

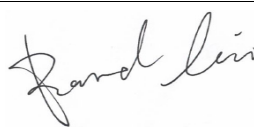
FCC PART 15.247 TEST REPORT

For

Zhejiang Sunseeker Industrial Co., Ltd.

Jinde Road 988, Jiangdong Industrial Park, Jinhua, Zhejiang, China

FCC ID: 2BFD7-ESPWROOM32UE

Report Type: Original Report	Product Name: 2.4G Wi-Fi&Bluetooth module
Report Number:	<u>RKSA240801002-00B</u>
Report Date:	<u>2024-11-12</u>
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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.

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REPORT REVISION HISTORY

Number of Revisions	Report No.	Version	Issue Date	Description
0	RKSA240801002-00B	R1V1	2024-11-12	Initial Release

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant:	Zhejiang Sunseeker Industrial Co., Ltd.
Product Name:	2.4G Wi-Fi&Bluetooth module
Tested Model:	ESP32-WROOM-32UE
Power Supply:	DC 3.3 V
Maximum Output Power:	GFSK: 5.66 dBm $\pi/4$ -DQPSK: 8.04 dBm 8DPSK: 8.63 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
★Maximum Antenna Gain:	Monopole Antenna: 3.95 dBi Dipole Antenna: 2.37 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: RKSA240801002-1 (Assigned by the BACL (Kunshan). The EUT supplied by the applicant was received on 2024-08-01.)

Objective

This test report is prepared for *Zhejiang Sunseeker Industrial 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 C63.10-2020, 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: Xshell

★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

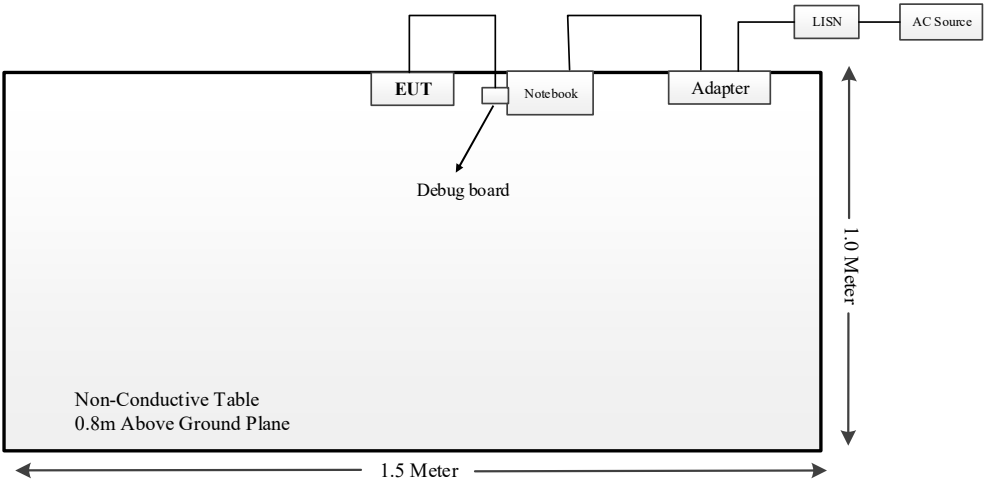
Manufacturer	Description	Model	Serial Number
Lenovo	Notebook	Y700P	PF2B7PL5
/	Debug board	/	/
/	Adapter	/	/

External I/O Cable

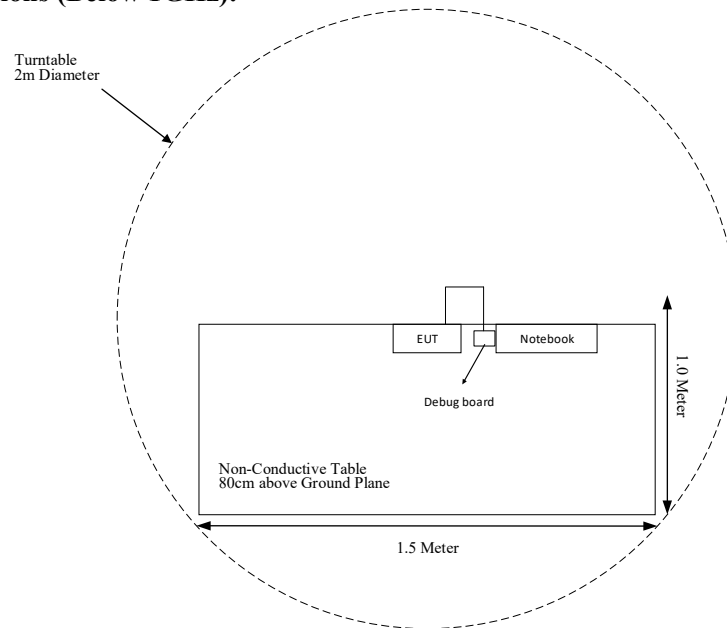
Cable Description	Length (m)	From Port	To
Power Cable 1	1.5	Notebook	Adapter
Power Cable 2	1.0	Adapter	AC Source/LISN
Data Cable	0.2	EUT	Debug Board

Block Diagram of Test Setup

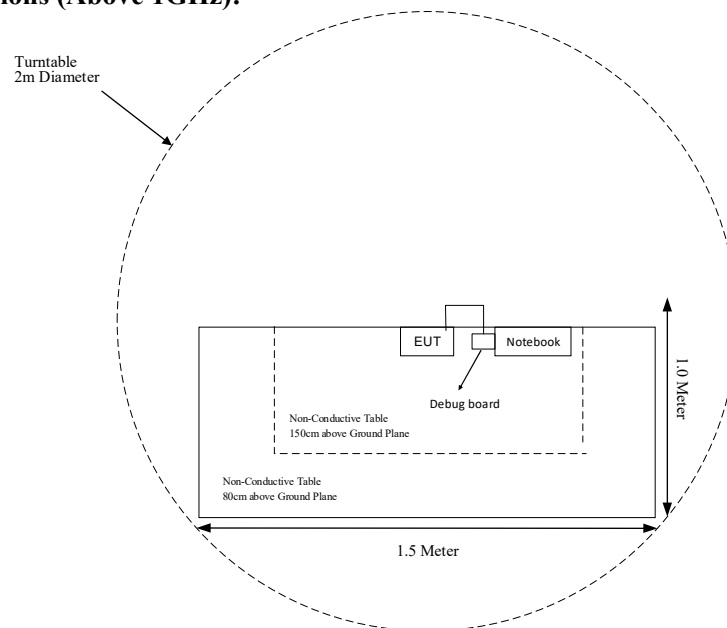
For Conducted Emissions:



For Radiated Emissions (Below 1GHz):



For Radiated Emissions (Above 1GHz):



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	2024-04-23	2025-04-22
Sunol Sciences	Broadband Antenna	JB3	A090314-1	2023-11-11	2024-11-10
Narda	6dB Attenuator	773-6	10690812-2-1	2023-11-11	2024-11-10
ETS-LINDGREN	Loop Antenna	6512	108100	2023-11-09	2024-11-08
Sonoma Instrument	Pre-amplifier	310N	171205	2024-04-23	2025-04-22
Rohde & Schwarz	Auto Test Software	EMC32	100361	N/A	N/A
MICRO-COAX	Coaxial Cable	Cable-8	008	2024-04-23	2025-04-22
MICRO-COAX	Coaxial Cable	Cable-9	009	2024-04-23	2025-04-22
MICRO-COAX	Coaxial Cable	Cable-10	010	2024-04-23	2025-04-22
Radiated Emission Test (Chamber #2)					
Rohde & Schwarz	EMI Test Receiver	ESU40	100207/040	2024-04-25	2025-04-24
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	PAM-0118P	512	2024-04-25	2025-04-24
SELECTOR	Amplifier	EM18G40G	060726	2024-04-25	2025-04-24
MICRO-TRONICS	Band Reject Filter	BRM50702	G024	2024-08-05	2025-08-04
Narda	Attenuator	10dB	010	2024-04-23	2025-04-22
Rohde & Schwarz	Auto test Software	EMC32	100361	N/A	N/A
MICRO-COAX	Coaxial Cable	Cable-6	006	2024-04-23	2025-04-22
MICRO-COAX	Coaxial Cable	Cable-11	011	2024-04-25	2025-04-24
MICRO-COAX	Coaxial Cable	Cable-12	012	2024-04-25	2025-04-24
MICRO-COAX	Coaxial Cable	Cable-13	013	2024-04-25	2025-04-24
RF Conducted Test					
Rohde & Schwarz	Signal Analyzer	FSV40-N	103298	2024-04-24	2025-04-23
Narda	Attenuator	10dB	010	2024-04-23	2025-04-22
Conducted Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESR	1316.3003K03-101746-zn	2024-07-28	2025-07-27
Rohde & Schwarz	LISN	ENV216	101115	2024-04-23	2025-04-22
Audix	Test Software	e3	V9	N/A	N/A
Rohde & Schwarz	Pulse limiter	ESH3-Z2	100552	2024-04-23	2025-04-22
MICRO-COAX	Coaxial Cable	Cable-15	015	2024-04-23	2025-04-22

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
§1.1310 & §2.1091	MAXIMUM PERMISSIBLE EXPOSURE (MPE)	Compliant
§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 §1.1310 & §2.1091 - MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart §2.1091 and subpart §1.1310, 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 guidelines.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minutes)
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

f = frequency in MHz; * = Plane-wave equivalent power density;

According to §1.1310 and §2.1091 RF exposure is calculated.

Calculated Formulary

Predication of MPE limit at a given distance

$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm²);

P = power input to the antenna (in appropriate units, e.g., mW);

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

Calculated Data:

Mode	Frequency Range (MHz)	Antenna Gain		★Tune-up Output Power		Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)
		(dBi)	(numeric)	(dBm)	(mW)			
2.4G Wi-Fi	2412-2462	3.95	2.48	23.0	199.53	20	0.0984	1.0
BLE	2402-2480	3.95	2.48	5.5	3.55	20	0.0018	1.0
Classic BT	2402-2480	3.95	2.48	9.0	7.94	20	0.0039	1.0

Note:

1. For the above tune up power were declared by the manufacturer.
2. 2.4G Wi-Fi and Classic BT/BLE cannot transmit simultaneously.

Result: The device meet FCC MPE at 20 cm distance.

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 Dipole Antenna, the antenna gain is 2.37 dBi and Monopole Antenna, the antenna gain is 3.95 dBi for Class BT, which use a unique type of connector to attach to the EUT, fulfill the requirement of this section. Please refer to the EUT photos.

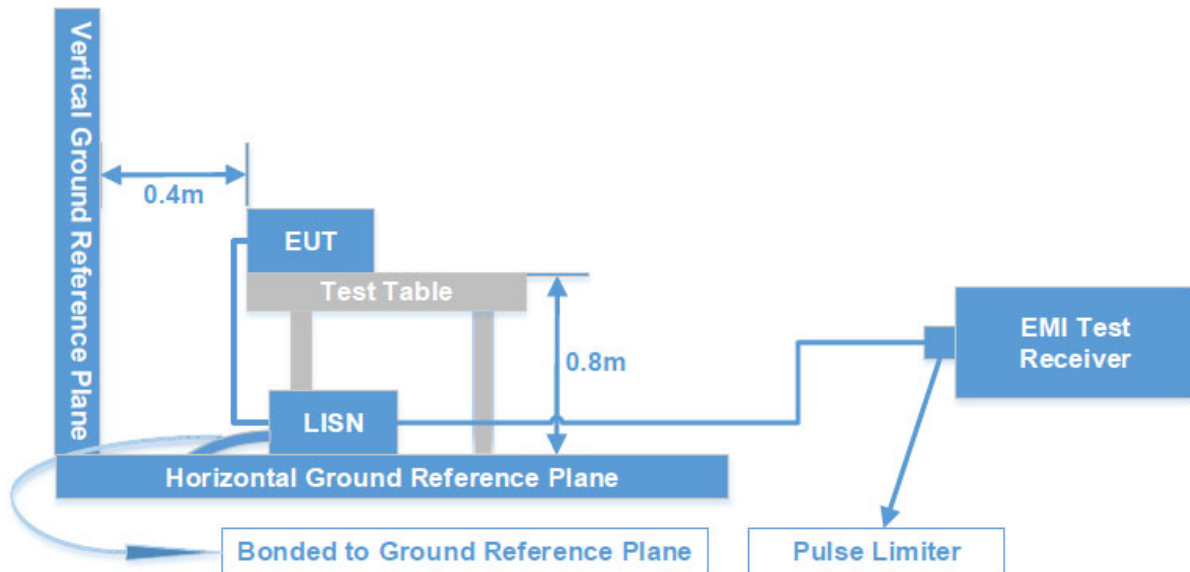
Result: Compliant.

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 C63.10-2020. The related limit was specified in FCC Part 15.207.

EMI Test Receiver Setup

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 C63.10-2020 clause 6.2

During the conducted emission test, the EUT or adapter 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:

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

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:

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

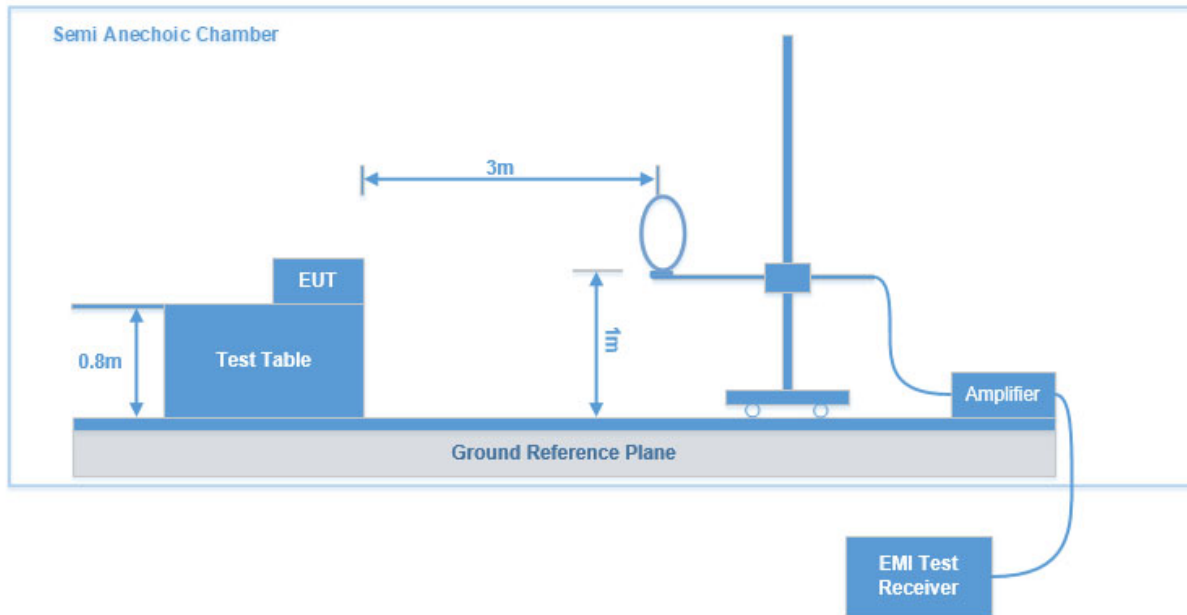
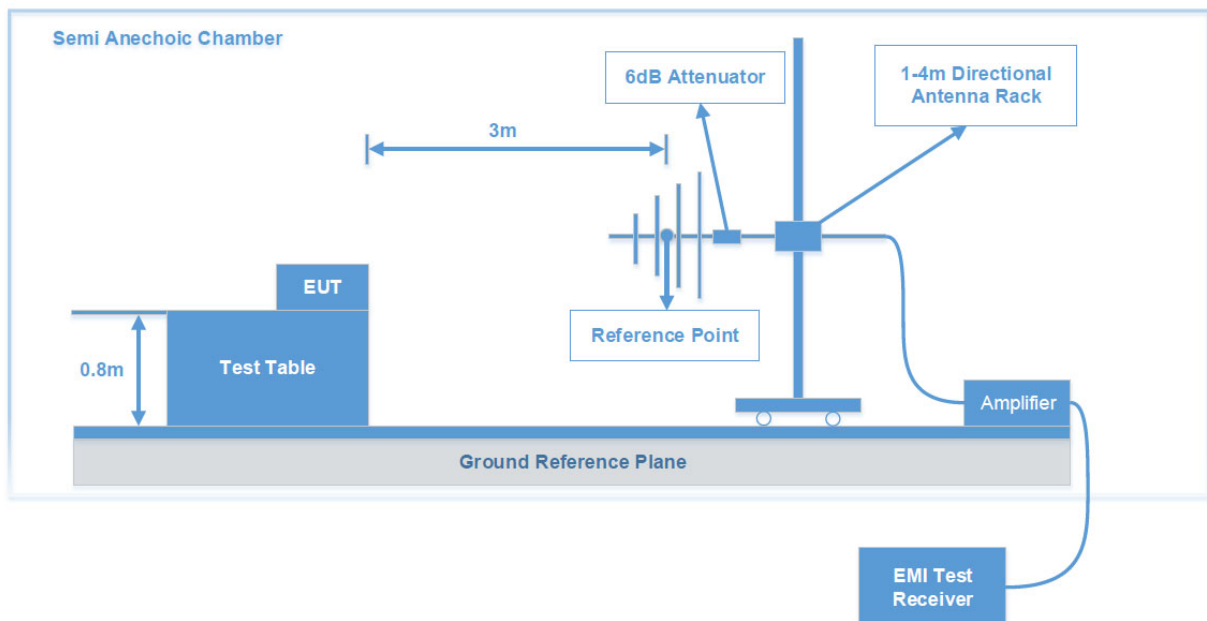
Test Results Summary

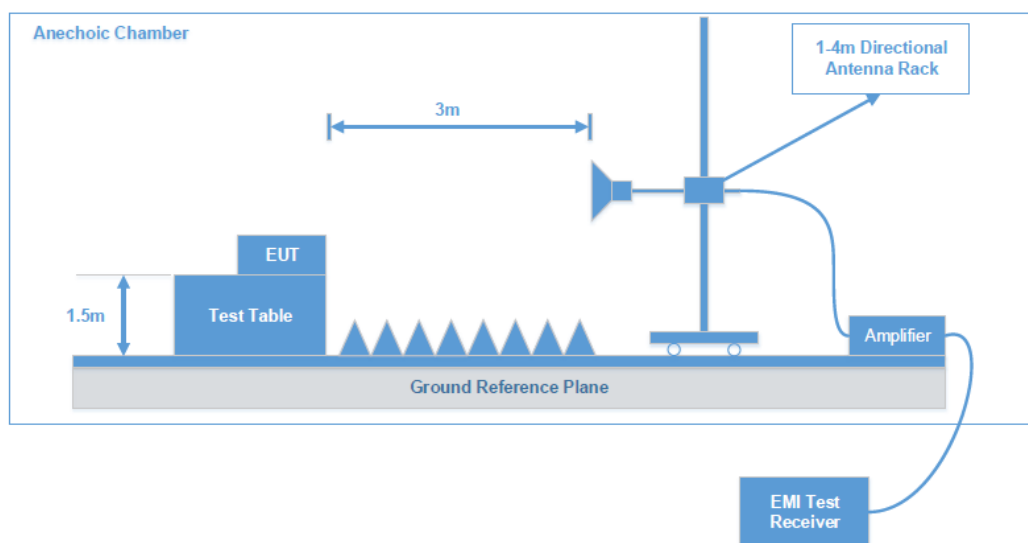
According to the recorded data in following table, the EUT complied with the FCC Part 15.207.

