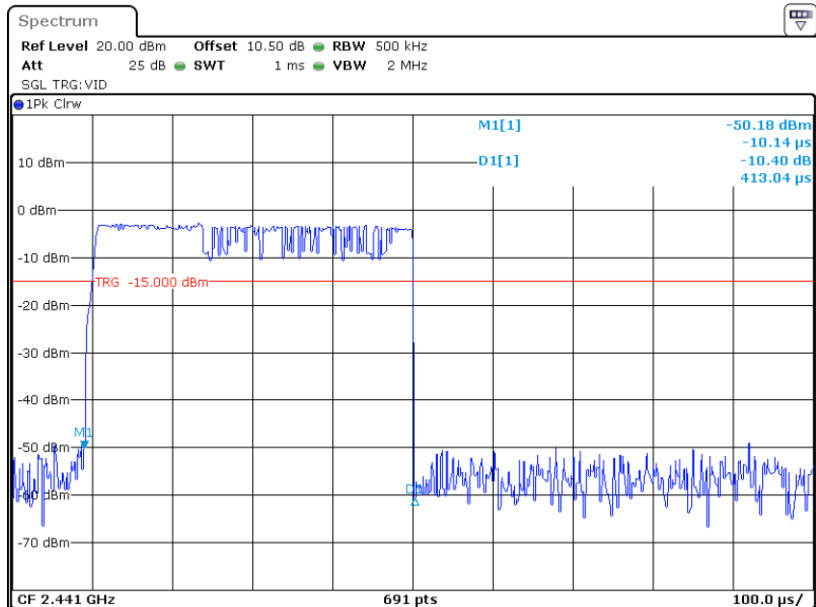
BDR (GFSK): Pulse time, Middle Channel, DH3

Project No.: RSHA240108001 Tester: Jenny Yang
Date: 27.FEB.2024 15:16:09

BDR (GFSK): Pulse time, Middle Channel, DH5

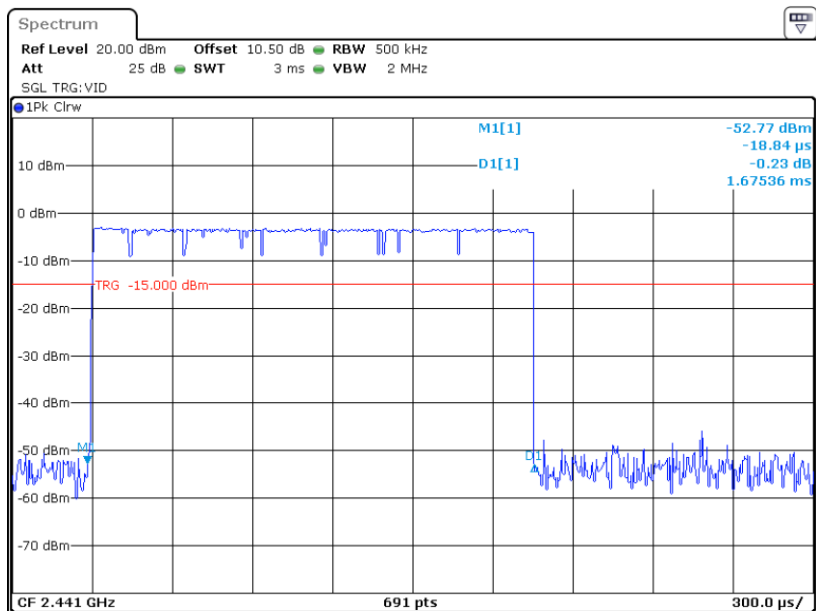


Project No.: RSHA240108001 Tester: Jenny Yang
Date: 27.FEB.2024 15:18:30

EDR ($\pi/4$ -DQPSK): Pulse time, Middle Channel, 2DH1

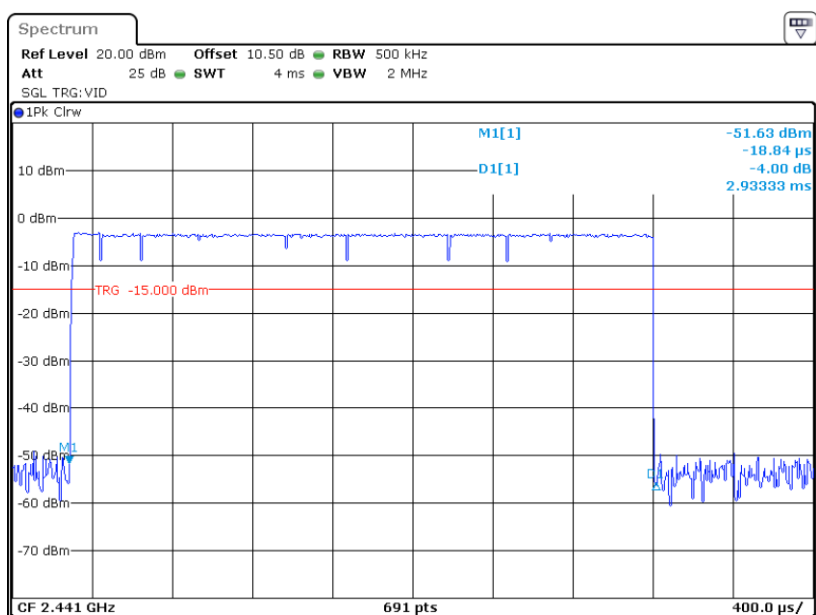
Project No.: RSHA240108001 Tester: Jenny Yang

Date: 27.FEB.2024 15:14:38

EDR ($\pi/4$ -DQPSK): Pulse time, Middle Channel, 2DH3

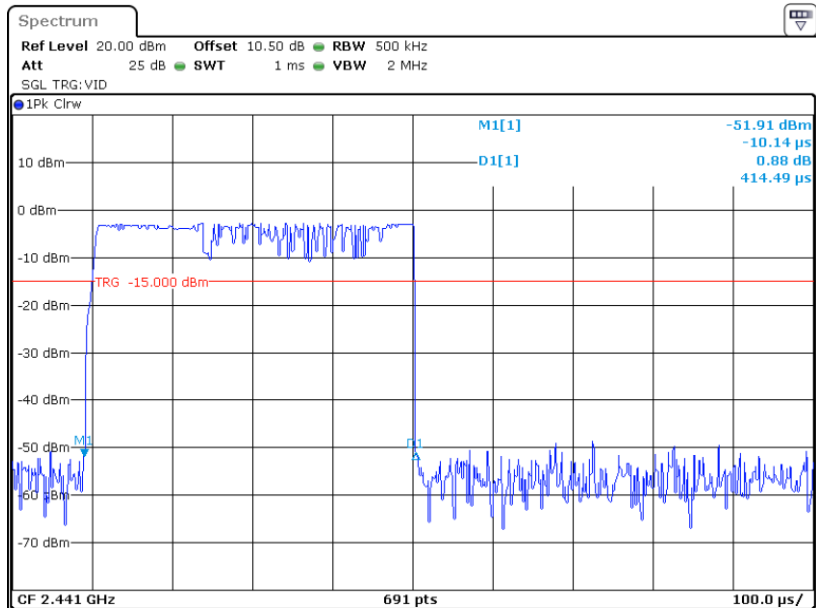
Project No.: RSHA240108001 Tester: Jenny Yang