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**9 kHz – 30 MHz:****30 MHz - 1 GHz:**

Above 1GHz:

The radiated emission tests were performed in the 3 meters, using the setup accordance with the ANSI C63.10-2020. The specification used was the FCC 15.209 and FCC 15.247 limits.

EMI Test Receiver Setup

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

Frequency Range	RBW	VBW	IF B/W	Measurement
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

According to ANSI C63.10-2020 clause 6.4, 6.5 and 6.6.

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 (dBμV/m) = Meter Reading (dBμV) + 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 (dBμV/m) – Corrected Amplitude (dBμV/m)

Note: The QuasiPeak (dBμV/m), MaxPeak (dBμV/m), Average (dBμV/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.

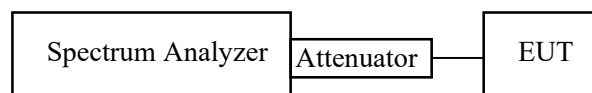
Test Procedure

According to ANSI C63.10-2020 sub-clause 7.8.2

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

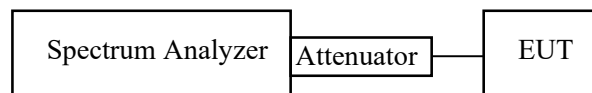
Applicable Standard

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

According to ANSI C63.10-2020 sub-clause 6.9.2

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.

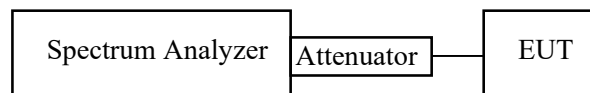
Test Procedure

According to ANSI C63.10-2020 sub-clause 7.8.3

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**

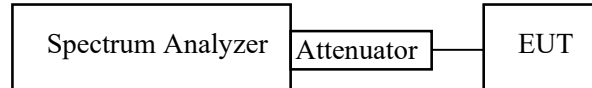
Frequency hopping systems in the 2400-2483.5 MHz shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions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

Test Procedure

According to ANSI C63.10-2020 sub-clause 7.8.4

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

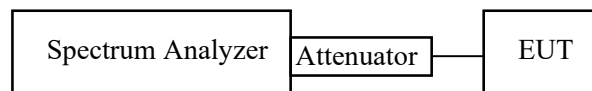
According to §15.247(b) (1), for frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725–5850 MHz band: 1 watt. And for all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125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

Test Procedure

According to ANSI C63.10-2020 sub-clause 7.8.5

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

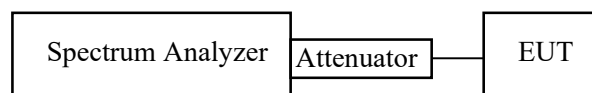
Applicable Standard

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

According to ANSI C63.10-2020 sub-clause 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. 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.

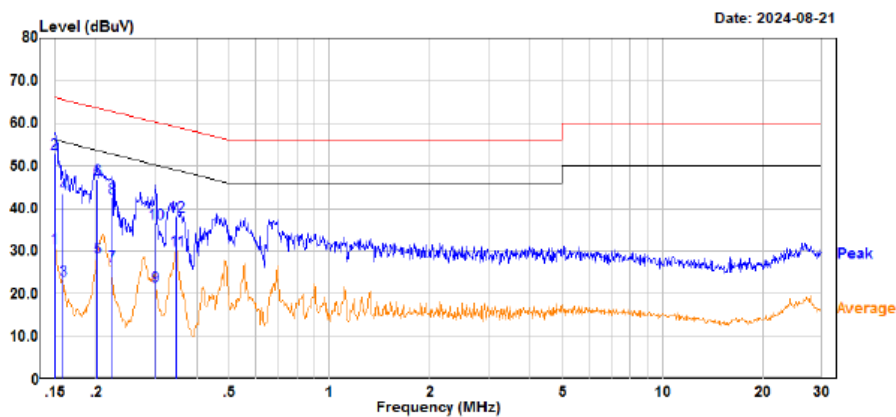
APPENDIX - TEST DATA**Environmental Conditions & Test Information**

Test Item:	AC LINE CONDUCTED EMISSIONS		RADIATED EMISSIONS	
			9 kHz - 1GHz	
Test Date:	2024-08-21	2024-08-28	2024-08-16	2024-09-06
Temperature:	24.7 °C	27.2 °C	24.7 °C	25.4 °C
Relative Humidity:	44 %	50 %	56 %	44 %
ATM Pressure:	100.3 kPa	100.6 kPa	100.8 kPa	101.2 kPa
Test Result:	Pass	Pass	Pass	Pass
Test Engineer:	Richard Wen	Leah Li	Grace Luo	Grace Luo

Test Item:	RADIATED EMISSIONS			
	1 GHz – 18 GHz		18 GHz - 25 GHz	
Test Date:	2024-08-21	2024-09-03	2024-08-25	2024-09-19
Temperature:	24.7 °C	24.3 °C	24.5 °C	24.8 °C
Relative Humidity:	44 %	47 %	52 %	51 %
ATM Pressure:	100.3 kPa	100.3 kPa	101.0 kPa	100.7 kPa
Test Result:	Pass	Pass	Pass	Pass
Test Engineer:	Klein Zhu & Destine Hu	Klein Zhu & Destine Hu	Hugh Wu	Hugh Wu

Test Item:	CHANNEL SEPARATION TEST	20 DB BANDWIDTH TEST	QUANTITY OF HOPPING CHANNEL TEST
Test Date:	2024-09-04&2024-10-10	2024-09-04	2024-09-04
Temperature:	22.6 °C~24.7 °C	24.7 °C	24.7 °C
Relative Humidity:	51 %~54%	51 %	51 %
ATM Pressure:	100.7 kPa~101.0 kPa	100.7 kPa	100.7 kPa
Test Result:	Pass	Pass	Pass
Test Engineer:	Jason Lu	Jason Lu	Jason Lu

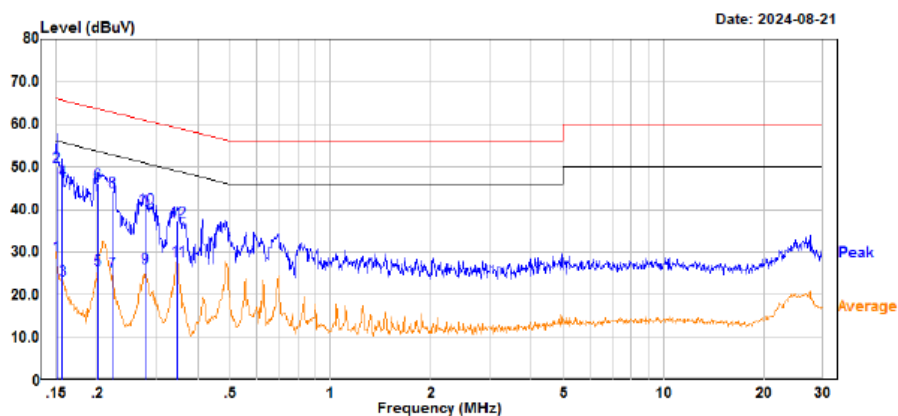
Test Item:	TIME OF OCCUPANCY (DWELL TIME)	BAND EDGES
Test Date:	2024-09-04	2024-09-04
Temperature:	24.7 °C	24.7 °C
Relative Humidity:	51 %	51 %
ATM Pressure:	100.7 kPa	100.7 kPa
Test Result:	Pass	Pass
Test Engineer:	Jason Lu	Jason Lu

AC LINE CONDUCTED EMISSIONS*EUT operation mode: Transmitting in 8DPSK Mode low channel (maximum output power mode)***2.4G copper tube Antenna:**

Trace: 1

Site : CE
Condition : limit\FCC PART 15.207
: DET:Peak
Project No. : RKSA240801002
Model : ESP32-WROOM-32UE
Phase : L
Voltage : AC 120V
Mode : BT
Test Equipment : ENV216,ESR
Temperature : 24.7°C
Humidity : 44%
Atmospheric pressure: 100.3kPa
Test Engineer : Richard Wen

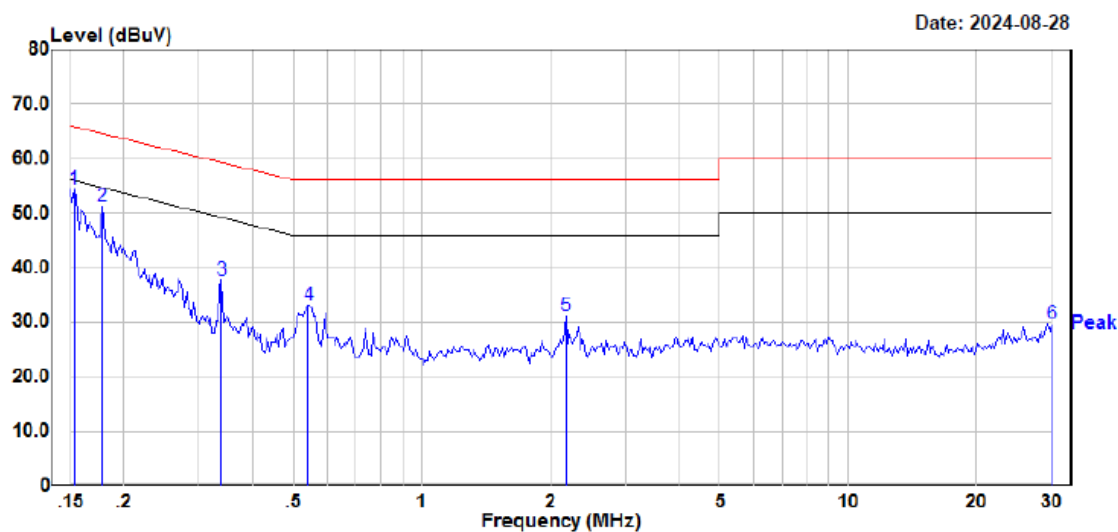
		Read		Limit	Over	
	Freq	Level	Factor	Level	Line	Limit Remark
	MHz	dBuV	dB	dBuV	dBuV	dB
1	0.150	10.65	20.12	30.77	56.00	-25.23 Average
2	0.150	32.93	20.12	53.05	66.00	-12.95 QP
3	0.159	2.99	20.11	23.10	55.50	-32.40 Average
4	0.159	23.46	20.11	43.57	65.50	-21.93 QP
5	0.201	8.54	20.11	28.65	53.56	-24.91 Average
6	0.201	26.74	20.11	46.85	63.56	-16.71 QP
7	0.222	6.38	20.13	26.51	52.73	-26.22 Average
8	0.222	22.52	20.13	42.65	62.73	-20.08 QP
9	0.301	1.69	20.17	21.86	50.20	-28.34 Average
10	0.301	16.33	20.17	36.50	60.20	-23.70 QP
11	0.348	9.96	20.19	30.15	49.00	-18.85 Average
12	0.348	17.93	20.19	38.12	59.00	-20.88 QP



Trace: 1

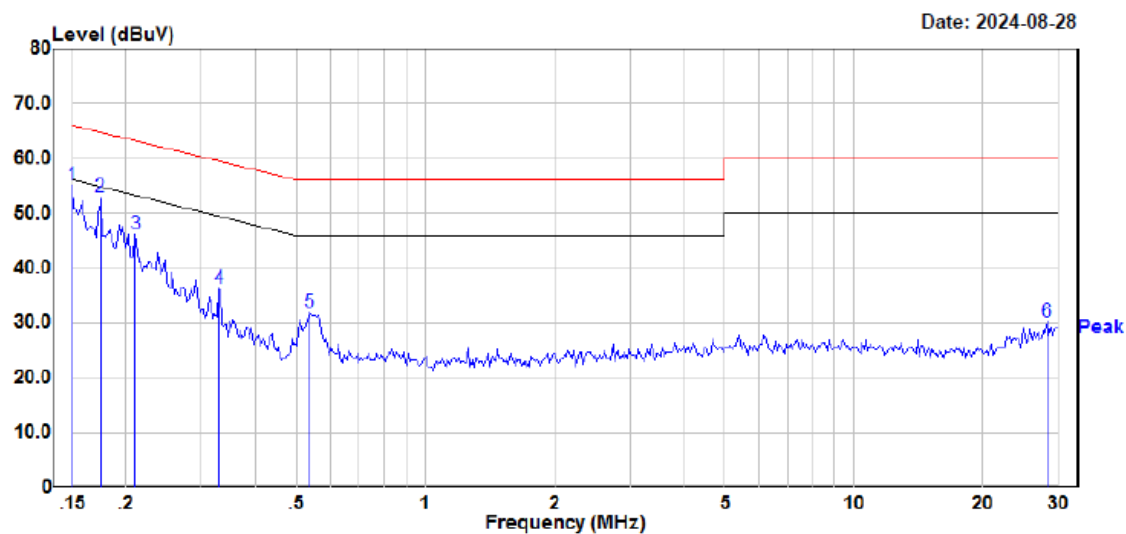
Site : CE
 Condition : limit\FCC PART 15.207
 : DET:Peak
 Project No. : RKSA240801002
 Model : ESP32-WROOM-32UE
 Phase : N
 Voltage : AC 120V
 Mode : BT
 Test Equipment : ENV216,ESR
 Temperature : 24.7°C
 Humidity : 44%
 Atmospheric pressure: 100.3kPa
 Test Engineer : Richard Wen

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	d8	dBuV	dBuV	dB	
1	0.151	9.03	20.12	29.15	55.96	-26.81	Average
2	0.151	30.02	20.12	50.14	55.96	-15.82	QP
3	0.157	3.28	20.11	23.39	55.63	-32.24	Average
4	0.157	26.77	20.11	46.88	55.63	-18.75	QP
5	0.200	5.87	20.11	25.98	53.60	-27.62	Average
6	0.200	26.12	20.11	46.23	53.60	-17.37	QP
7	0.221	5.15	20.13	25.28	52.77	-27.49	Average
8	0.221	24.16	20.13	44.29	52.77	-18.48	QP
9	0.278	6.24	20.15	26.39	50.87	-24.48	Average
10	0.278	20.26	20.15	40.41	50.87	-20.46	QP
11	0.348	7.79	20.19	27.98	49.00	-21.02	Average
12	0.348	17.07	20.19	37.26	49.00	-21.74	QP

Rod Antenna:

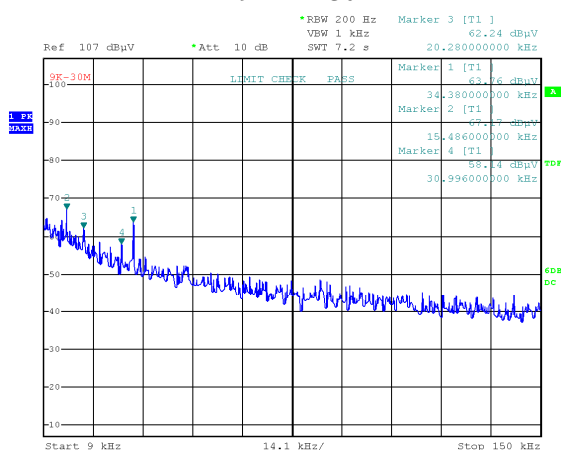
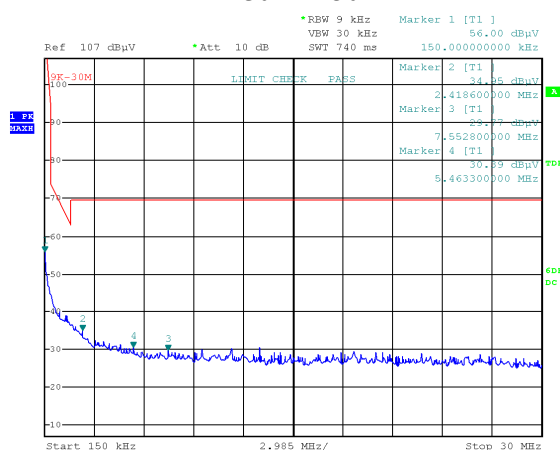
Site : CE
Condition : limit\FCC PART 15.207
Project No. : RKSA240801002
Model : ESP32-WROOM-32UE
Phase : L
Voltage : AC 120V
Mode : BT
Test Equipment : ENV216,ESR
Temperature : 27.2°C
Humidity : 50%
Atmospheric pressure: 100.6kPa
Test Engineer : Leah Li

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.153	34.28	20.12	54.40	65.83	-11.43	Peak
2	0.178	31.11	20.12	51.23	64.60	-13.37	Peak
3	0.339	17.54	20.19	37.73	59.23	-21.50	Peak
4	0.541	13.04	20.12	33.16	56.00	-22.84	Peak
5	2.175	10.96	20.17	31.13	56.00	-24.87	Peak
6	30.000	9.95	19.87	29.82	60.00	-30.18	Peak



Site : CE
Condition : limit\FCC PART 15.207
: DET:Peak
Project No. : RKSA240801002
Model : ESP32-WROOM-32UE
Phase : N
Voltage : AC 120V
Mode : BT
Test Equipment : ENV216,ESR
Temperature : 27.2℃
Humidity : 50%
Atmospheric pressure: 100.6kPa
Test Engineer : Leah Li

	Read			Limit	Over	
	Freq	Level	Factor	Level	Line	Limit Remark
	MHz	dBuV	dB	dBuV	dBuV	dB
1	0.150	35.01	20.12	55.13	66.00	-10.87 Peak
2	0.174	32.92	20.11	53.03	64.76	-11.73 Peak
3	0.210	25.98	20.12	46.10	63.19	-17.09 Peak
4	0.329	16.12	20.18	36.30	59.48	-23.18 Peak
5	0.535	11.76	20.12	31.88	56.00	-24.12 Peak
6	28.263	10.35	19.85	30.20	60.00	-29.80 Peak

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:***Dipole Antenna:****9 kHz-30 MHz:** (Transmitting maximum output power 8DPSK mode low channel)**Parallel(worst case)****9kHz-150kHz****150kHz-30MHz**

Project No.RKSA240801002

Tester:Grace Luo

Date: 16.AUG.2024 18:37:47

Project No.RKSA240801002

Tester:Grace Luo

Date: 16.AUG.2024 18:34:31

9kHz-150kHz

Frequency (MHz)	Corrected Amplitude (dBμV/m) @3m	Detector PK/QP/Ave.	Corrected Factor (dB/m)	Limit (dBμV/m) @3m	Margin (dB)
0.03	63.76	PK	46.06	116.88	53.12
0.02	67.17	PK	52.87	123.81	56.64
0.02	62.24	PK	49.92	121.46	59.22
0.03	58.14	PK	46.87	117.70	59.56

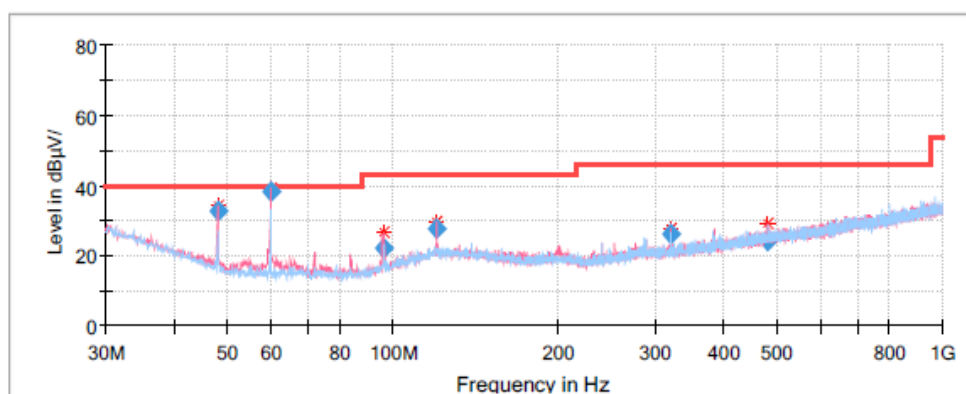
150kHz-30MHz

Frequency (MHz)	Corrected Amplitude (dBμV/m) @3m	Detector PK/QP/Ave.	Corrected Factor (dB/m)	Limit (dBμV/m) @3m	Margin (dB)
0.15	56.00	PK	50.90	104.08	48.08
2.42	34.95	PK	12.64	69.54	34.59
7.55	29.77	PK	6.58	69.54	39.77
5.46	30.39	PK	7.79	69.54	39.15

30 MHz - 1 GHz (Transmitting in maximum output power 8DPSK mode):
Low Channel: 2402 MHz

Common Information

Project No:	RKSA240801002
EUT Model:	ESP32-WROOM-32UE
Test Mode:	Transmitting in BT-3DH5 mode low channel
Standard:	FCC Part 15.205 & FCC Part 15.209 & FCC Part 15.247
Test Equipment:	ESCI, JB3, 310N
Temperature:	24.7°C
Humidity:	56%
Barometric Pressure:	100.8kPa
Test Engineer:	Grace Luo
Test Date:	2024/8/16



Final Result

Frequency (MHz)	QuasiPeak (dBμ V/m)	Limit (dBμ V/m)	Margin (dB)	Pol	Corr. (dB/m)
47.998400	32.83	40.00	7.17	V	-15.7
59.991950	38.39	40.00	1.61	V	-17.6
96.066000	22.37	43.50	21.13	V	-15.4
119.990000	27.87	43.50	15.63	V	-10.9
319.988000	25.97	46.00	20.03	V	-10.0
479.961150	24.32	46.00	21.68	V	-5.9

Middle Channel: 2441 MHz

Common Information

Project No:

EUT Model:

Test Mode:

Standard:

Test Equipment:

Temperature:

Humidity:

Barometric Pressure:

Test Engineer:

Test Date:

RKSA240801002

ESP32-WROOM-32UE

Transmitting in BT-3DH5 mode middle channel

FCC Part 15.205 &FCC Part 15.209&FCC Part 15.247

ESCI, JB3, 310N

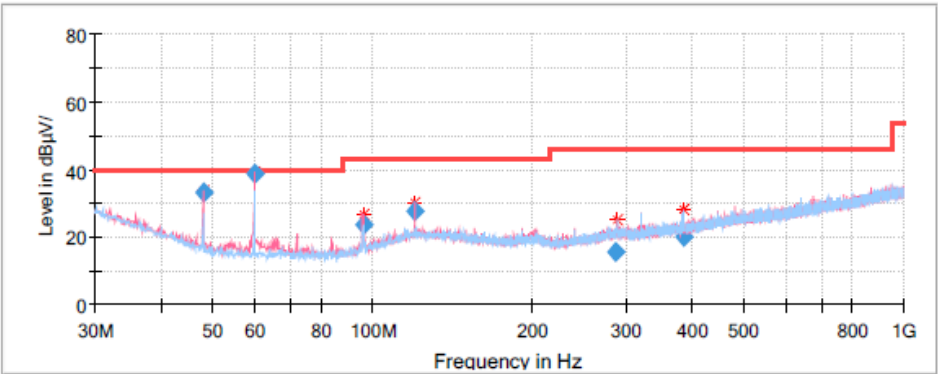
24.7℃

56%

100.8kPa

Grace Luo

2024/8/16

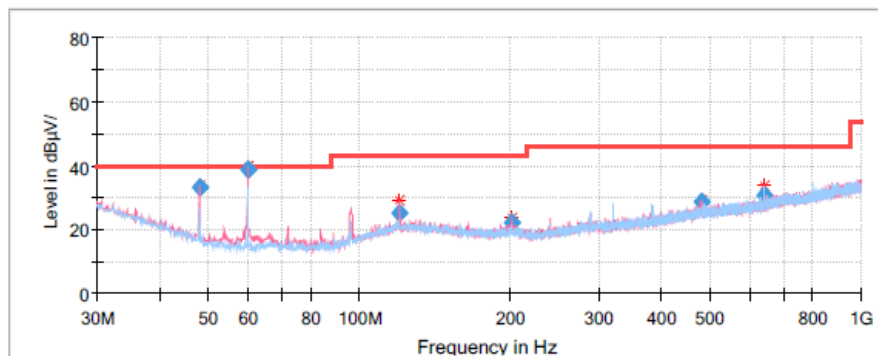


Final Result

Frequency (MHz)	QuasiPeak (dBμ V/m)	Limit (dBμ V/m)	Margin (dB)	Pol	Corr. (dB/m)
47.997800	33.03	40.00	6.97	V	-15.7
59.992250	38.54	40.00	1.46	V	-17.6
96.104350	23.63	43.50	19.87	V	-15.4
120.012200	27.83	43.50	15.67	V	-10.9
288.240350	15.45	46.00	30.55	H	-10.6
385.114050	20.24	46.00	25.76	V	-8.4

High Channel:2480 MHz**Common Information**

Project No: RKSA240801002
EUT Model: ESP32-WROOM-32UE
Test Mode: Transmitting in BT-3DH5 mode high channel
Standard: FCC Part 15.205 & FCC Part 15.209 & FCC Part 15.247
Test Equipment: ESCI, JB3, 310N
Temperature: 24.7°C
Humidity: 56%
Barometric Pressure: 100.8kPa
Test Engineer: Grace Luo
Test Date: 2024/8/16

**Final Result**

Frequency (MHz)	QuasiPeak (dBμ V/m)	Limit (dBμ V/m)	Margin (dB)	Pol	Corr. (dB/m)
47.945000	32.96	40.00	7.04	V	-16.1
59.948000	38.69	40.00	1.31	V	-17.5
119.967000	25.35	43.50	18.15	V	-10.9
202.020650	22.26	43.50	21.24	V	-12.3
479.987300	28.44	46.00	17.56	V	-5.9
639.987750	30.83	46.00	15.17	H	-3.3

1 GHz - 18 GHz:

GFSK:

Low Channel: 2402 MHz

Common Information

Project No.:

RKSA240801002

Test Mode:

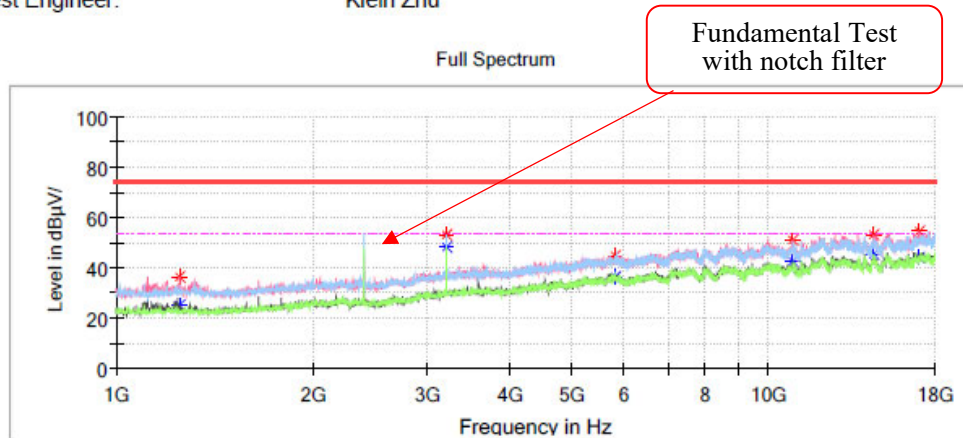
BT

Standard:

FCC Part 15.247&FCC Part 15.205&FCC Part 15.209

Test Engineer:

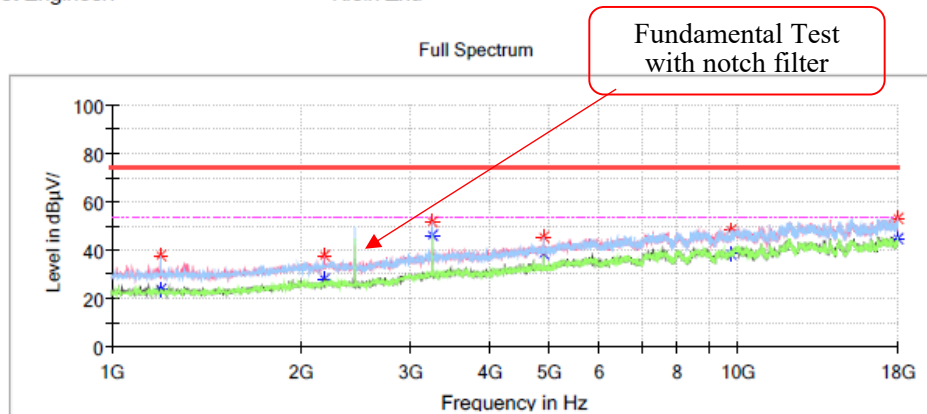
Klein Zhu

**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)
1248.200000	36.54	---	74.00	37.46	V	-15.1
1248.200000	---	24.98	54.00	29.02	V	-15.1
3201.500000	---	48.42	54.00	5.58	H	-7.6
3201.500000	53.11	---	74.00	20.89	H	-7.6
5834.800000	44.95	---	74.00	29.05	H	-0.1
5834.800000	---	36.57	54.00	17.43	H	-0.1
10899.100000	51.37	---	74.00	22.63	V	7.3
10899.100000	---	42.68	54.00	11.32	V	7.3
14489.500000	53.12	---	74.00	20.88	V	9.4
14489.500000	---	45.22	54.00	8.78	V	9.4
16971.500000	---	44.24	54.00	9.76	V	12.2
16971.500000	54.72	---	74.00	19.28	V	12.2

Middle Channel: 2441 MHz**Common Information**

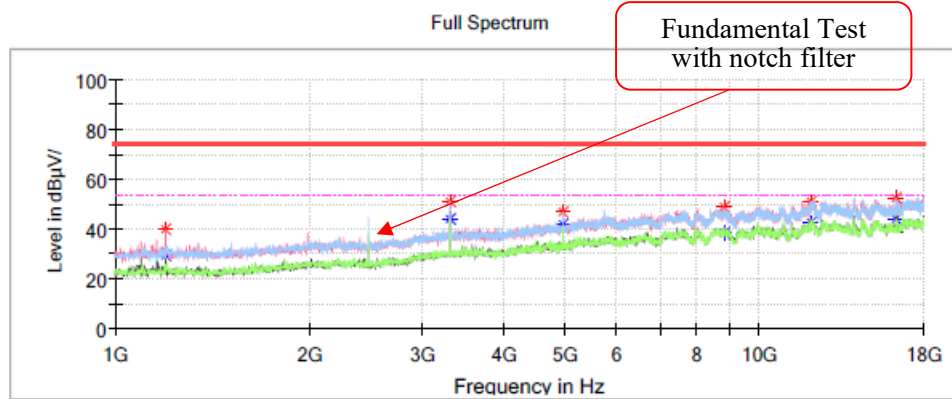
Project No.: RKSA240801002
 Test Mode: BT
 Standard: FCC Part 15.247&FCC Part 15.205&FCC Part 15.209
 Test Engineer: Klein Zhu

**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)
1197.200000	37.53	---	74.00	36.47	H	-15.2
1197.200000	---	24.09	54.00	29.91	H	-15.2
2186.600000	---	27.68	54.00	26.32	V	-11.2
2186.600000	37.63	---	74.00	36.37	V	-11.2
3254.200000	51.54	---	74.00	22.46	H	-7.4
3254.200000	---	45.92	54.00	8.08	H	-7.4
4881.100000	---	38.78	54.00	15.22	V	-2.9
4881.100000	45.36	---	74.00	28.64	V	-2.9
9727.800000	---	38.75	54.00	15.25	H	6.2
9727.800000	48.02	---	74.00	25.98	H	6.2
18000.000000	---	44.97	54.00	9.03	H	12.0
18000.000000	53.42	---	74.00	20.58	H	12.0

High Channel: 2480 MHz**Common Information**

Project No.: RKSA240801002
Test Mode: BT
Standard: FCC Part 15.247&FCC Part 15.205&FCC Part 15.209
Test Engineer: Klein Zhu

**Critical Freqs**

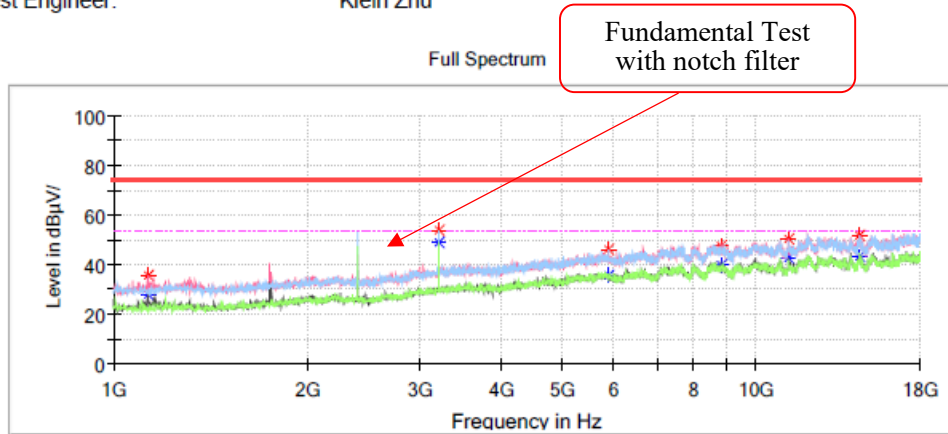
Frequency (MHz)	MaxPeak (dB μV/m)	Average (dB μV/m)	Limit (dB μV/m)	Margin (dB)	Pol	Corr. (dB/m)
1195.500000	---	29.25	54.00	24.75	V	-15.2
1195.500000	39.64	---	74.00	34.36	V	-15.2
3305.200000	---	44.27	54.00	9.73	H	-7.2
3305.200000	50.93	---	74.00	23.07	H	-7.2
4959.300000	---	42.28	54.00	11.72	V	-2.6
4959.300000	46.78	---	74.00	27.22	V	-2.6
8835.300000	---	38.43	54.00	15.57	V	5.4
8835.300000	49.29	---	74.00	24.71	V	5.4
12061.900000	---	42.91	54.00	11.09	V	9.1
12061.900000	51.06	---	74.00	22.94	V	9.1
16308.500000	---	43.75	54.00	10.25	H	10.3
16308.500000	52.15	---	74.00	21.85	H	10.3

$\pi/4$ -DQPSK:

Low Channel: 2402 MHz

Common Information

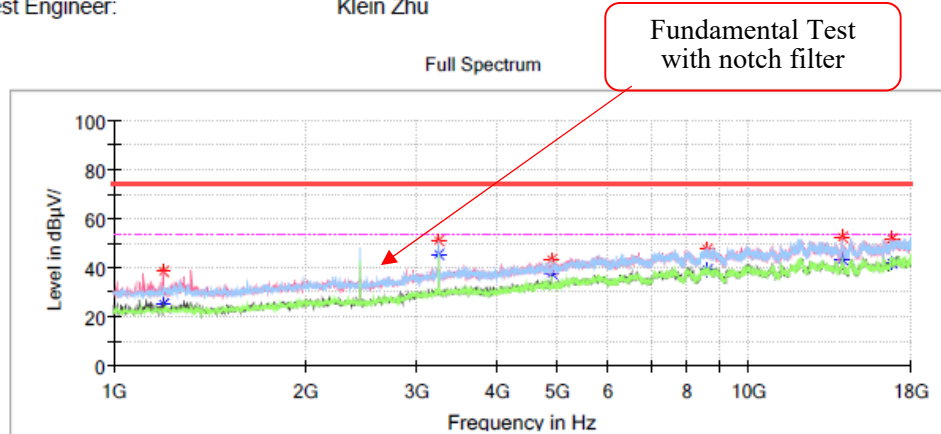
Project No.: RKSA240801002
 Test Mode: BT
 Standard: FCC Part 15.247&FCC Part 15.205&FCC Part 15.209
 Test Engineer: Klein Zhu

**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)
1129.200000	---	27.90	54.00	26.10	V	-15.3
1129.200000	35.32	---	74.00	38.68	V	-15.3
3201.500000	---	48.89	54.00	5.11	H	-7.6
3201.500000	53.80	---	74.00	20.20	H	-7.6
5885.800000	---	35.93	54.00	18.07	H	-0.1
5885.800000	45.98	---	74.00	28.02	H	-0.1
8801.300000	---	39.98	54.00	14.02	V	5.4
8801.300000	47.55	---	74.00	26.45	V	5.4
11201.700000	---	42.62	54.00	11.38	V	7.9
11201.700000	50.29	---	74.00	23.71	V	7.9
14492.900000	---	43.59	54.00	10.41	V	9.4
14492.900000	51.52	---	74.00	22.48	V	9.4

Middle Channel: 2441 MHz**Common Information**

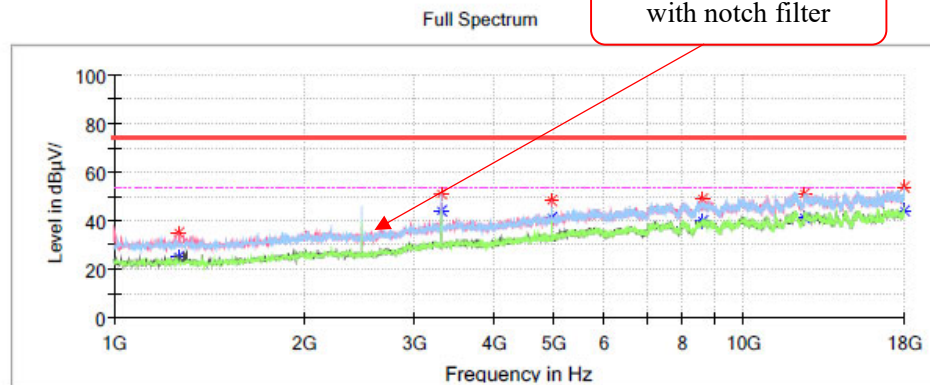
Project No.: RKSA240801002
Test Mode: BT
Standard: FCC Part 15.247&FCC Part 15.205&FCC Part 15.209
Test Engineer: Klein Zhu

**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)
1193.800000	---	25.50	54.00	28.50	V	-15.2
1193.800000	38.56	---	74.00	35.44	V	-15.2
3254.200000	---	45.56	54.00	8.44	H	-7.4
3254.200000	51.25	---	74.00	22.75	H	-7.4
4881.100000	---	37.99	54.00	16.01	V	-2.9
4881.100000	43.60	---	74.00	30.40	V	-2.9
8607.500000	47.76	---	74.00	26.24	H	5.4
8607.500000	---	39.09	54.00	14.91	H	5.4
14001.600000	---	43.49	54.00	10.51	V	9.8
14001.600000	52.72	---	74.00	21.28	V	9.8
16799.800000	---	41.81	54.00	12.19	H	11.7
16799.800000	52.09	---	74.00	21.91	H	11.7