Date: 27.FEB.2024 15:16:41

EDR ($\pi/4$ -DQPSK): Pulse time, Middle Channel, 2DH5

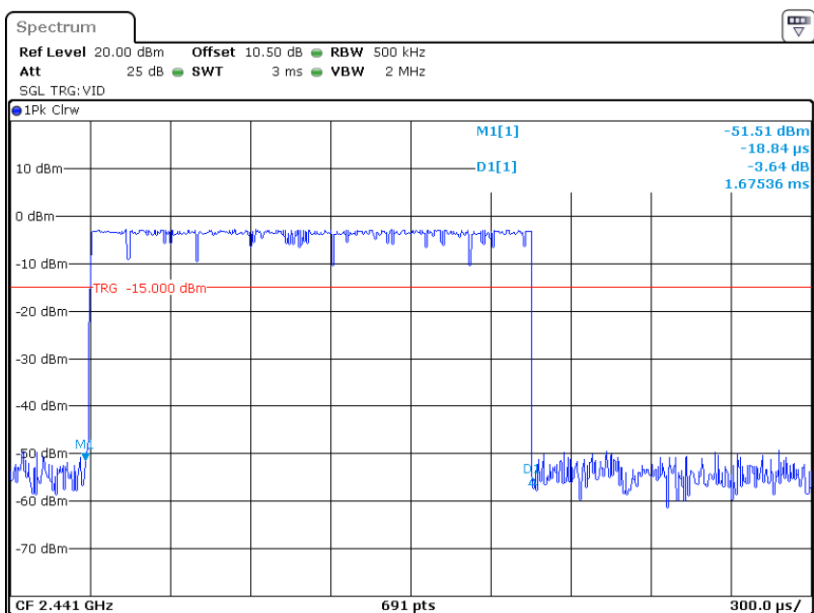
Project No.: RSHA240108001 Tester: Jenny Yang

Date: 27.FEB.2024 15:19:05

EDR (8DPSK): Pulse time, Middle Channel, 3DH1

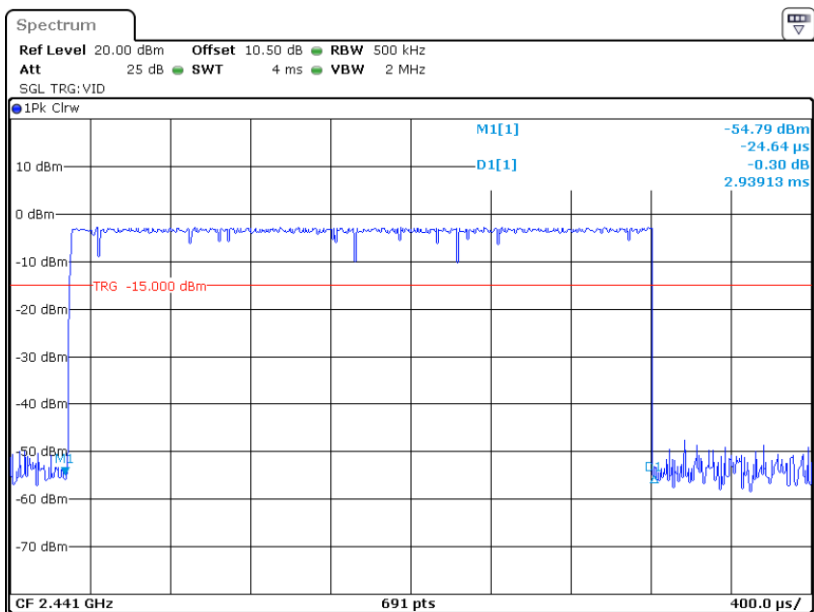
Project No.: RSHA240108001 Tester: Jenny Yang

Date: 27.FEB.2024 15:15:08

EDR (8DPSK): Pulse time, Middle Channel, 3DH3

Project No.: RSHA240108001 Tester: Jenny Yang

Date: 27.FEB.2024 15:17:37

EDR (8DPSK): Pulse time, Middle Channel, 3DH5

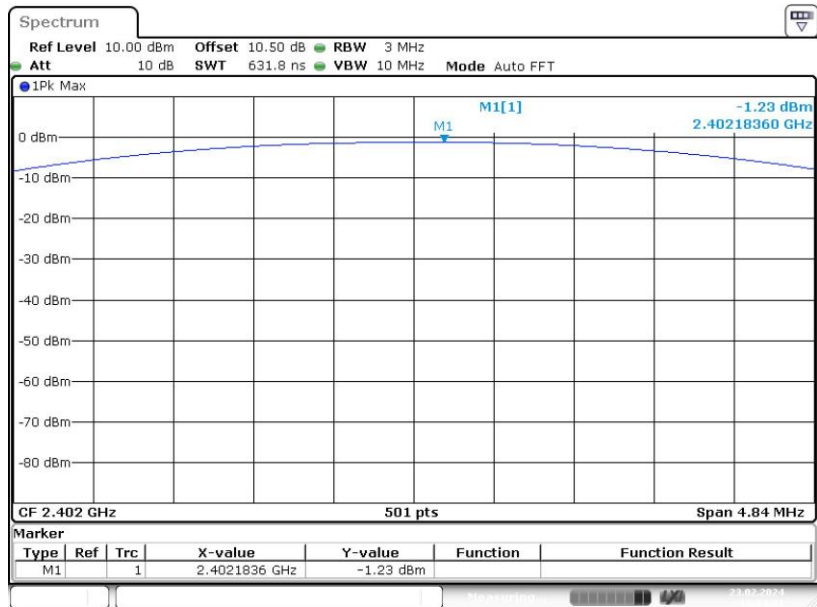
Project No.: RSHA240108001 Tester: Jenny Yang

Date: 27.FEB.2024 15:19:40

PEAK OUTPUT POWER MEASUREMENT*EUT operation mode: Transmitting*

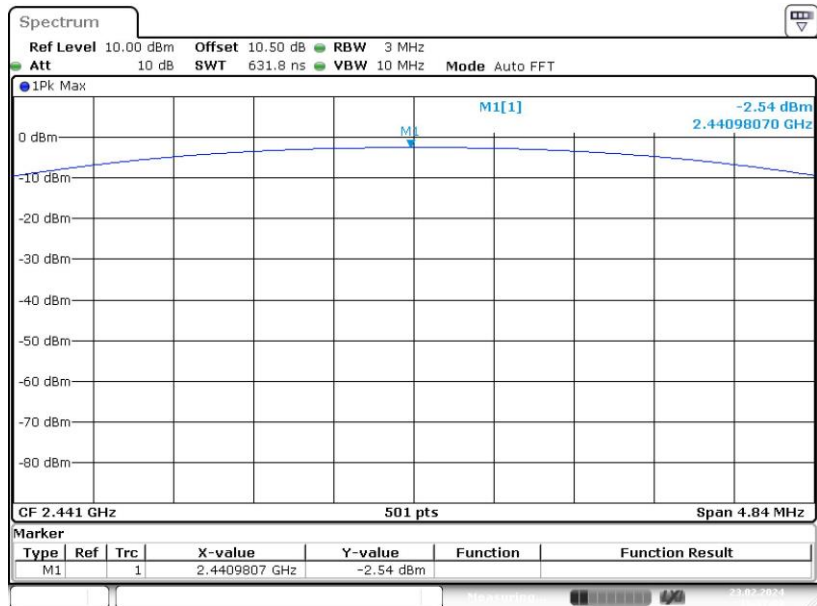
Mode	Channel	Frequency (MHz)	Result (dBm)	Limit (dBm)
GFSK	Low	2402	-1.23	21
	Middle	2441	-2.54	
	High	2480	-3.57	
$\pi/4$ DQPSK	Low	2402	0.96	
	Middle	2441	-0.3	
	High	2480	-1.29	
8DPSK	Low	2402	1.39	
	Middle	2441	0.08	
	High	2480	-0.88	

BDR (GFSK): 2402MHz



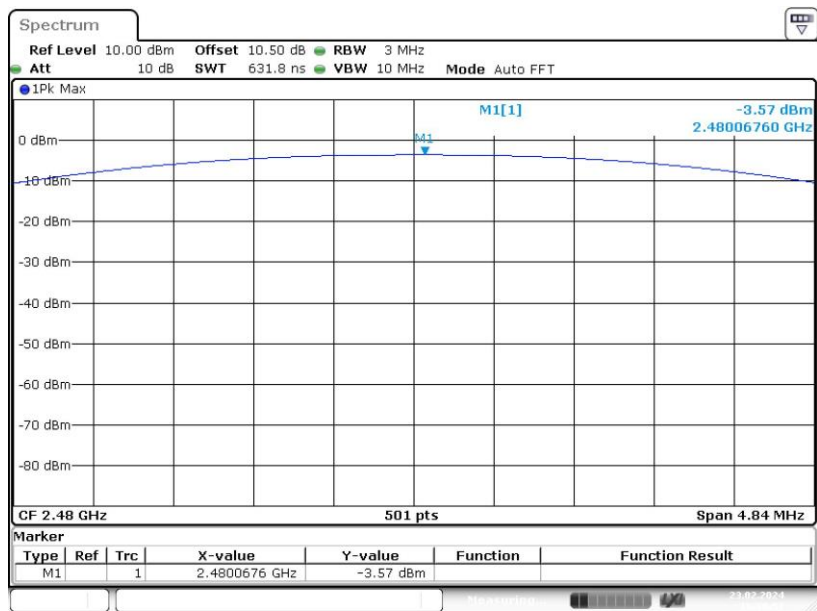
ProjectNo.: RSHA240108001 Tester: Jenny Yang
 Date: 23.FEB.2024 16:34:31

BDR (GFSK): 2441MHz



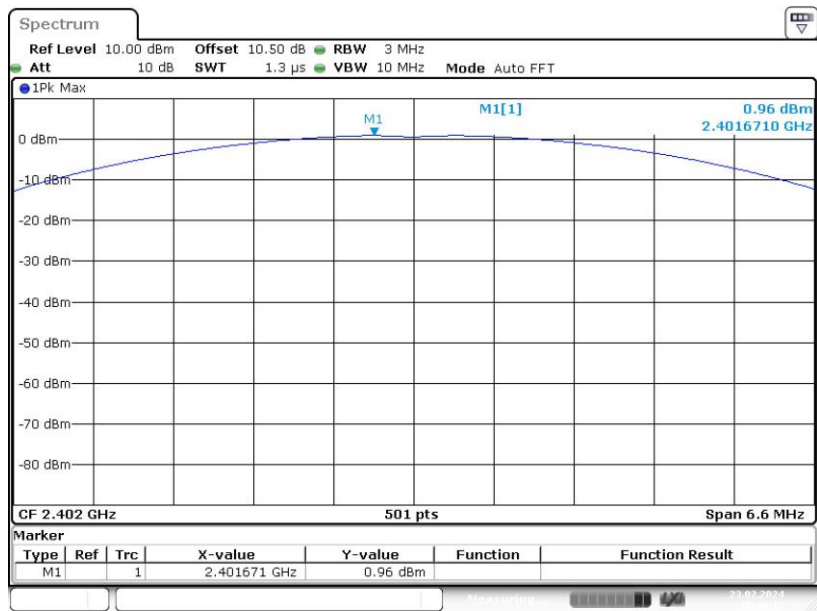
ProjectNo.: RSHA240108001 Tester: Jenny Yang
 Date: 23.FEB.2024 16:37:10