High Channel: 2480 MHz**Common Information**

Project No.: RKSA240801002
Test Mode: BT
Standard: FCC Part 15.247&FCC Part 15.205&FCC Part 15.209
Test Engineer: Klein Zhu

**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)
1266.900000	35.20	---	74.00	38.80	V	-15.1
1266.900000	---	24.96	54.00	29.04	V	-15.1
3305.200000	51.32	---	74.00	22.68	H	-7.2
3305.200000	---	44.31	54.00	9.69	H	-7.2
4959.300000	48.48	---	74.00	25.52	V	-2.6
4959.300000	---	41.05	54.00	12.95	V	-2.6
8617.700000	48.78	---	74.00	25.22	H	5.4
8617.700000	---	39.72	54.00	14.28	H	5.4
12495.400000	50.73	---	74.00	23.27	V	9.7
12495.400000	---	41.46	54.00	12.54	V	9.7
17996.600000	---	44.16	54.00	9.84	H	12.0
17996.600000	54.00	---	74.00	20.00	H	12.0

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

Project No.:

RKSA240801002

Test Mode:

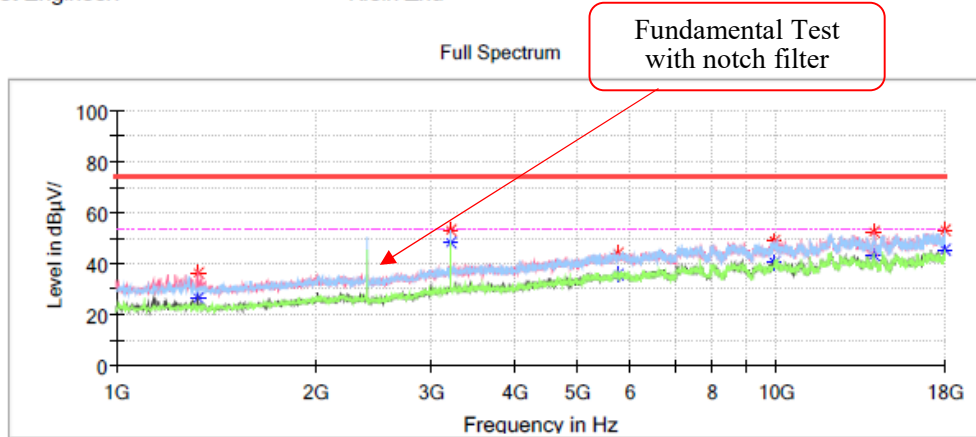
BT

Standard:

FCC Part 15.247&FCC Part 15.205&FCC Part 15.209

Test Engineer:

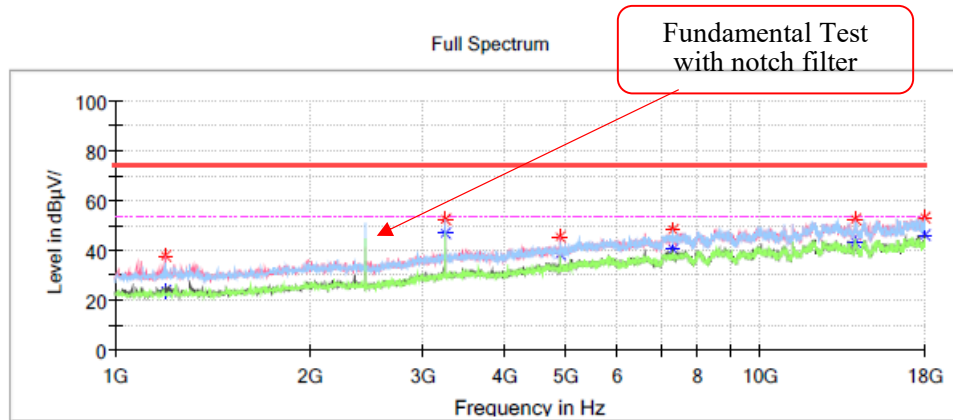
Klein Zhu

**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	---	26.44	54.00	27.56	V	-15.0
1326.400000	36.70	---	74.00	37.30	V	-15.0
3201.500000	---	48.28	54.00	5.72	H	-7.6
3201.500000	53.47	---	74.00	20.53	H	-7.6
5737.900000	---	35.37	54.00	18.63	V	-0.2
5737.900000	44.01	---	74.00	29.99	V	-0.2
9952.200000	---	40.44	54.00	13.56	V	7.0
9952.200000	49.04	---	74.00	24.96	V	7.0
14006.700000	---	43.63	54.00	10.37	V	9.8
14006.700000	52.39	---	74.00	21.61	V	9.8
17998.300000	---	45.34	54.00	8.66	H	12.0
17998.300000	53.16	---	74.00	20.84	H	12.0

Middle Channel: 2441 MHz**Common Information**

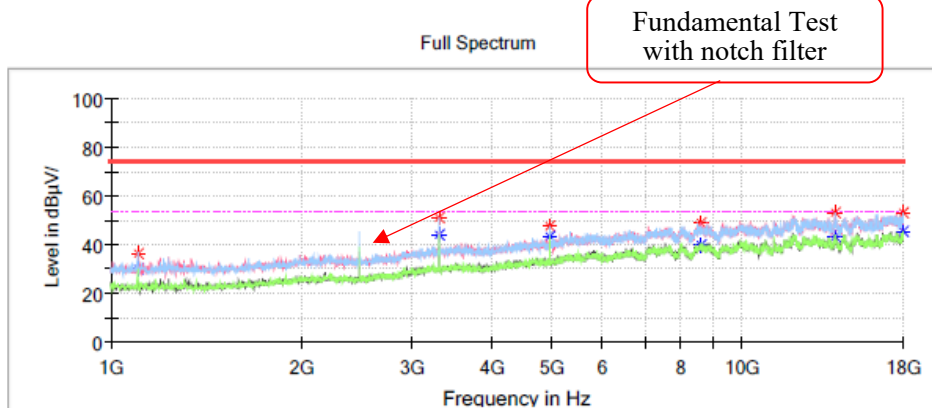
Project No.: RKSA240801002
 Test Mode: BT
 Standard: FCC Part 15.247&FCC Part 15.205&FCC Part 15.209
 Test Engineer: Klein Zhu

**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)
1193.800000	---	23.48	54.00	30.52	V	-15.2
1193.800000	37.91	---	74.00	36.09	V	-15.2
3254.200000	---	46.79	54.00	7.21	H	-7.4
3254.200000	52.39	---	74.00	21.61	H	-7.4
4881.100000	45.79	---	74.00	28.21	V	-2.9
4881.100000	---	38.71	54.00	15.29	V	-2.9
7322.300000	48.38	---	74.00	25.62	V	3.4
7322.300000	---	40.84	54.00	13.16	V	3.4
14011.800000	52.35	---	74.00	21.65	H	9.8
14011.800000	---	43.55	54.00	10.45	H	9.8
17998.300000	---	46.40	54.00	7.60	V	12.0
17998.300000	53.29	---	74.00	20.71	V	12.0

High Channel: 2480 MHz**Common Information**

Project No.: RKSA240801002
 Test Mode: BT
 Standard: FCC Part 15.247&FCC Part 15.205&FCC Part 15.209
 Test Engineer: Klein Zhu

**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)
1102.000000	36.29	---	74.00	37.71	H	-15.3
1102.000000	---	29.95	54.00	24.05	H	-15.3
3305.200000	51.05	---	74.00	22.95	H	-7.2
3305.200000	---	44.27	54.00	9.73	H	-7.2
4959.300000	47.50	---	74.00	26.50	H	-2.6
4959.300000	---	43.45	54.00	10.55	H	-2.6
8602.400000	49.19	---	74.00	24.81	V	5.4
8602.400000	---	39.80	54.00	14.20	V	5.4
14008.400000	53.01	---	74.00	20.99	H	9.8
14008.400000	---	43.37	54.00	10.63	H	9.8
17998.300000	---	45.44	54.00	8.56	V	12.0
17998.300000	53.26	---	74.00	20.74	V	12.0

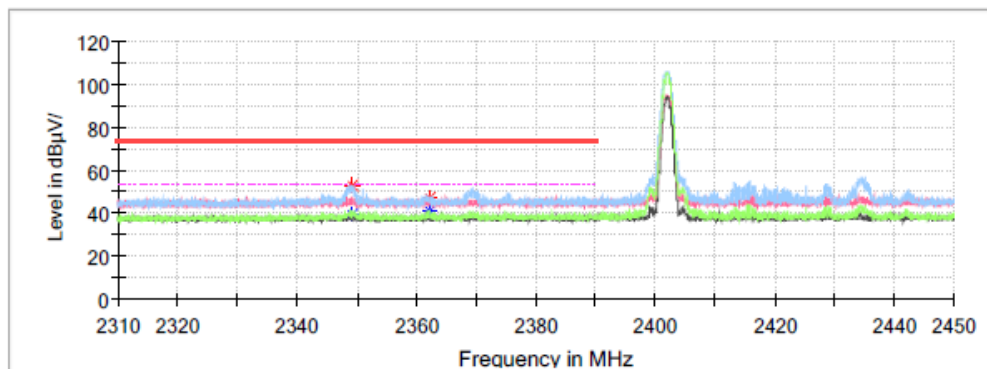
Band Edge:
GFSK:

Left Side

Common Information

Project No.: RKSA240801002
Test Mode: BT
Standard: FCC Part 15.247&FCC Part 15.205&FCC Part 15.209
Test Engineer: Klein Zhu

Full Spectrum



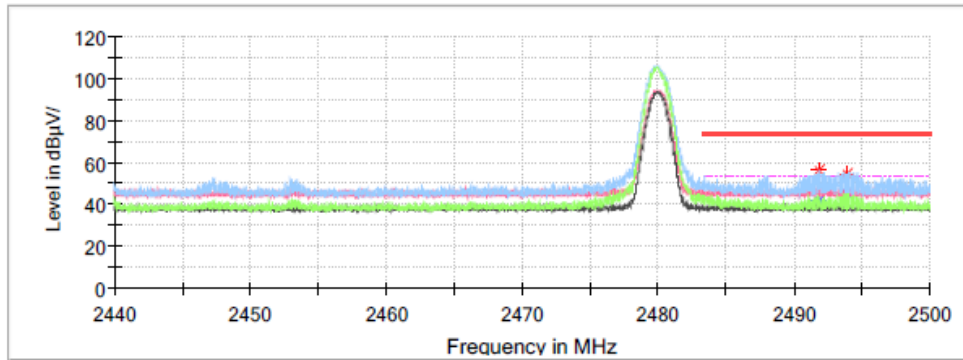
Critical Freqs

Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
2349.256000	52.87	---	74.00	21.13	H	-0.7
2349.256000	---	39.74	54.00	14.26	H	-0.7
2362.052000	46.90	---	74.00	27.10	H	-0.7
2362.052000	---	41.35	54.00	12.65	H	-0.7

Right Side**Common Information**

Project No.: RKSA240801002
Test Mode: BT
Standard: FCC Part 15.247&FCC Part 15.205&FCC Part 15.209
Test Engineer: Klein Zhu

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)
2491.864000	56.00	---	74.00	18.00	H	-0.2
2491.864000	---	41.59	54.00	12.41	H	-0.2
2493.934000	54.70	---	74.00	19.30	H	-0.2
2493.934000	---	45.62	54.00	8.38	H	-0.2

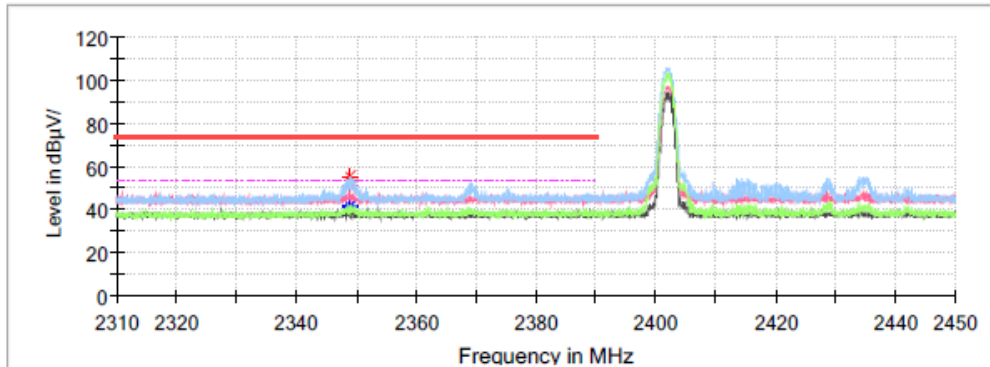
$\pi/4$ -DQPSK:

Left Side

Common Information

Project No.: RKSA240801002
Test Mode: BT
Standard: FCC Part 15.247&FCC Part 15.205&FCC Part 15.209
Test Engineer: Klein Zhu

Full Spectrum



Critical_Freqs

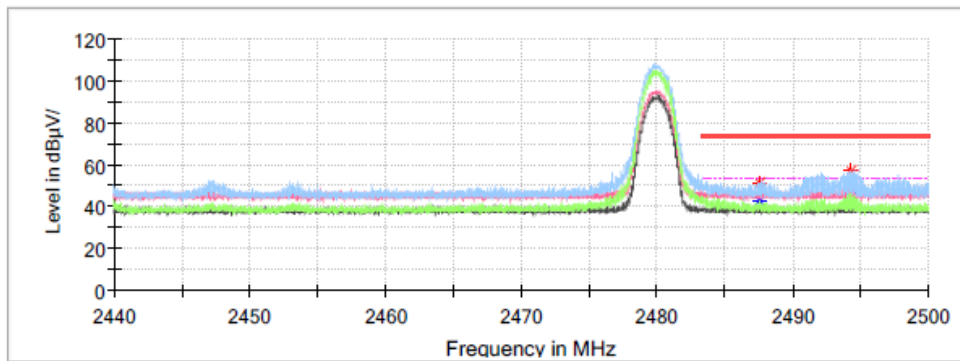
Frequency (MHz)	MaxPeak (dB μ V/m)	Average (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Pol	Corr. (dB/m)
2348.864000	55.20	---	74.00	18.80	H	-0.7
2348.864000	---	41.25	54.00	12.75	H	-0.7
2349.004000	51.41	---	74.00	22.59	H	-0.7
2349.004000	---	41.73	54.00	12.27	H	-0.7

Right Side

Common Information

Project No.: RKSA240801002
Test Mode: BT
Standard: FCC Part 15.247&FCC Part 15.205&FCC Part 15.209
Test Engineer: Klein Zhu

Full Spectrum



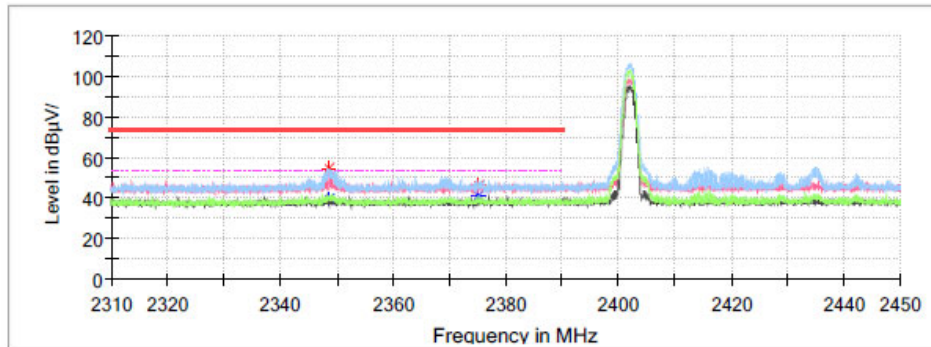
Critical_Freqs

Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
2487.628000	---	42.52	54.00	11.48	H	-0.2
2487.628000	51.45	---	74.00	22.55	H	-0.2
2494.258000	---	45.94	54.00	8.06	H	-0.2
2494.258000	57.12	---	74.00	16.88	H	-0.2

8DPSK:**Left Side****Common Information**

Project No.: RKSA240801002
Test Mode: BT
Standard: FCC Part 15.247&FCC Part 15.205&FCC Part 15.209
Test Engineer: Klein Zhu

Full Spectrum

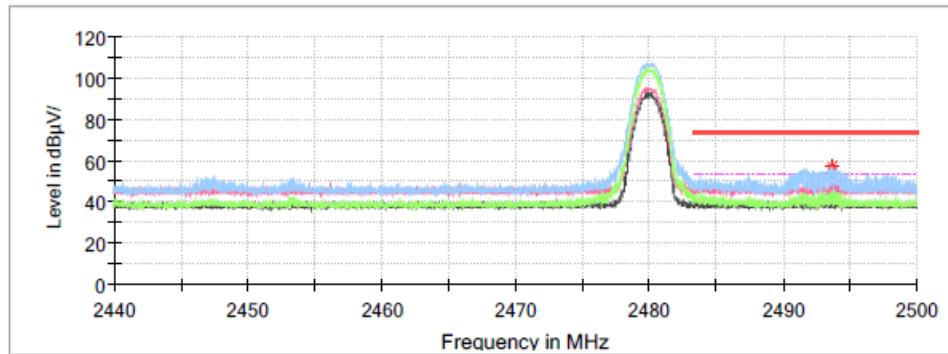
**Critical Freqs**

Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
2348.598000	54.44	---	74.00	19.56	H	-0.7
2348.598000	---	39.65	54.00	14.35	H	-0.7
2375.128000	46.31	---	74.00	27.69	H	-0.6
2375.128000	---	40.94	54.00	13.06	H	-0.6

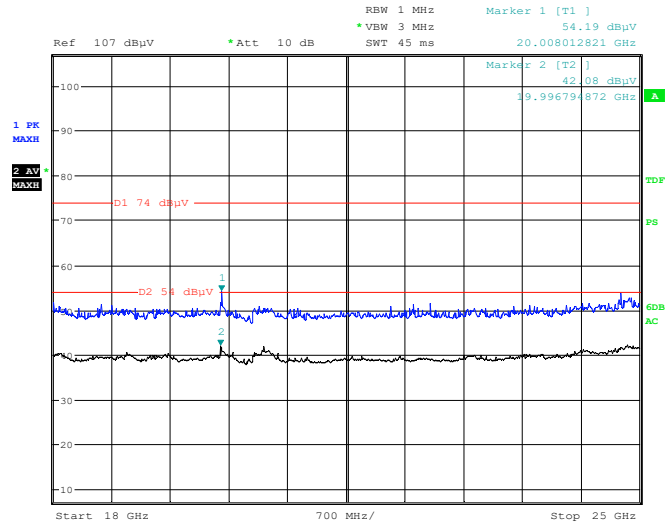
Right Side**Common Information**

Project No.: RKSA240801002
Test Mode: BT
Standard: FCC Part 15.247&FCC Part 15.205&FCC Part 15.209
Test Engineer: Klein Zhu

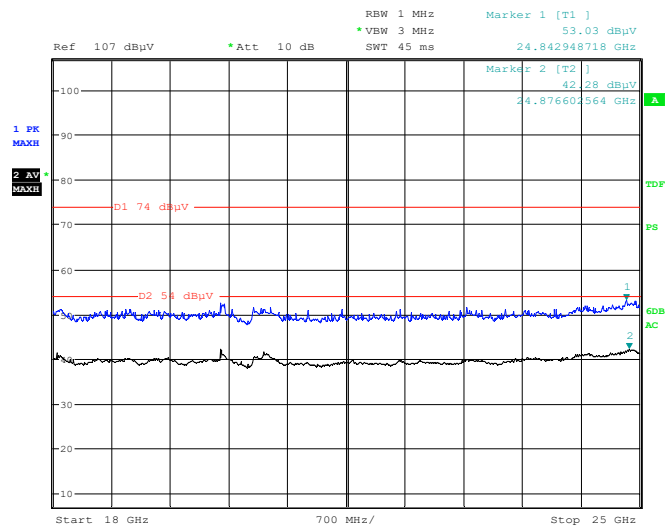
Full Spectrum

**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)
2493.646000	54.47	---	74.00	19.53	H	-0.2
2493.646000	---	45.71	54.00	8.29	H	-0.2
2493.724000	57.40	---	74.00	16.60	H	-0.2
2493.724000	---	43.97	54.00	10.03	H	-0.2

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

Project No :RKSA240801002 Tester :Hugh Wu
Date: 25.AUG.2024 16:22:34

Vertical

Project No :RKSA240801002 Tester :Hugh Wu
Date: 25.AUG.2024 16:10:56

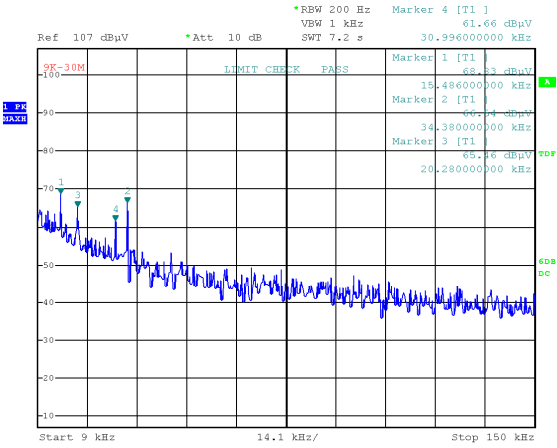
Note: The test distance is 3m. The limit is 74dBμV/m(Peak) and 54dBμV/m(Average).