BDR (GFSK): 2480MHz



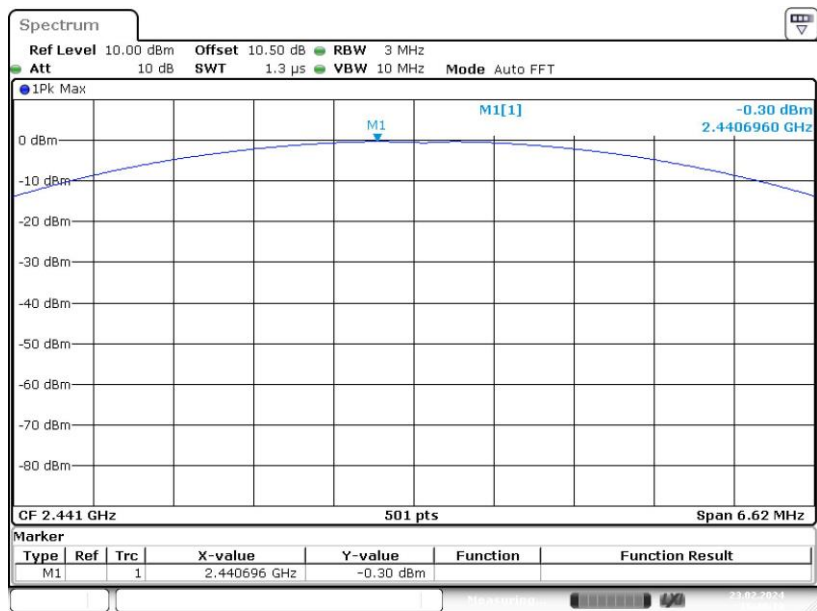
ProjectNo.:RSHA240108001 Tester:Jenny Yang
Date: 23.FEB.2024 16:38:57

EDR($\pi/4$ -DQPSK): 2402MHz



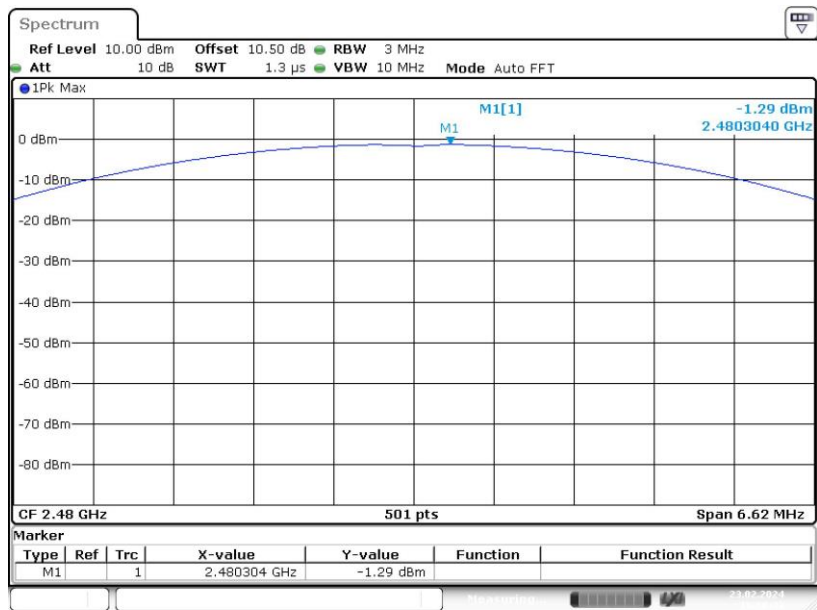
ProjectNo.:RSHA240108001 Tester:Jenny Yang
Date: 23.FEB.2024 16:46:18

EDR($\pi/4$ -DQPSK): 2441MHz



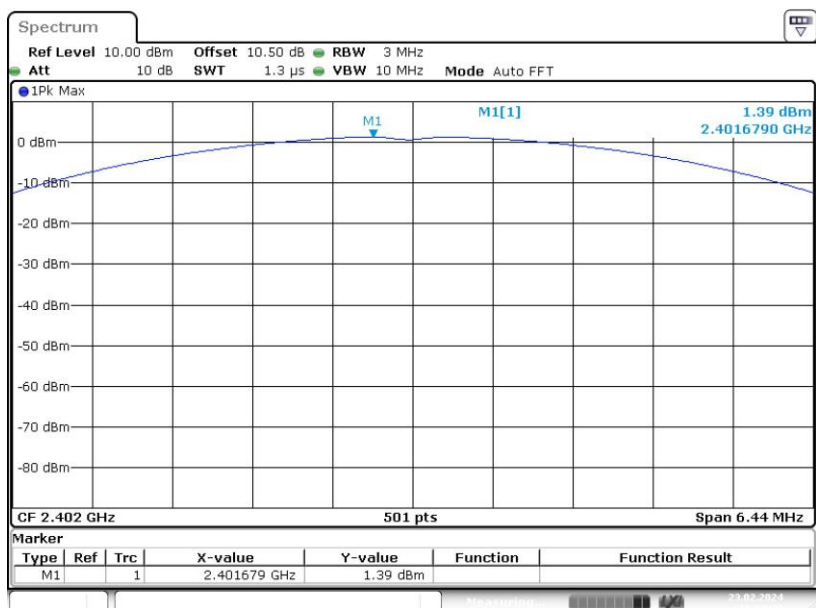
ProjectNo.: RSHA240108001 Tester:Jenny Yang
Date: 23.FEB.2024 16:48:19

EDR($\pi/4$ -DQPSK): 2480MHz



ProjectNo.: RSHA240108001 Tester:Jenny Yang
Date: 23.FEB.2024 16:50:43

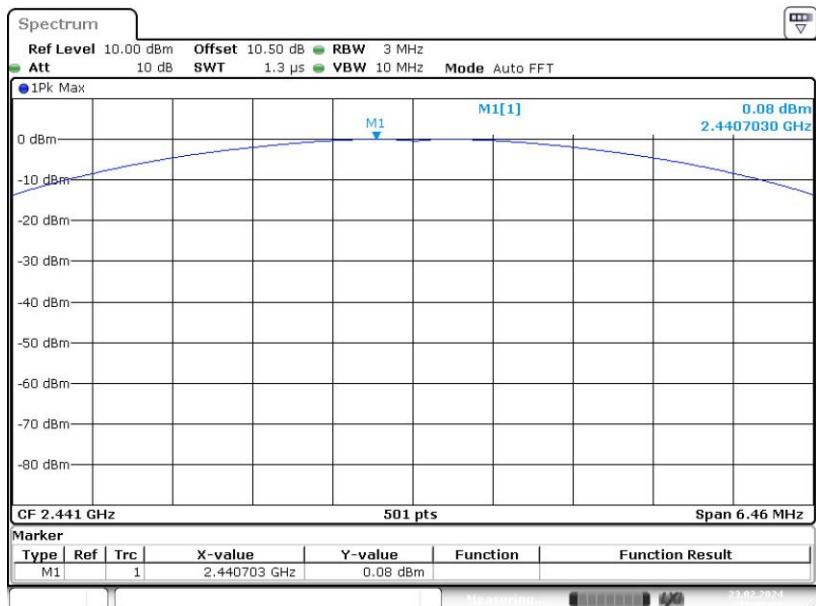
EDR(8DPSK): 2402MHz



ProjectNo.: RSHA240108001 Tester:Jenny Yang

Date: 23.FEB.2024 16:52:49

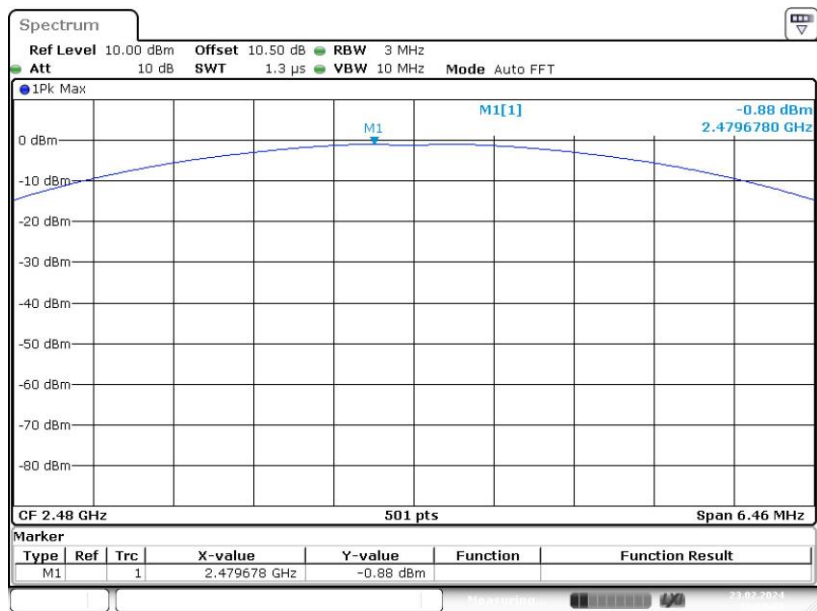
EDR(8DPSK): 2441MHz



ProjectNo.: RSHA240108001 Tester:Jenny Yang

Date: 23.FEB.2024 16:56:29

EDR(8DPSK): 2480MHz



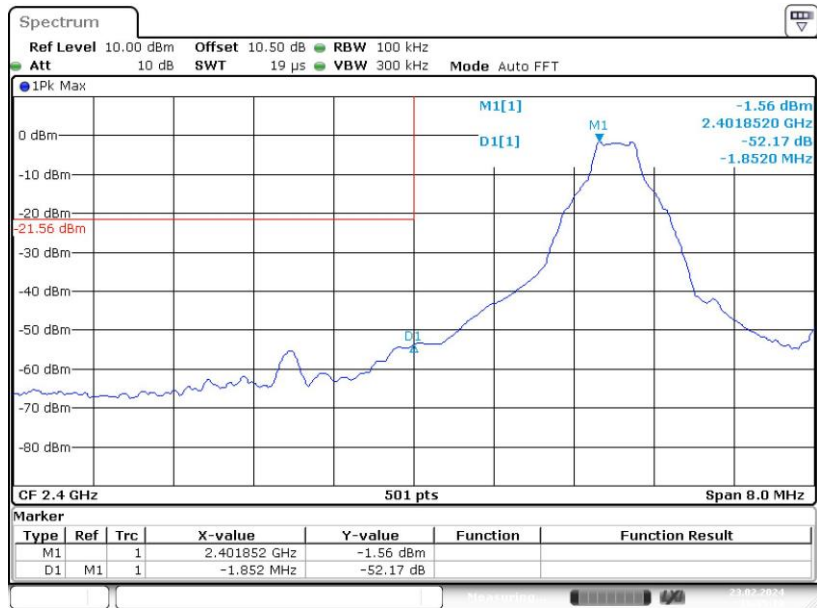
ProjectNo.:RSHA240108001 Tester:Jenny Yang
Date: 23.FEB.2024 16:58:29

BAND EDGES*EUT operation mode: Transmitting & Hopping**Test Result: Compliant.*

Mode	Channel	Frequency (MHz)	Result (dBc)	Limit (dBc)
GFSK	Low	2402	52.17	20
	High	2480	60.48	
$\pi/4$ DQPSK	Low	2402	53.21	
	High	2480	61.42	
8DPSK	Low	2402	50.06	
	High	2480	60.17	
GFSK (Hopping)	Low	2402	47.53	
	High	2480	48.00	
$\pi/4$ DQPSK (Hopping)	Low	2402	49.52	
	High	2480	47.87	
8DPSK (Hopping)	Low	2402	49.2	
	High	2480	47.71	