Monopole Antenna:

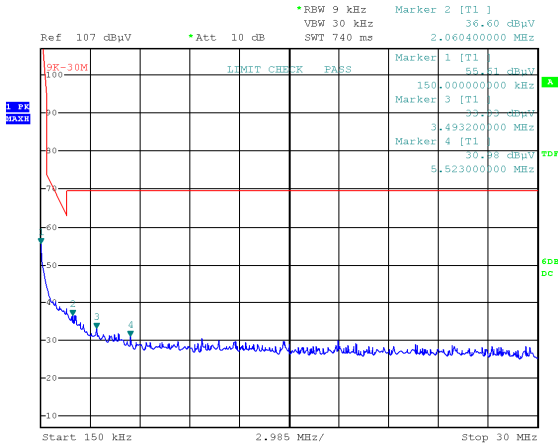
9 kHz-30 MHz: (Transmitting maximum output power 8DPSK mode low channel)

Parallel(worst case)

9kHz-150kHz



150kHz-30MHz



Project No.RKSA240801002
Date: 6.SEP.2024 23:22:09

Tester:Grace Luo

Project No.RKSA240801002
Date: 6.SEP.2024 23:10:54

Tester:Grace Luo

9kHz-150kHz

Frequency (MHz)	Corrected Amplitude (dBμV/m) @3m	Detector PK/QP/Ave.	Corrected Factor (dB/m)	Limit (dBμV/m) @3m	Margin (dB)
0.02	68.83	PK	52.87	123.81	54.98
0.03	66.54	PK	46.06	116.88	50.34
0.02	65.46	PK	49.92	121.46	56.00
0.03	61.66	PK	46.87	117.70	56.04

150kHz-30MHz

Frequency (MHz)	Corrected Amplitude (dBμV/m) @3m	Detector PK/QP/Ave.	Corrected Factor (dB/m)	Limit (dBμV/m) @3m	Margin (dB)
0.15	55.61	PK	50.90	104.08	48.47
2.06	36.60	PK	14.15	69.54	32.94
3.49	33.03	PK	14.54	69.54	36.51
5.52	30.98	PK	7.73	69.54	38.56

30 MHz - 1 GHz (Transmitting in maximum output power 8DPSK mode):
Low Channel: 2402 MHz

Common Information

Project No:

EUT Model:

Test Mode:

Standard:

Test Equipment:

Temperature:

Humidity:

Barometric Pressure:

Test Engineer:

Test Date:

RKSA240801002

ESP32-WROOM-32UE

Transmitting in BT-3DH5 mode low channel

FCC Part 15.205 & FCC Part 15.209 & FCC Part 15.247

ESCI, JB3, 310N

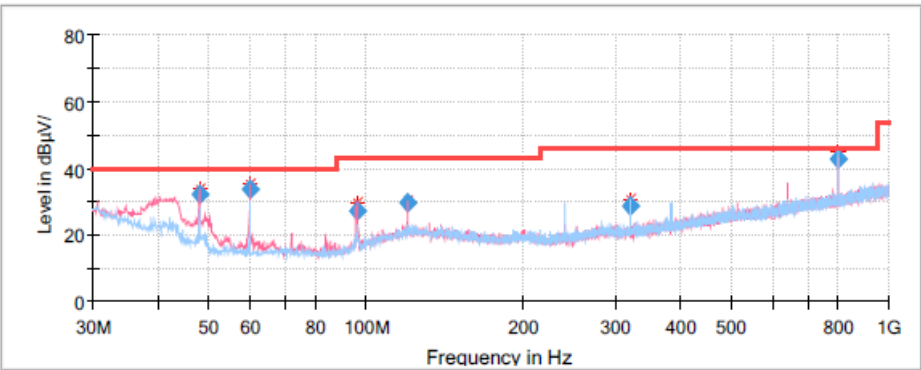
25.4℃

44%

101.2kPa

Grace Luo

2024/9/6



Final Result

Frequency (MHz)	QuasiPeak (dBμ V/m)	Limit (dBμ V/m)	Margin (dB)	Pol	Corr. (dB/m)
47.980100	32.13	40.00	7.87	V	-15.7
59.998250	33.92	40.00	6.08	V	-17.6
96.395150	27.37	43.50	16.13	V	-15.3
120.015500	29.78	43.50	13.72	V	-10.9
319.999400	28.90	46.00	17.10	H	-10.0
800.682700	42.60	46.00	3.40	H	-0.8

Middle Channel: 2441 MHz

Common Information

Project No:

EUT Model:

Test Mode:

Standard:

Test Equipment:

Temperature:

Humidity:

Barometric Pressure:

Test Engineer:

Test Date:

RKSA240801002

ESP32-WROOM-32UE

Transmitting in BT-3DH5 mode middle channel

FCC Part 15.205 &FCC Part 15.209&FCC Part 15.247

ESCI, JB3, 310N

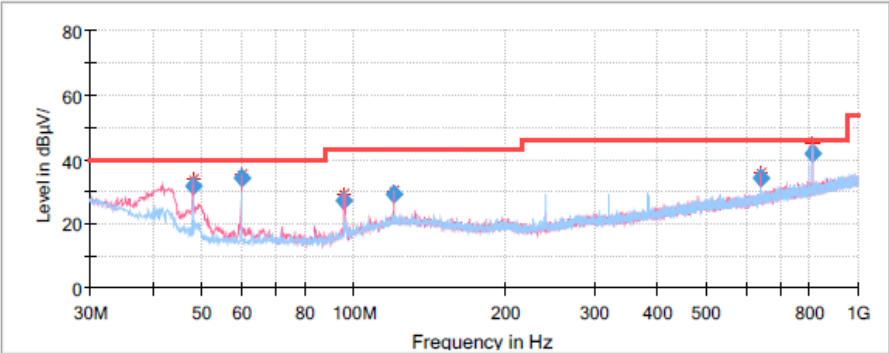
25.4℃

44%

101.2kPa

Grace Luo

2024/9/6



Final Result

Frequency (MHz)	QuasiPeak (dBµ V/m)	Limit (dBµ V/m)	Margin (dB)	Pol	Corr. (dB/m)
48.026000	31.82	40.00	8.18	V	-15.7
60.012050	34.23	40.00	5.77	V	-17.6
95.942550	27.01	43.50	16.49	V	-15.5
120.014300	29.40	43.50	14.10	V	-10.9
640.016550	34.36	46.00	11.64	V	-3.3
813.315850	42.00	46.00	4.00	H	-0.5

High Channel:2480 MHz

Common Information

Project No:

EUT Model:

Test Mode:

Standard:

Test Equipment:

Temperature:

Humidity:

Barometric Pressure:

Test Engineer:

Test Date:

RKSA240801002

ESP32-WROOM-32UE

Transmitting in BT-3DH5 mode high channel

FCC Part 15.205 & FCC Part 15.209&FCC Part 15.247

ESCI, JB3, 310N

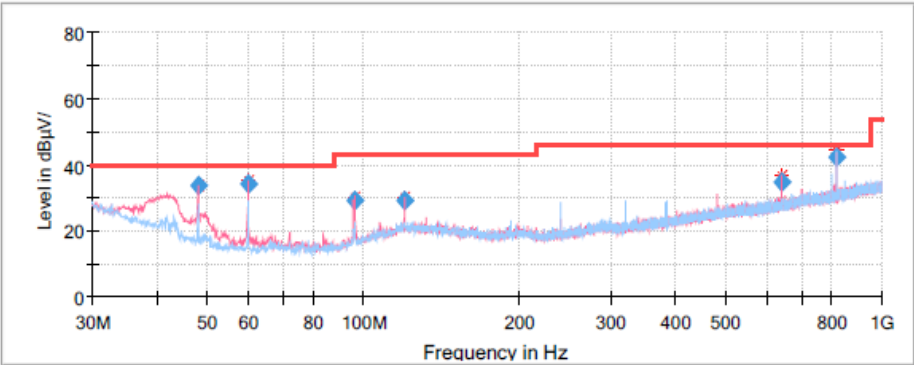
25.4℃

44%

101.2kPa

Grace Luo

2024/9/6



Final Result

Frequency (MHz)	QuasiPeak (dBµ V/m)	Limit (dBµ V/m)	Margin (dB)	Pol	Corr. (dB/m)
48.002000	33.96	40.00	6.04	V	-15.7
60.005750	34.15	40.00	5.85	V	-17.6
96.091750	29.40	43.50	14.10	V	-15.4
119.999600	29.37	43.50	14.13	V	-10.9
640.014450	34.54	46.00	11.46	V	-3.3
820.670100	42.08	46.00	3.02	H	-0.4

1 GHz - 18 GHz:**GFSK:****Low Channel: 2402 MHz****Common Information**

Project No.:

RKSA240801002

Test Mode:

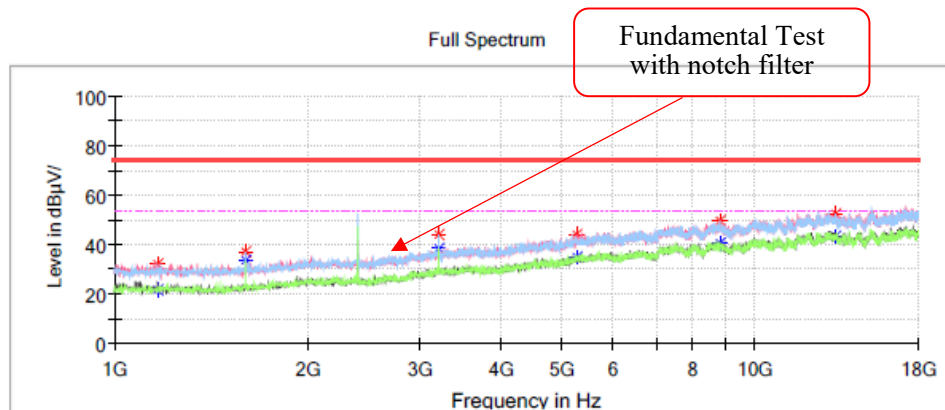
BT

Standard:

FCC Part 15.247&FCC Part 15.205&FCC Part 15.209

Test Engineer:

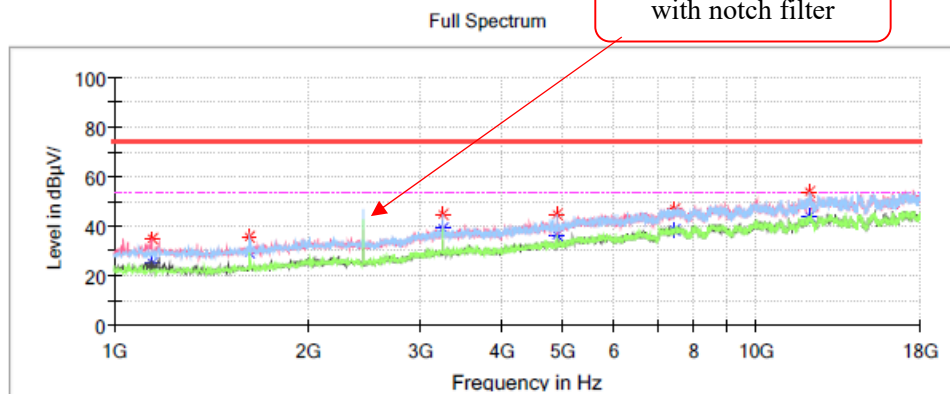
Destine Hu

**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)
1166.600000	32.47	---	74.00	41.53	V	-15.2
1166.600000	---	21.93	54.00	32.07	V	-15.2
1600.100000	37.05	---	74.00	36.95	H	-14.1
1600.100000	---	33.49	54.00	20.51	H	-14.1
3201.500000	---	38.43	54.00	15.57	H	-7.6
3201.500000	44.02	---	74.00	29.98	H	-7.6
5256.800000	---	35.01	54.00	18.99	V	-1.4
5256.800000	44.29	---	74.00	29.71	V	-1.4
8837.000000	---	40.57	54.00	13.43	H	5.4
8837.000000	49.51	---	74.00	24.49	H	5.4
13353.900000	---	43.36	54.00	10.64	V	9.6
13353.900000	52.49	---	74.00	21.51	V	9.6

Middle Channel: 2441 MHz**Common Information**

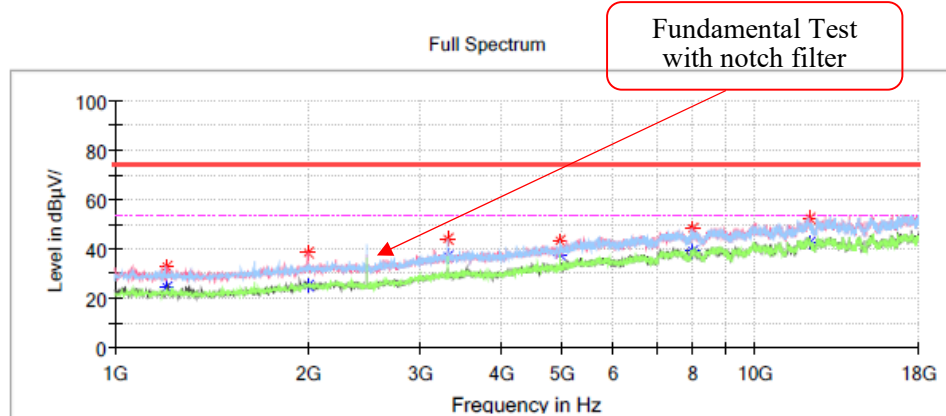
Project No.: RKSA240801002
Test Mode: BT
Standard: FCC Part 15.247&FCC Part 15.205&FCC Part 15.209
Test Engineer: Destine Hu

**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)
1144.500000	---	24.95	54.00	29.05	V	-15.2
1144.500000	35.31	---	74.00	38.69	V	-15.2
1625.600000	---	29.55	54.00	24.45	H	-14.0
1625.600000	35.71	---	74.00	38.29	H	-14.0
3254.200000	---	39.32	54.00	14.68	H	-7.4
3254.200000	44.82	---	74.00	29.18	H	-7.4
4881.100000	---	36.23	54.00	17.77	H	-2.9
4881.100000	44.59	---	74.00	29.41	H	-2.9
7448.100000	---	38.26	54.00	15.74	H	3.8
7448.100000	47.15	---	74.00	26.85	H	3.8
12067.000000	---	44.07	54.00	9.93	V	9.1
12067.000000	53.70	---	74.00	20.30	V	9.1

High Channel: 2480 MHz**Common Information**

Project No.: RKSA240801002
Test Mode: BT
Standard: FCC Part 15.247&FCC Part 15.205&FCC Part 15.209
Test Engineer: Destine Hu

**Critical Freqs**

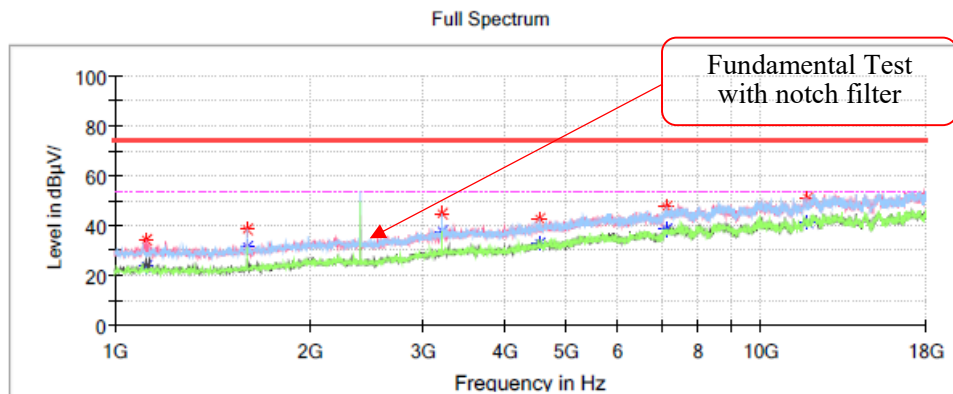
Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
1205.700000	---	24.20	54.00	29.80	V	-15.2
1205.700000	33.05	---	74.00	40.95	V	-15.2
1997.900000	---	24.98	54.00	29.02	H	-11.8
1997.900000	38.51	---	74.00	35.49	H	-11.8
3305.200000	---	37.07	54.00	16.93	H	-7.2
3305.200000	43.79	---	74.00	30.21	H	-7.2
4959.300000	---	37.98	54.00	16.02	H	-2.6
4959.300000	43.65	---	74.00	30.35	H	-2.6
8004.000000	---	38.89	54.00	15.11	V	3.9
8004.000000	48.08	---	74.00	25.92	V	3.9
12167.300000	---	42.93	54.00	11.07	V	9.2
12167.300000	52.68	---	74.00	21.32	V	9.2

$\pi/4$ -DQPSK:

Low Channel: 2402 MHz

Common Information

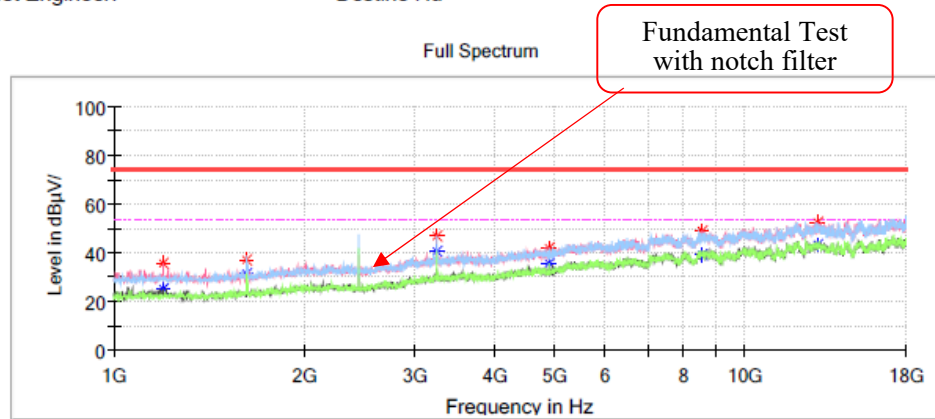
Project No.: RKSA240801002
Test Mode: BT
Standard: FCC Part 15.247&FCC Part 15.205&FCC Part 15.209
Test Engineer: Destine Hu

**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)
1119.000000	---	23.59	54.00	30.41	V	-15.3
1119.000000	34.17	---	74.00	39.83	V	-15.3
1600.100000	---	31.59	54.00	22.41	H	-14.1
1600.100000	38.53	---	74.00	35.47	H	-14.1
3201.500000	---	38.00	54.00	16.00	H	-7.6
3201.500000	44.64	---	74.00	29.36	H	-7.6
4541.100000	---	33.03	54.00	20.97	H	-4.1
4541.100000	42.78	---	74.00	31.22	H	-4.1
7125.100000	---	38.29	54.00	15.71	H	2.9
7125.100000	47.21	---	74.00	26.79	H	2.9
11839.200000	---	41.36	54.00	12.64	V	8.9
11839.200000	51.18	---	74.00	22.82	V	8.9

Middle Channel: 2441 MHz**Common Information**

Project No.: RKSA240801002
 Test Mode: BT
 Standard: FCC Part 15.247&FCC Part 15.205&FCC Part 15.209
 Test Engineer: Destine Hu

**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)
1198.900000	---	25.26	54.00	28.74	V	-15.2
1198.900000	35.48	---	74.00	38.52	V	-15.2
1625.600000	---	31.44	54.00	22.56	H	-14.0
1625.600000	37.17	---	74.00	36.83	H	-14.0
3254.200000	---	40.69	54.00	13.31	H	-7.4
3254.200000	47.08	---	74.00	26.92	H	-7.4
4881.100000	---	35.34	54.00	18.66	H	-2.9
4881.100000	42.02	---	74.00	31.98	H	-2.9
8575.200000	---	38.96	54.00	15.04	V	5.4
8575.200000	48.84	---	74.00	25.16	V	5.4
13063.200000	---	43.62	54.00	10.38	V	9.7
13063.200000	52.60	---	74.00	21.40	V	9.7

High Channel: 2480 MHz**Common Information**

Project No.:

RKSA240801002

Test Mode:

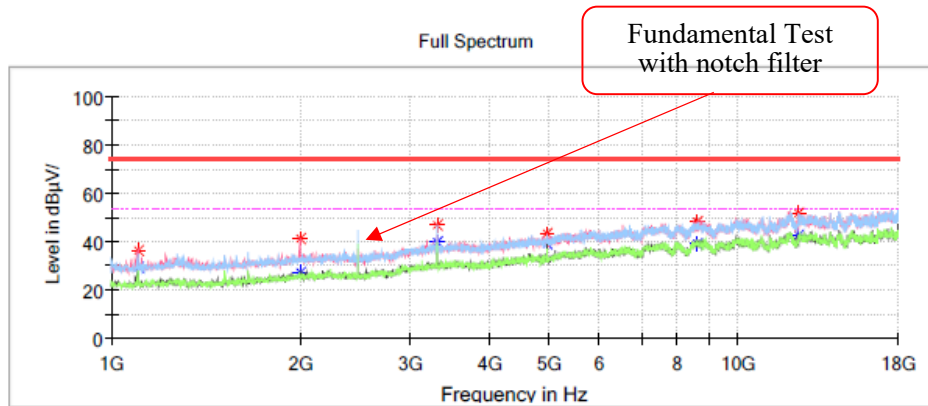
BT

Standard:

FCC Part 15.247&FCC Part 15.205&FCC Part 15.209

Test Engineer:

Destine Hu

**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)
1102.000000	---	29.50	54.00	24.50	V	-15.3
1102.000000	36.40	---	74.00	37.60	V	-15.3
1997.900000	---	27.49	54.00	26.51	V	-11.8
1997.900000	41.19	---	74.00	32.81	V	-11.8
3305.200000	---	39.54	54.00	14.46	H	-7.2
3305.200000	46.71	---	74.00	27.29	H	-7.2
4959.300000	---	39.10	54.00	14.90	V	-2.6
4959.300000	43.66	---	74.00	30.34	V	-2.6
8609.200000	---	39.25	54.00	14.75	V	5.4
8609.200000	48.53	---	74.00	25.47	V	5.4
12505.600000	---	42.93	54.00	11.07	H	9.7
12505.600000	51.78	---	74.00	22.22	H	9.7

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

Project No.:

RKSA240801002

Test Mode:

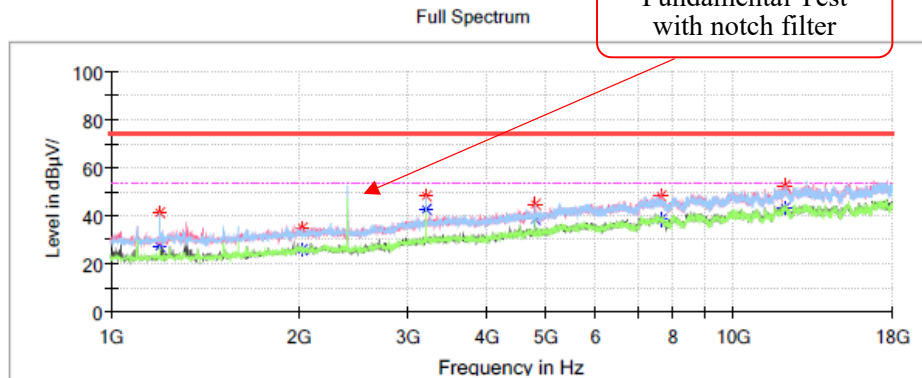
BT

Standard:

FCC Part 15.247&FCC Part 15.205&FCC Part 15.209

Test Engineer:

Destine Hu

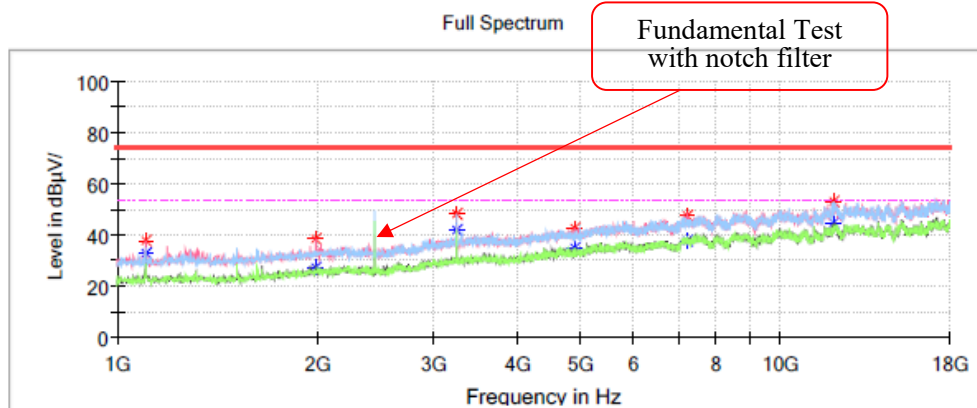
**Critical Freqs**

Frequency (MHz)	MaxPeak (dB µV/m)	Average (dB µV/m)	Limit (dB µV/m)	Margin (dB)	Pol	Corr. (dB/m)
1195.500000	---	27.36	54.00	26.64	H	-15.2
1195.500000	41.46	---	74.00	32.54	H	-15.2
2025.100000	---	25.98	54.00	28.02	V	-11.7
2025.100000	35.23	---	74.00	38.77	V	-11.7
3201.500000	---	42.58	54.00	11.42	H	-7.6
3201.500000	48.13	---	74.00	25.87	H	-7.6
4802.900000	---	38.34	54.00	15.66	H	-3.2
4802.900000	44.86	---	74.00	29.14	H	-3.2
7624.900000	---	38.31	54.00	15.69	V	3.9
7624.900000	48.06	---	74.00	25.94	V	3.9
12101.000000	---	43.23	54.00	10.77	H	9.1
12101.000000	52.31	---	74.00	21.69	H	9.1

Middle Channel: 2441 MHz**Common Information**

Project No.:
Test Mode:
Standard:
Test Engineer:

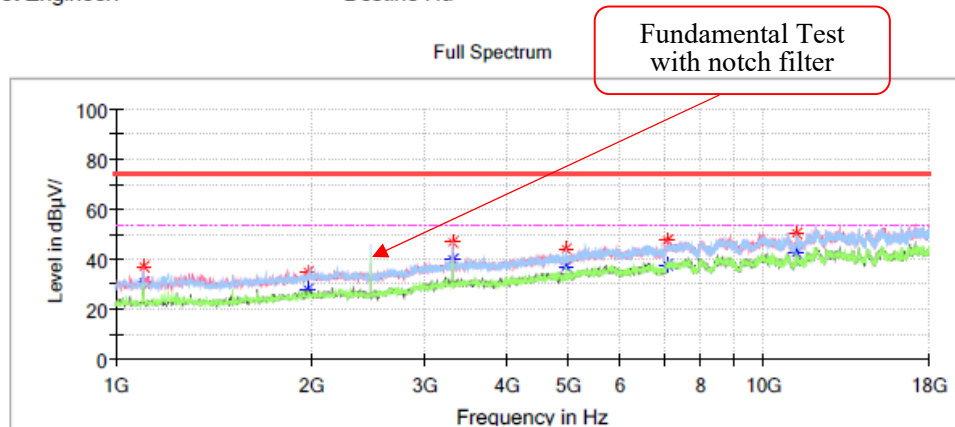
RKSA240801002
BT
FCC Part 15.247&FCC Part 15.205&FCC Part 15.209
Destine Hu

**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)
1103.700000	---	32.63	54.00	21.37	V	-15.3
1103.700000	37.61	---	74.00	36.39	V	-15.3
1996.200000	---	27.51	54.00	26.49	V	-11.8
1996.200000	38.55	---	74.00	35.45	V	-11.8
3254.200000	---	42.17	54.00	11.83	H	-7.4
3254.200000	48.32	---	74.00	25.68	H	-7.4
4881.100000	---	35.08	54.00	18.92	V	-2.9
4881.100000	42.58	---	74.00	31.42	V	-2.9
7254.300000	---	37.66	54.00	16.34	V	3.3
7254.300000	47.76	---	74.00	26.24	V	3.3
12061.900000	---	44.76	54.00	9.24	H	9.1
12061.900000	53.42	---	74.00	20.58	H	9.1

High Channel: 2480 MHz**Common Information**

Project No.: RKSA240801002
 Test Mode: BT
 Standard: FCC Part 15.247&FCC Part 15.205&FCC Part 15.209
 Test Engineer: Destine Hu

**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)
1102.000000	---	31.02	54.00	22.98	V	-15.3
1102.000000	37.07	---	74.00	36.93	V	-15.3
1982.600000	---	27.82	54.00	26.18	V	-11.8
1982.600000	35.06	---	74.00	38.94	V	-11.8
3305.200000	46.65	---	74.00	27.35	H	-7.2
3305.200000	---	39.95	54.00	14.05	H	-7.2
4959.300000	44.27	---	74.00	29.73	H	-2.6
4959.300000	---	36.94	54.00	17.06	H	-2.6
7079.200000	47.40	---	74.00	26.60	V	2.8
7079.200000	---	37.73	54.00	16.27	V	2.8
11208.500000	---	42.64	54.00	11.36	V	8.0
11208.500000	50.23	---	74.00	23.77	V	8.0

Band Edge:
GFSK:

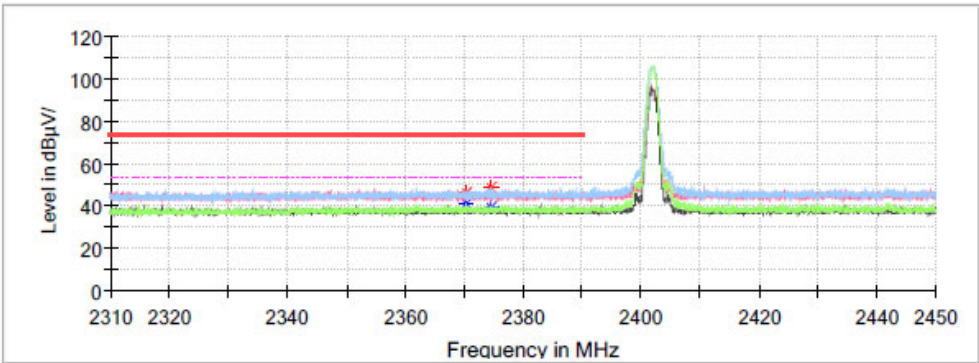
Left Side

Common Information

Project No.:
Test Mode:
Standard:
Test Engineer:

RKSA240801002
BT
FCC Part 15.247&FCC Part 15.205&FCC Part 15.209
Destine Hu

Full Spectrum



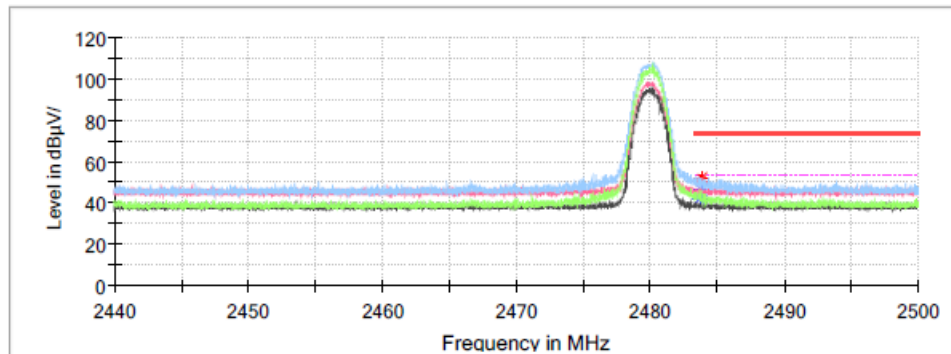
Critical_Freqs

Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
2370.312000	---	40.85	54.00	13.15	H	-0.6
2370.312000	46.01	---	74.00	27.99	H	-0.6
2374.442000	---	39.35	54.00	14.65	H	-0.6
2374.442000	48.35	---	74.00	25.65	H	-0.6

Right Side**Common Information**

Project No.: RKSA240801002
Test Mode: BT
Standard: FCC Part 15.247&FCC Part 15.205&FCC Part 15.209
Test Engineer: Destine Hu

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)
2483.662000	---	42.01	54.00	11.99	H	-0.3
2483.662000	50.75	---	74.00	23.25	H	-0.3
2483.830000	---	46.22	54.00	7.78	H	-0.3
2483.830000	52.13	---	74.00	21.87	H	-0.3

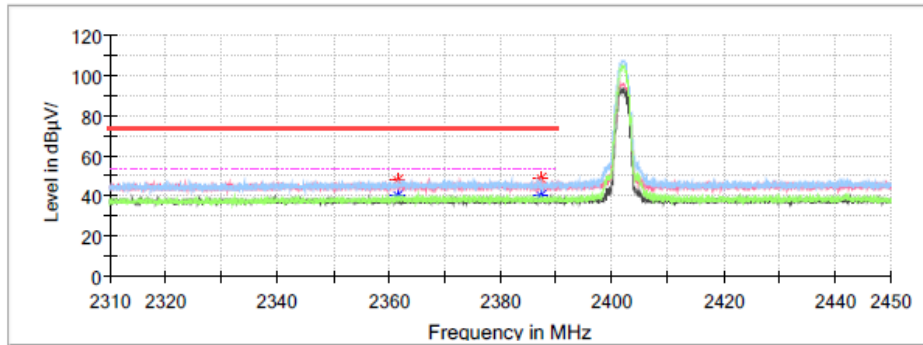
$\pi/4$ -DQPSK:

Left Side

Common Information

Project No.: RKSA240801002
Test Mode: BT
Standard: FCC Part 15.247&FCC Part 15.205&FCC Part 15.209
Test Engineer: Destine Hu

Full Spectrum



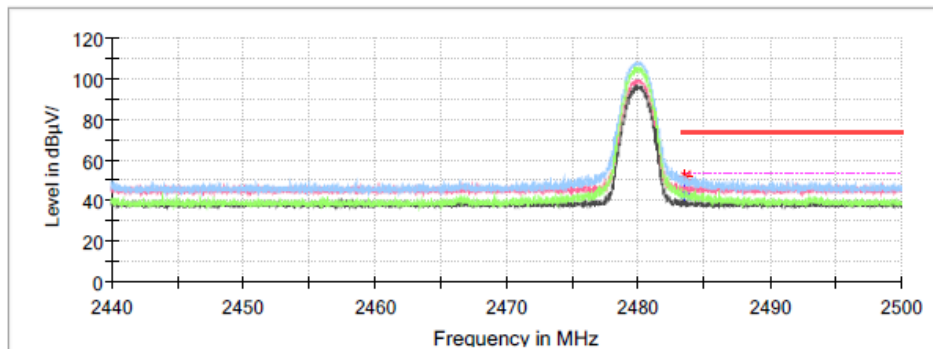
Critical Freqs

Frequency (MHz)	MaxPeak (dB μ V/m)	Average (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Pol	Corr. (dB/m)
2361.548000	47.76	---	74.00	26.24	H	-0.7
2361.548000	---	40.60	54.00	13.40	H	-0.7
2387.280000	49.00	---	74.00	25.00	H	-0.6
2387.280000	---	40.44	54.00	13.56	H	-0.6

Right Side**Common Information**

Project No.: RKSA240801002
Test Mode: BT
Standard: FCC Part 15.247&FCC Part 15.205&FCC Part 15.209
Test Engineer: Destine Hu

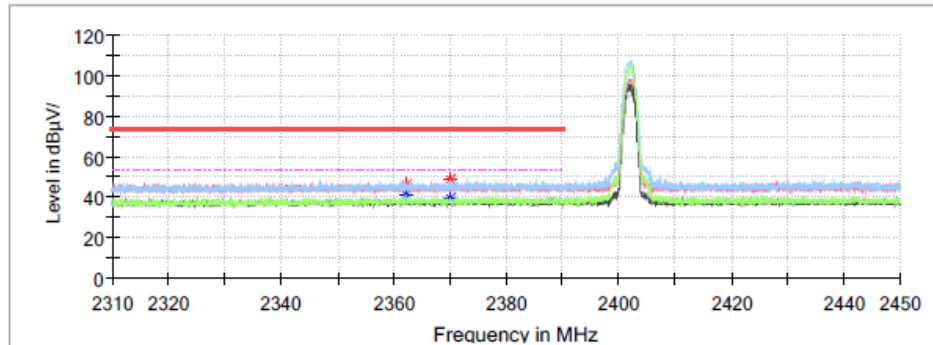
Full Spectrum

**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)
2483.542000	---	45.30	54.00	8.70	H	-0.3
2483.542000	49.94	---	74.00	24.06	H	-0.3
2483.560000	---	43.03	54.00	10.97	H	-0.3
2483.560000	51.65	---	74.00	22.35	H	-0.3