Band Edge

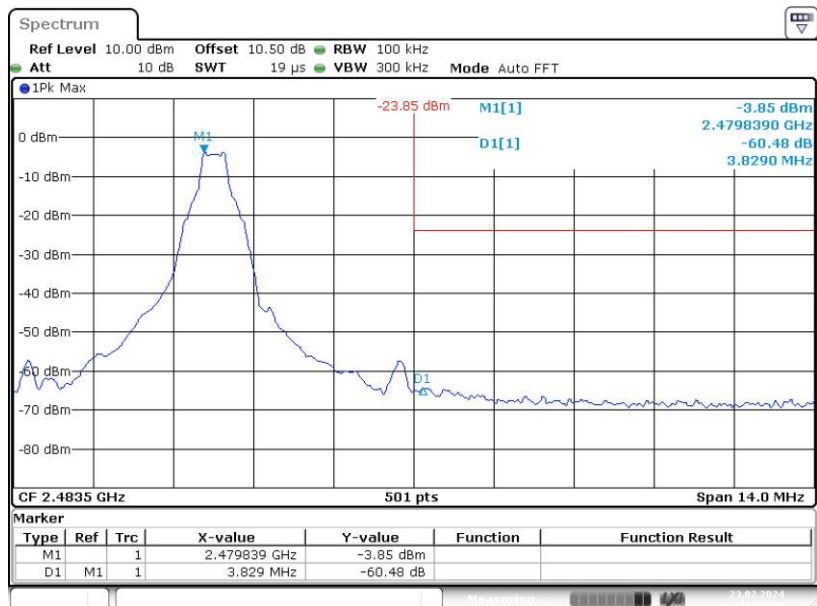
BDR (GFSK): Left Side - Transmitting



ProjectNo.: RSHA240108001 Tester: Jenny Yang

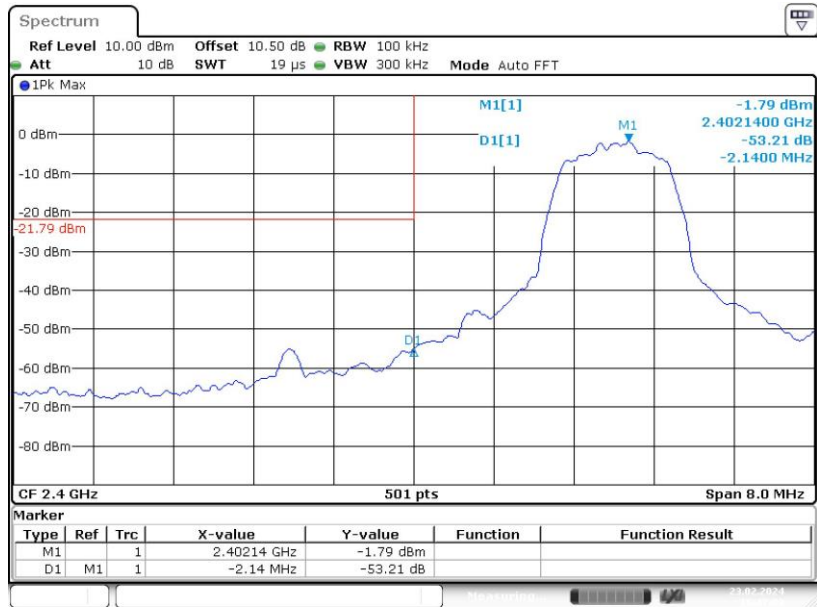
Date: 23.FEB.2024 16:35:19

BDR (GFSK): Right Side - Transmitting

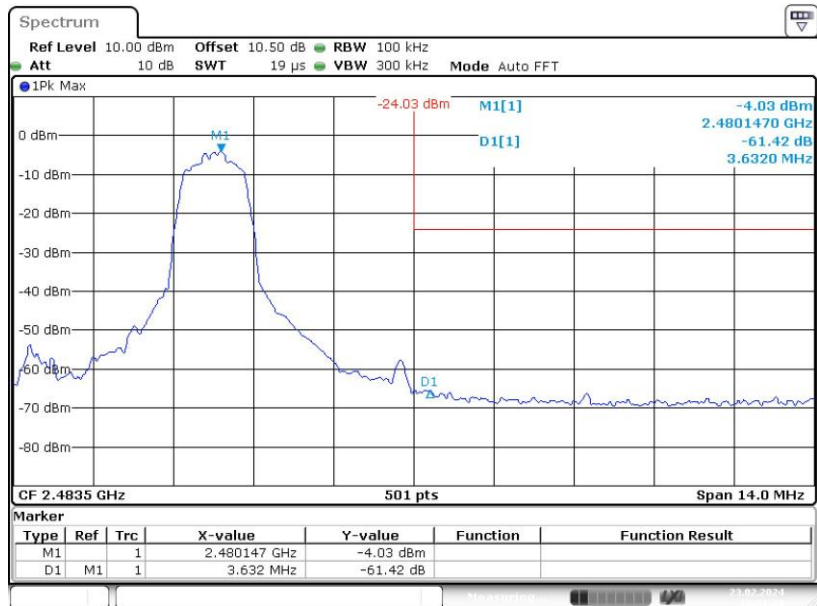


ProjectNo.: RSHA240108001 Tester: Jenny Yang

Date: 23.FEB.2024 16:39:49

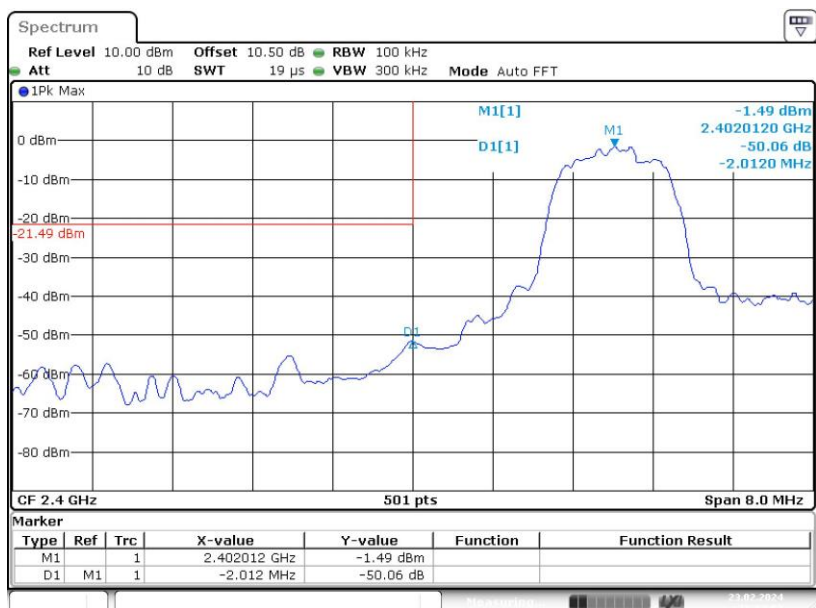
EDR ($\pi/4$ -DQPSK): Left Side - Transmitting