8DPSK:**Left Side****Common Information**

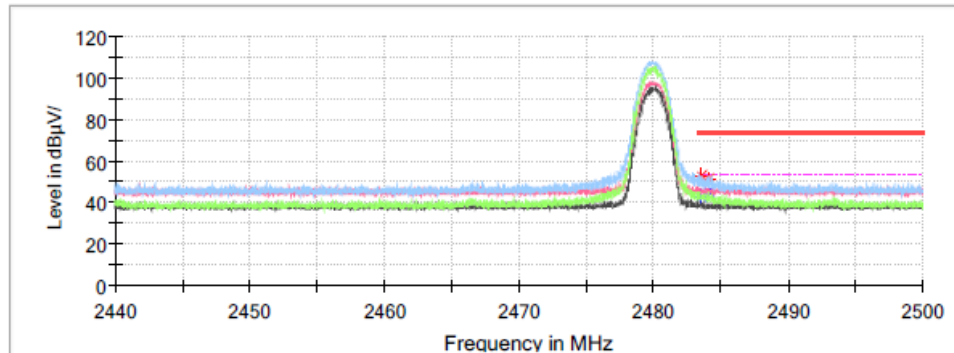
Project No.: RKSA240801002
Test Mode: BT
Standard: FCC Part 15.247&FCC Part 15.205&FCC Part 15.209
Test Engineer: Destine Hu

Full Spectrum**Critical_Freqs**

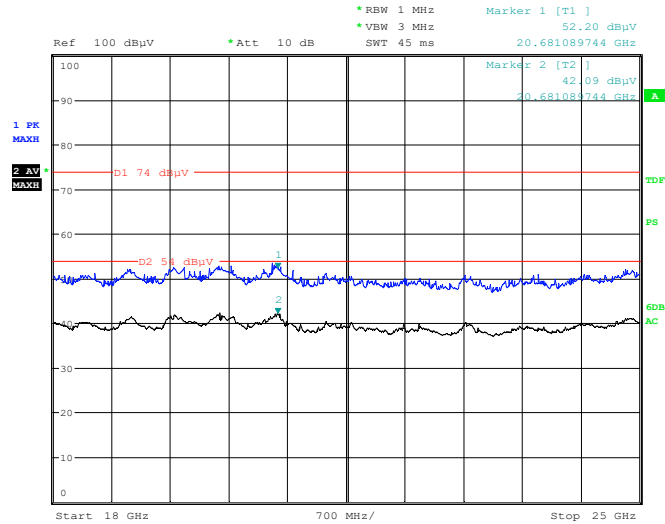
Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
2362.108000	---	40.76	54.00	13.24	H	-0.7
2362.108000	46.31	---	74.00	27.69	H	-0.7
2370.032000	---	39.03	54.00	14.97	H	-0.6
2370.032000	48.91	---	74.00	25.09	H	-0.6

Right Side**Common Information**

Project No.: RKSA240801002
Test Mode: BT
Standard: FCC Part 15.247&FCC Part 15.205&FCC Part 15.209
Test Engineer: Destine Hu

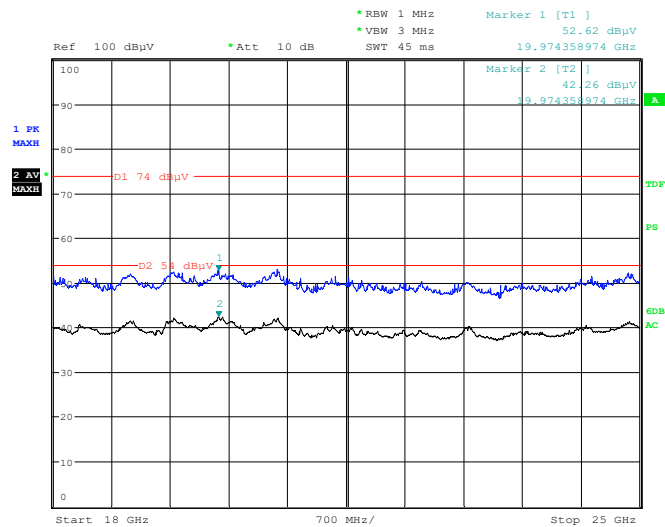
Full Spectrum**Critical_Freqs**

Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
2483.536000	52.79	---	74.00	21.21	H	-0.3
2483.536000	---	42.67	54.00	11.33	H	-0.3
2484.070000	51.13	---	74.00	22.87	H	-0.3
2484.070000	---	45.04	54.00	8.96	H	-0.3

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

Project No :RKSA240801002
Date: 19.SEP.2024 22:59:20

Tester :Hugh Wu

Vertical

Project No :RKSA240801002
Date: 19.SEP.2024 23:14:15

Tester :Hugh Wu

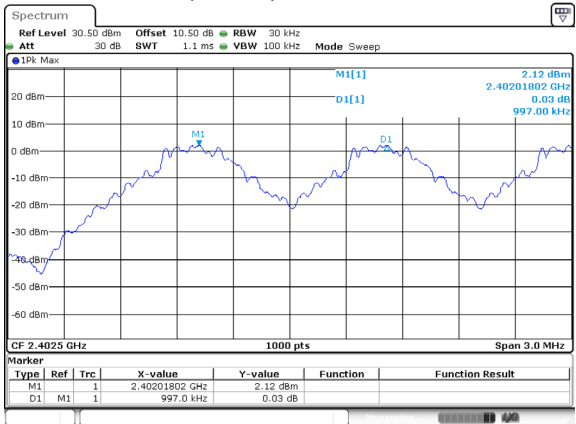
Note: The test distance is 3m. The limit is 74dBuV/m(Peak) and 54dBuV/m(Average).

CHANNEL SEPARATION TEST*EUT operation mode: Transmitting*

Mode	Channel	Result (MHz)	Limit (MHz)	Result
GFSK	Low	0.997	0.869	Pass
	Middle	1.000	0.869	Pass
	High	1.003	0.869	Pass

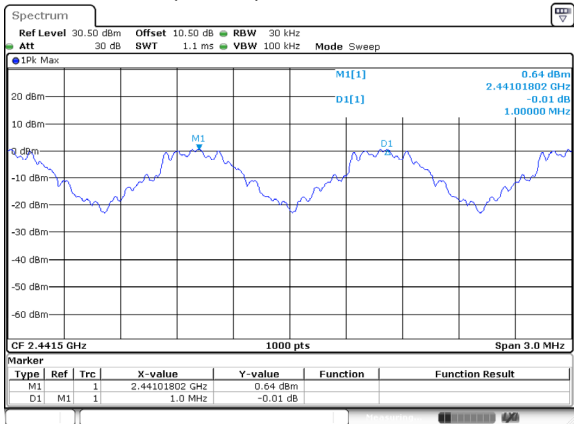
Note: Only GFSK mode result is reported since EDR($\pi/4$ -DQPSK, 8DPSK) has the exact same channel plan.
Limit = 20 dB bandwidth*2/3

BDR (GFSK): Low Channel



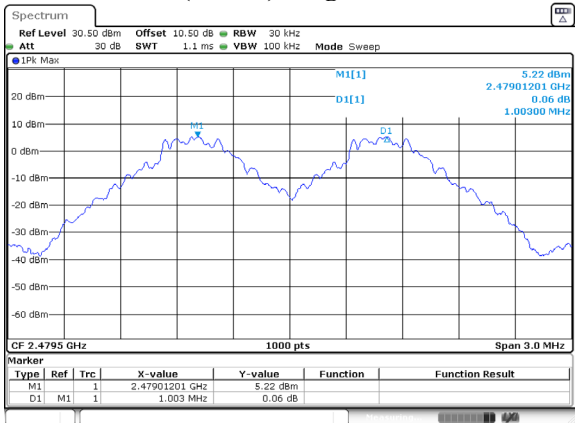
ProjectNo.: RKSA240801002 Tester: Jason Lu
Date: 4 SEP 2024 13:25:05

BDR (GFSK): Middle Channel



ProjectNo.: RKSA240801002 Tester: Jason Lu
Date: 4 SEP 2024 14:19:41

BDR (GFSK): High Channel

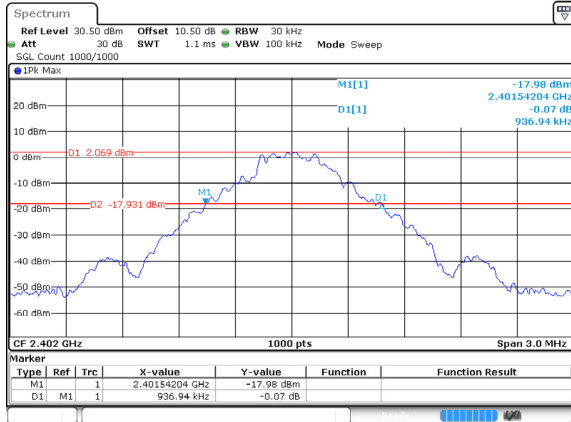


ProjectNo.: RKSA240801002 Tester: Jason Lu
Date: 10 OCT 2024 09:52:15

20 dB BANDWIDTH TEST*EUT operation mode: Transmitting*

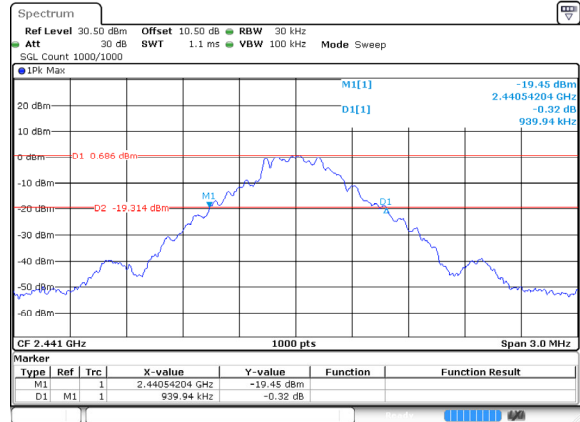
Mode	Channel	Frequency (MHz)	20 dB Emission Bandwidth (MHz)
BDR (GFSK)	Low	2402	0.937
	Middle	2441	0.940
	High	2480	0.934
EDR ($\pi/4$-DQPSK)	Low	2402	1.297
	Middle	2441	1.303
	High	2480	1.297
EDR (8DPSK)	Low	2402	1.279
	Middle	2441	1.279
	High	2480	1.279

BDR (GFSK): Low Channel



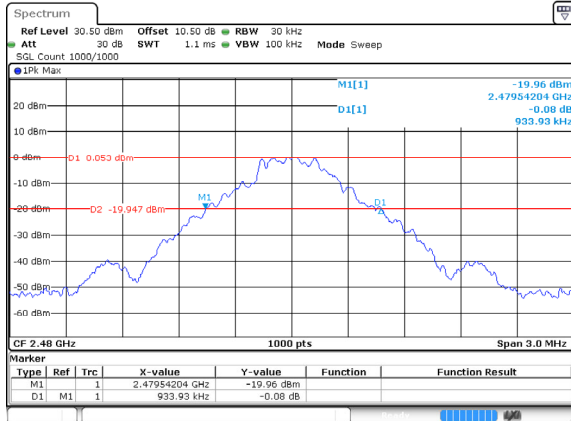
ProjectNo. RKSA240801002 Tester: Jason Lu
Date: 4 SEP 2024 13:22:26

BDR (GFSK): Middle Channel

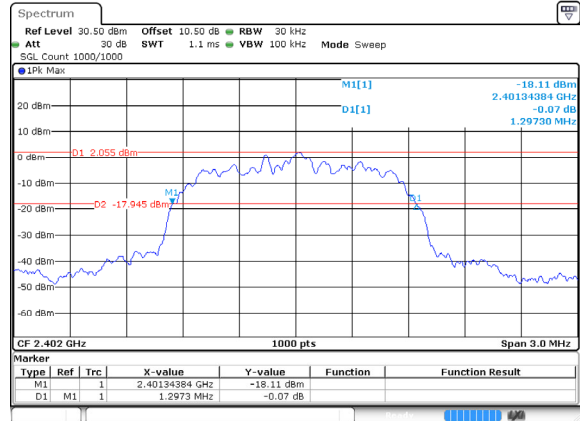


ProjectNo. RKSA240801002 Tester: Jason Lu
Date: 4 SEP 2024 13:25:42

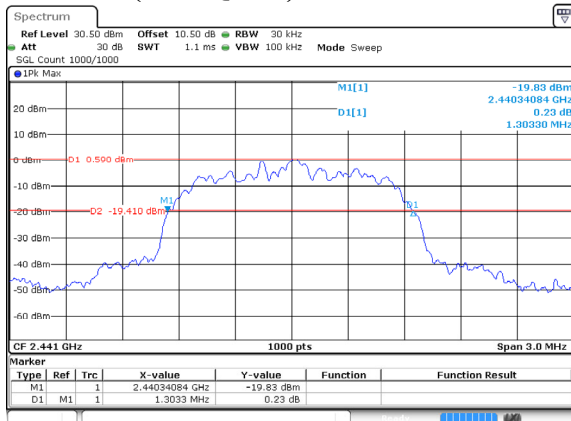
BDR (GFSK): High Channel



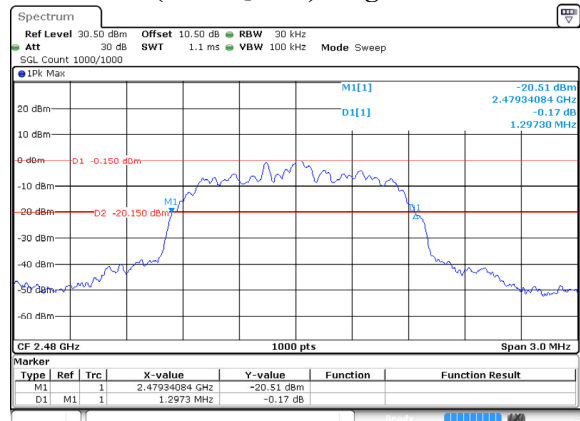
ProjectNo. RKSA240801002 Tester: Jason Lu
Date: 4 SEP 2024 13:28:46

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

ProjectNo. RKSA240801002 Tester: Jason Lu
Date: 4 SEP 2024 13:40:19

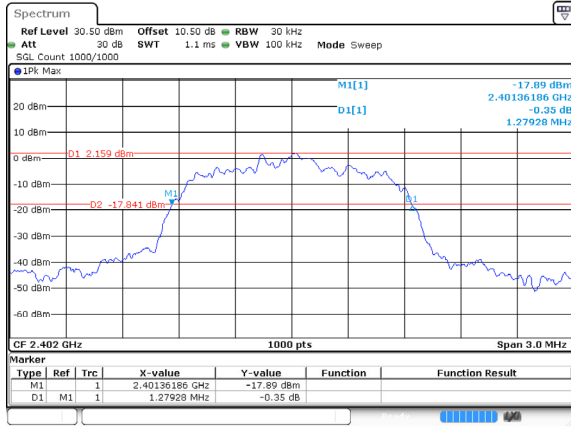
EDR($\pi/4$ -DQPSK): Middle Channel

ProjectNo. RKSA240801002 Tester: Jason Lu
Date: 4 SEP 2024 13:43:55

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

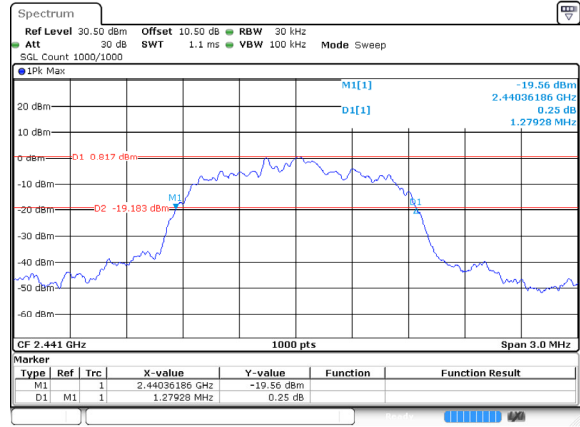
ProjectNo. RKSA240801002 Tester: Jason Lu
Date: 4 SEP 2024 13:49:38

EDR (8DPSK): Low Channel



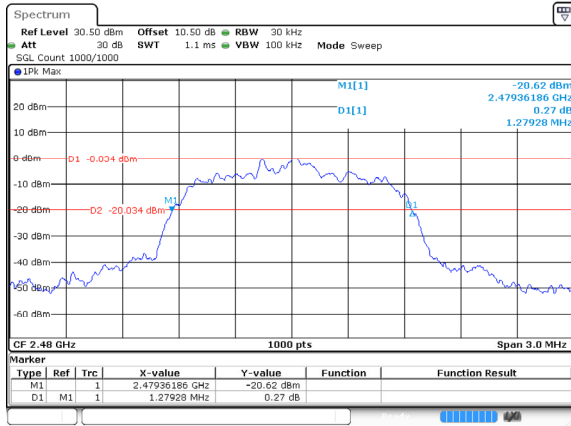
ProjectNo.: RKSA240801002 Tester: Jason Lu
Date: 4 SEP. 2024 13:57:56

EDR (8DPSK): Middle Channel



ProjectNo.: RKSA240801002 Tester: Jason Lu
Date: 4 SEP. 2024 14:00:59

EDR (8DPSK): High Channel



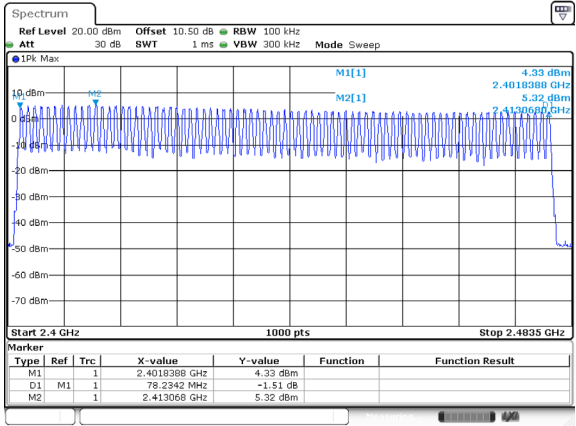
ProjectNo.: RKSA240801002 Tester: Jason Lu
Date: 4 SEP. 2024 14:03:50

QUANTITY OF HOPPING CHANNEL TEST

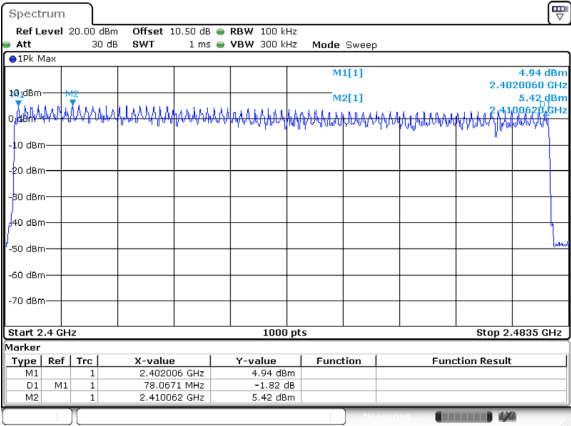
EUT operation mode: Hopping

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

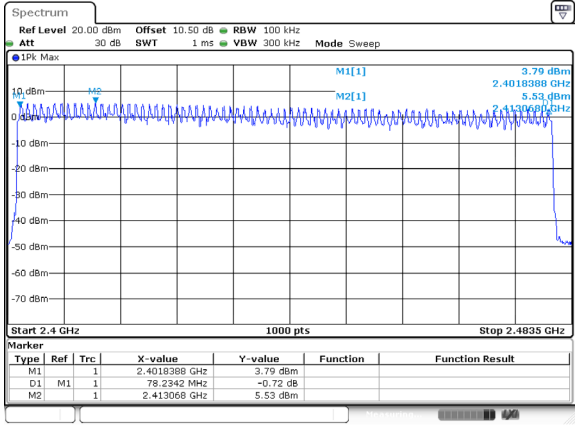
BDR (GFSK):Number of Hopping Channels



EDR (π/4-DQPSK): Number of Hopping Channels



EDR (8DPSK): Number of Hopping Channels



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

Mode		Channel	Pulse Width (ms)	Dwell Time (s)	Limit (s)	Result
BDR (GFSK)	DH1	Middle	0.384	0.123	0.4	Pass
	DH3	Middle	1.646	0.263	0.4	Pass
	DH5	Middle	2.931	0.313	0.4	Pass
EDR ($\pi/4$ -DQPSK)	2DH1	Middle	0.403	0.129	0.4	Pass
	2DH3	Middle	1.669	0.267	0.4	Pass
	2DH5	Middle	2.914	0.311	0.4	Pass
EDR (8DPSK)	3DH1	Middle	0.400	0.128	0.4	Pass
	3DH3	Middle	1.667	0.267	0.4	Pass
	3DH5	Middle	2.911	0.311	0.4	Pass

Note:

DH1: Dwell time = Pulse time*(1600/2/79)*31.6S

DH3: Dwell time = Pulse time*(1600/4/79)*31.6S

DH5: Dwell time = Pulse time*(1600/6/79)*31.6S

2DH1: Dwell time = Pulse time*(1600/2/79)*31.6S

2DH3: Dwell time = Pulse time*(1600/4/79)*31.6S

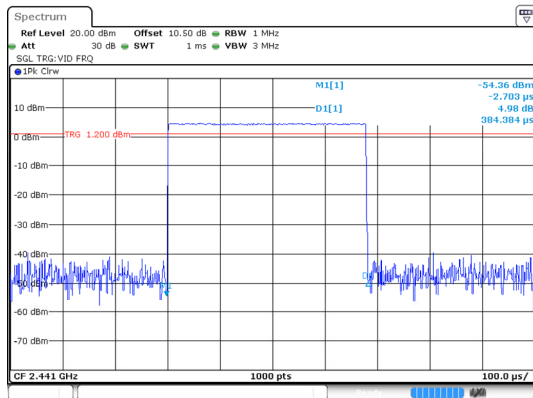
2DH5: Dwell time = Pulse time*(1600/6/79)*31.6S

3 DH1: Dwell time = Pulse time*(1600/2/79)*31.6S

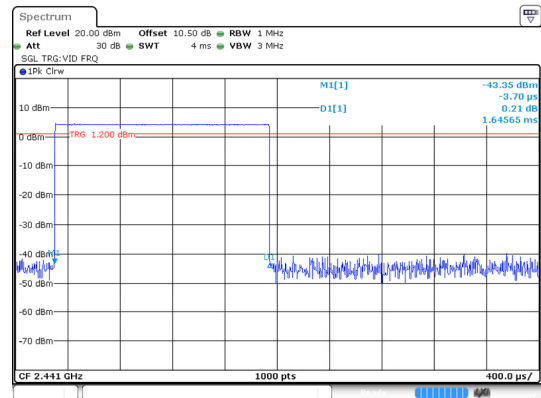
3DH3: Dwell time = Pulse time*(1600/4/79)*31.6S

3DH5: Dwell time = Pulse time*(1600/6/79)*31.6S

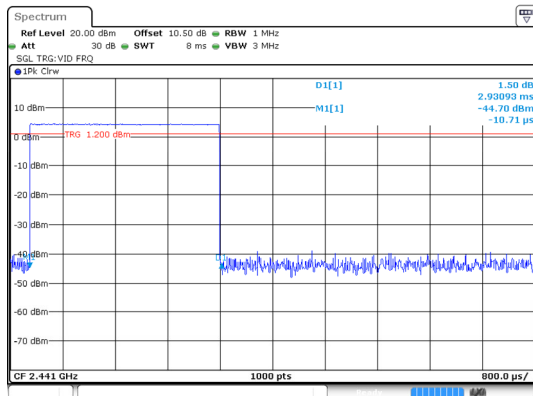
BDR (GFSK): Pulse time, Middle Channel, DH1



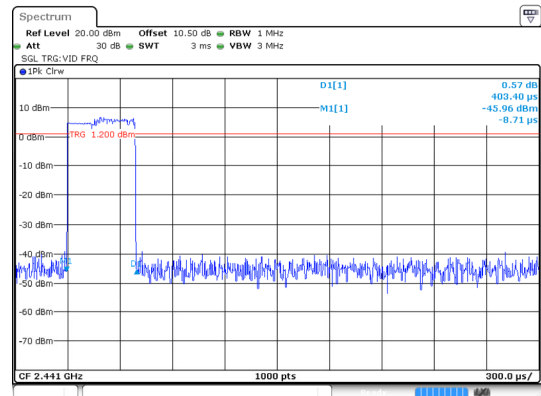
BDR (GFSK): Pulse time, Middle Channel, DH3



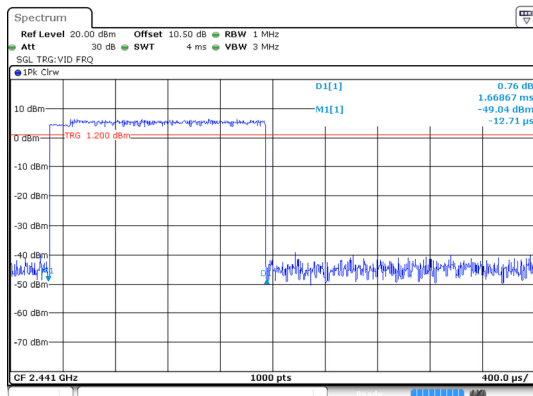
BDR (GFSK): Pulse time, Middle Channel, DH5



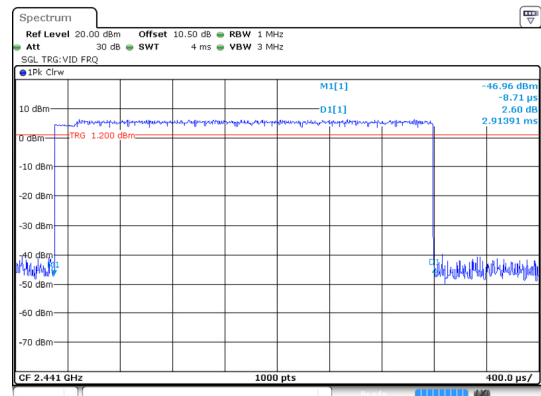
EDR ($\pi/4$ -DQPSK): Pulse time, Middle Channel, 2DH1



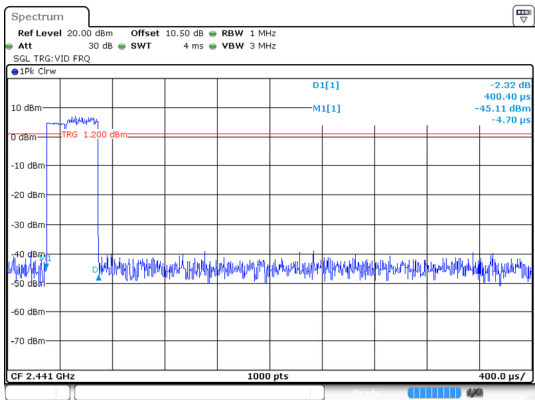
EDR ($\pi/4$ -DQPSK): Pulse time, Middle Channel, 2DH3



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

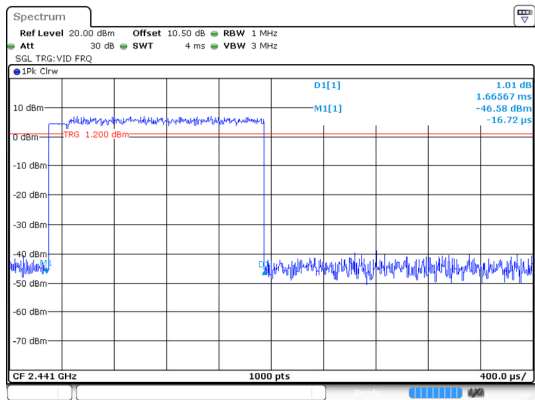


EDR (8DPSK): Pulse time, Middle Channel, 3DH1



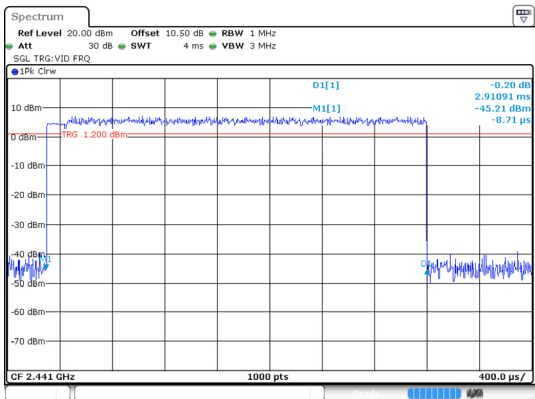
ProjectNo.:RKSA240801002 Tester:Jason Lu
Date: 4.SEP.2024 15:26:01

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



ProjectNo.:RKSA240801002 Tester:Jason Lu
Date: 4.SEP.2024 15:26:57

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

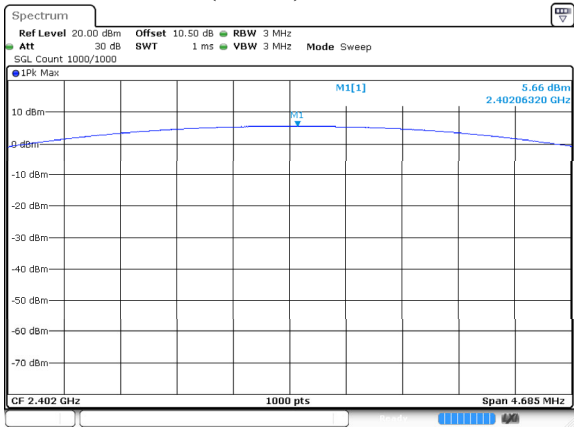


ProjectNo.:RKSA240801002 Tester:Jason Lu
Date: 4.SEP.2024 15:27:55

PEAK OUTPUT POWER MEASUREMENT*EUT operation mode: Transmitting*

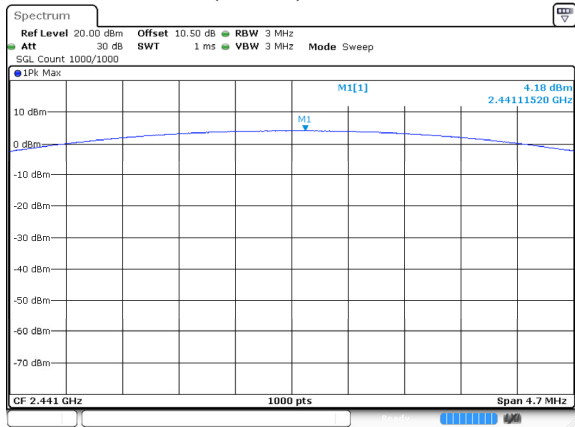
Mode	Channel	Frequency (MHz)	Result (dBm)	Limit (dBm)
GFSK	Low	2402	5.66	21
	Middle	2441	4.18	
	High	2480	3.40	
$\pi/4$ DQPSK	Low	2402	8.04	
	Middle	2441	6.60	
	High	2480	5.76	
8DPSK	Low	2402	8.63	
	Middle	2441	6.89	
	High	2480	6.32	

BDR (GFSK): 2402MHz



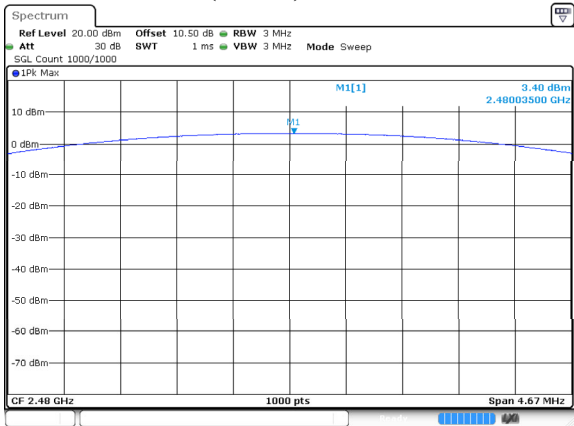
ProjectNo.: RKSA240801002 Tester: Jason Lu
Date: 4 SEP. 2024 13:24:20

BDR (GFSK): 2441MHz



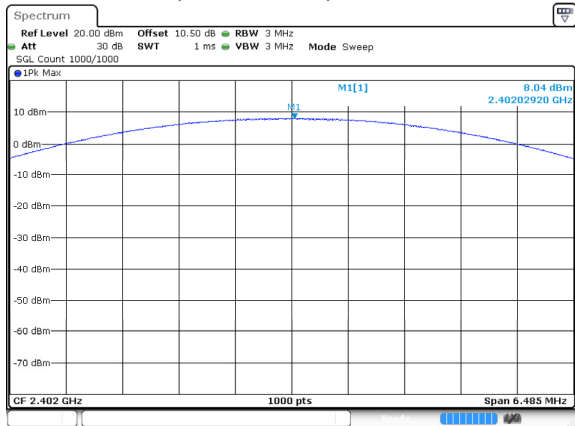
ProjectNo.: RKSA240801002 Tester: Jason Lu
Date: 4 SEP. 2024 13:27:04

BDR (GFSK): 2480MHz



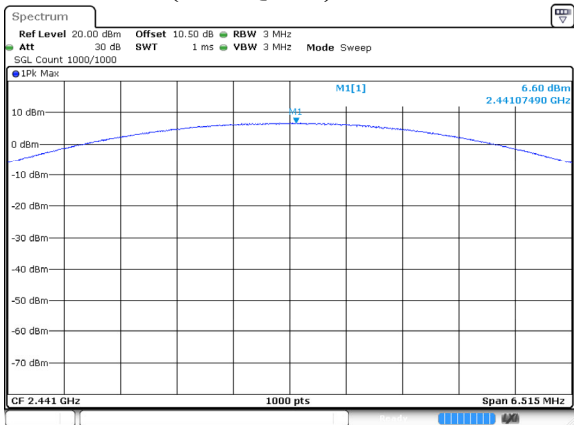
ProjectNo.: RKSA240801002 Tester: Jason Lu
Date: 4 SEP. 2024 13:30:33

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



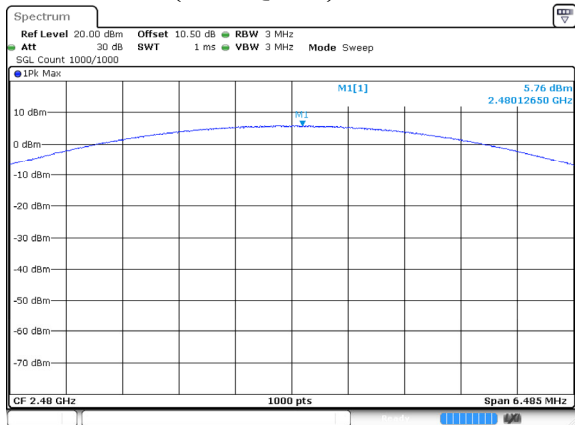
ProjectNo.: RKSA240801002 Tester: Jason Lu
Date: 4 SEP. 2024 13:42:21

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



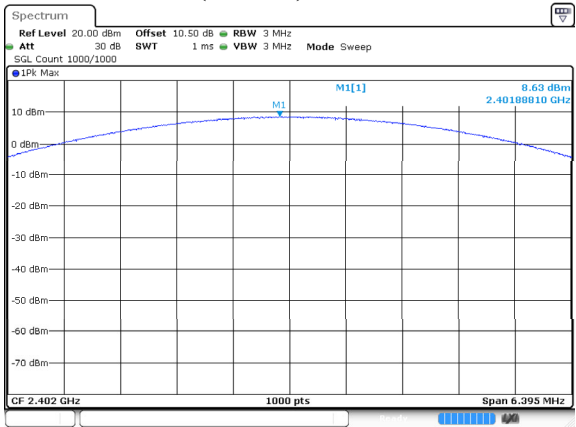
ProjectNo.: RKSA240801002 Tester: Jason Lu
Date: 4 SEP. 2024 13:46:43

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



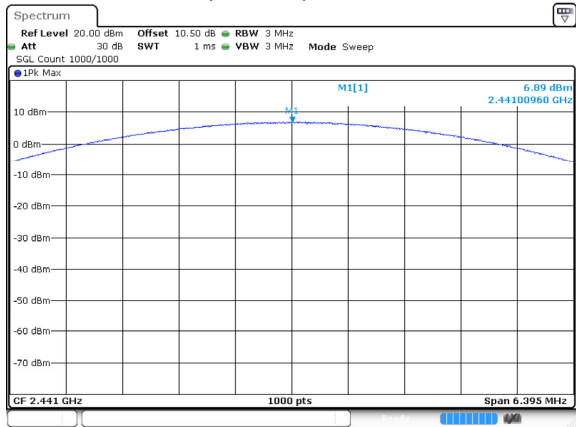
ProjectNo.: RKSA240801002 Tester: Jason Lu
Date: 4 SEP. 2024 13:51:29

EDR(8DPSK): 2402MHz



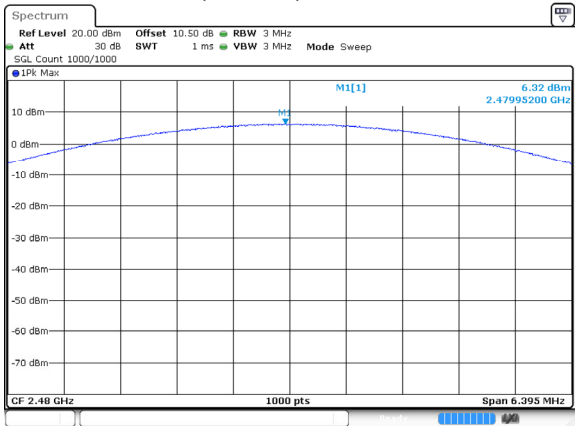
ProjectNo.: RKSA240801002 Tester: Jason Lu
Date: 4 SEP 2024 13:59:52

EDR(8DPSK):2441MHz



ProjectNo.: RKSA240801002 Tester: Jason Lu
Date: 4 SEP 2024 14:02:10

EDR(8DPSK): 2480MHz



ProjectNo.: RKSA240801002 Tester: Jason Lu
Date: 4 SEP 2024 14:05:51

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

Mode	Channel	Frequency (MHz)	Result (dBc)	Limit (dBc)
GFSK	Low	2402	50.07	20
	High	2480	50.69	
$\pi/4$ DQPSK	Low	2402	51.23	
	High	2480	50.90	
8DPSK	Low	2402	51.22	
	High	2480	49.96	
GFSK (Hopping)	Low	2402	53.07	
	High	2480	50.50	
$\pi/4$ DQPSK (Hopping)	Low	2402	52.92	
	High	2480	50.04	
8DPSK (Hopping)	Low	2402	52.77	
	High	2480	50.10	