ProjectNo.: RSHA240108001 Tester: Jenny Yang
Date: 23.FEB.2024 16:47:09

EDR ($\pi/4$ -DQPSK): Right Side - Transmitting

ProjectNo.: RSHA240108001 Tester: Jenny Yang
Date: 23.FEB.2024 16:51:30

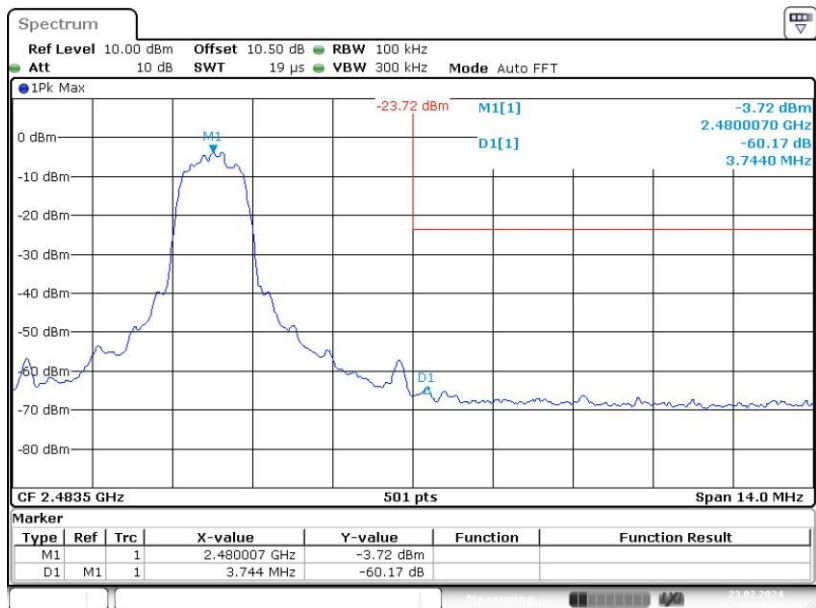
EDR (8DPSK): Left Side - Transmitting



ProjectNo.: RSHA240108001 Tester: Jenny Yang

Date: 23.FEB.2024 16:54:00

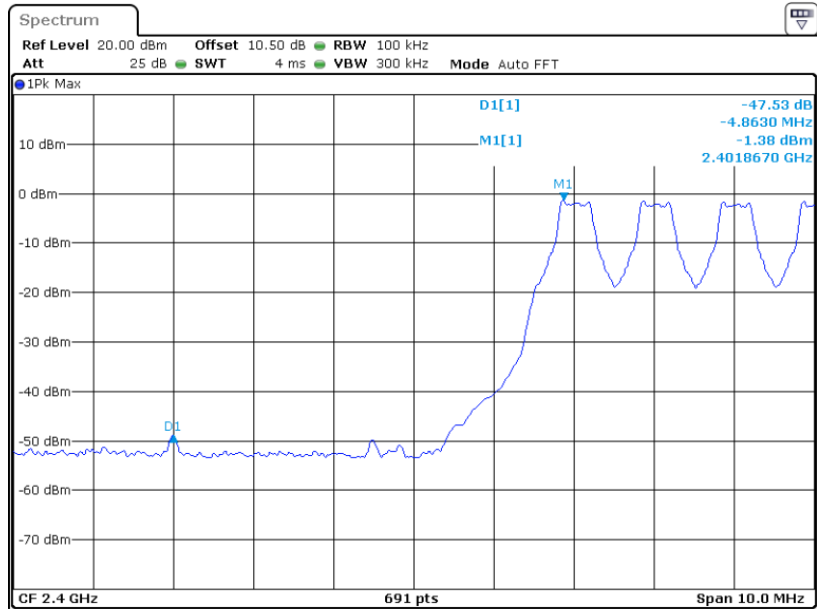
EDR (8DPSK): Right Side - Transmitting



ProjectNo.: RSHA240108001 Tester: Jenny Yang

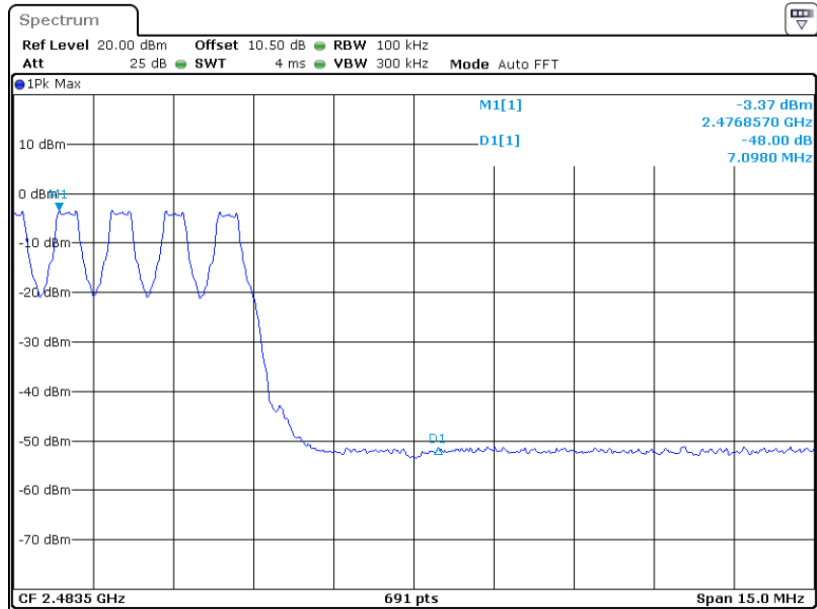
Date: 23.FEB.2024 16:59:25

BDR (GFSK): Left Side - Hopping



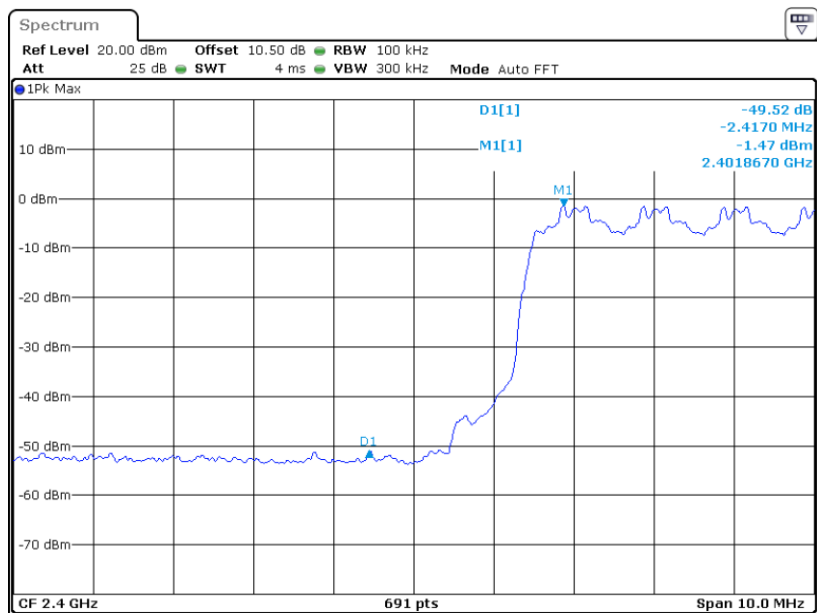
Project No.: RSHA240108001 Tester: Jenny Yang
Date: 27.FEB.2024 16:43:26

BDR (GFSK): Right Side- Hopping



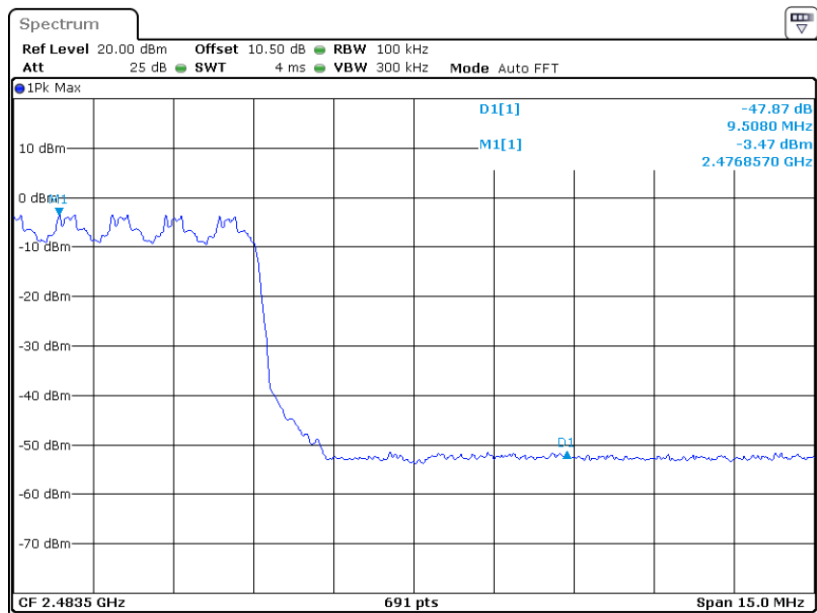
Project No.: RSHA240108001 Tester: Jenny Yang
Date: 27.FEB.2024 16:54:28

EDR ($\pi/4$ -DQPSK): Left Side- Hopping



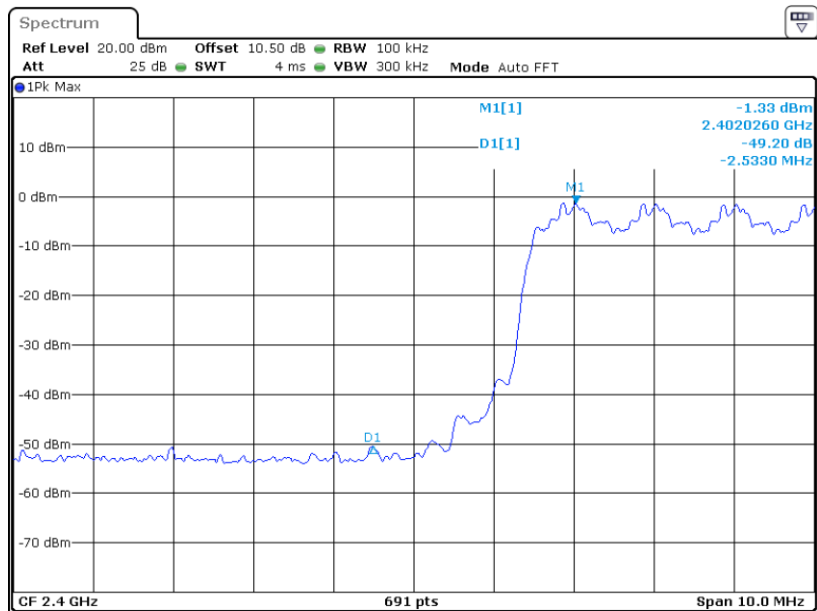
Project No.: RSHA240108001 Tester: Jenny Yang
Date: 27.FEB.2024 16:41:30

EDR ($\pi/4$ -DQPSK): Right Side- Hopping



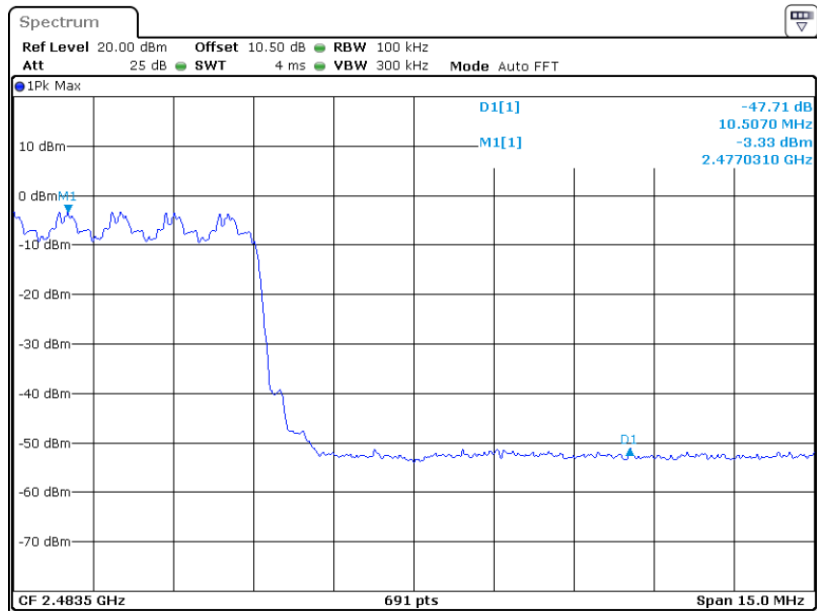
Project No.: RSHA240108001 Tester: Jenny Yang
Date: 27.FEB.2024 17:33:59

EDR (8DPSK): Left Side- Hopping



Project No.:RSHA240108001 Tester:Jenny Yang
Date: 27.FEB.2024 16:33:59

EDR (8DPSK): Right Side- Hopping



Project No.:RSHA240108001 Tester:Jenny Yang
Date: 27.FEB.2024 17:42:08

Declarations

1. The laboratory is not responsible for the authenticity of any information provided by the applicant. Information from the applicant that may affect test results is marked with “★”.
2. The test data was only valid for the test sample(s).
3. This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.
4. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.
5. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor $k=2$ with the 95.45% confidence interval.

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