NVLAP TESTING
NVLAP LAB CODE 600338-0

BACL Bay Area Compliance Labs Corp.

FCC PART 15.247
TEST REPORT

For

Monolith Electric (Changzhou) Co., Ltd.

No.1-2 of Building 5, No.8 Huashan Road, Xinbei District, Changzhou, China

FCC ID: 2AVLFET030

Report Type:	**Product Name:**
Original Report	5m DIGITAL TAPE

Report Number: RKSA240521001-00B

Report Date: 2024-07-25

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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	RKSA240521001-00B	R1V1	2024-07-25	Initial Release

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant:	Monolith Electric (Changzhou) Co., Ltd.
Product Name:	5m DIGITAL TAPE
Tested Model	ET-030
Series Model:	ET030, ED030, DM030, EM030, PS030, BR030, ET005, ET-031
Model Difference:	Model name
Power Supply:	DC 3.7V from battery or DC 5V from type-C port
RF Function:	2.4G SRD
Operating Band/Frequency:	2404-2478 MHz
Maximum Output Power:	4.89 dBm
Channel Number:	37
Modulation Type:	GFSK
Antenna Type:	PCB Antenna
★Maximum Antenna Gain:	-7.62dBi

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: RKSA240521001-1 (Assigned by the BACL (Kunshan). The EUT supplied by the applicant was received on 2024-05-21.)

Objective

This test report is prepared for *Monolith Electric (Changzhou) 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℃
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)	Channel	Frequency (MHz)
1	2404	14	2432	27	2458
2	2406	15	2434	28	2460
3	2408	16	2436	29	2462
4	2410	17	2438	30	2464
5	2412	18	2440	31	2466
6	2414	19	2442	32	2468
7	2416	20	2444	33	2470
8	2418	21	2446	34	2472
9	2420	22	2448	35	2474
10	2422	23	2450	36	2476
11	2424	24	2452	37	2478
12	2428	25	2454	/	/
13	2430	26	2456	/	/

EUT was tested with Channel 1, 19 and 37.

EUT Exercise Software

RF Test Tool: RF_Test

Mode	Channel	★Power level:
SRD	2404	4
	2442	4
	2478	4

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

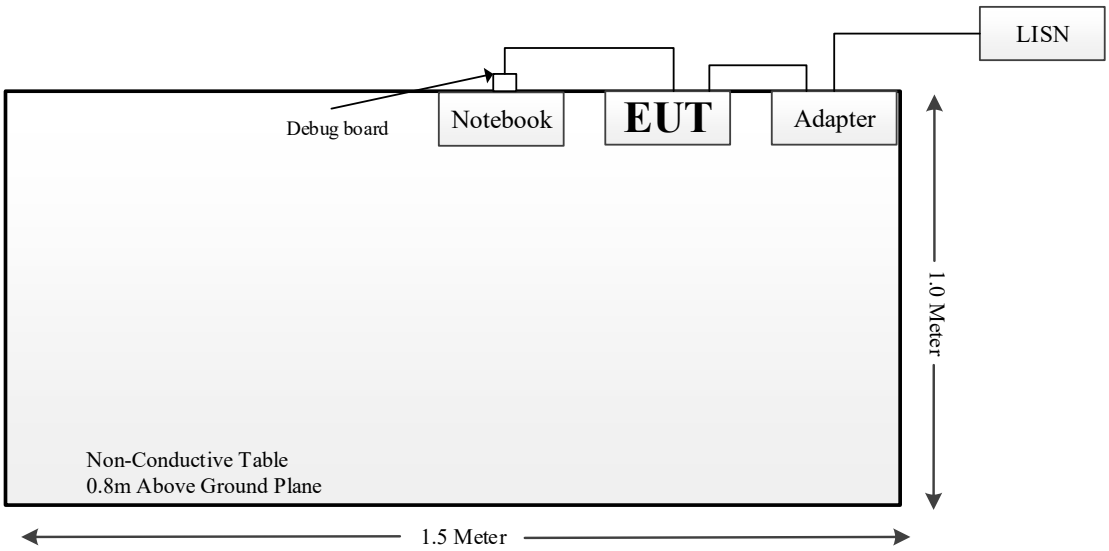
Manufacturer	Description	Model	Serial Number
Lenovo	Notebook	T470S	/
Power on Tools Co.,Ltd.	Adapter	DA-00052000UL001	/
Unknown	Debug borad	/	/

External I/O Cable

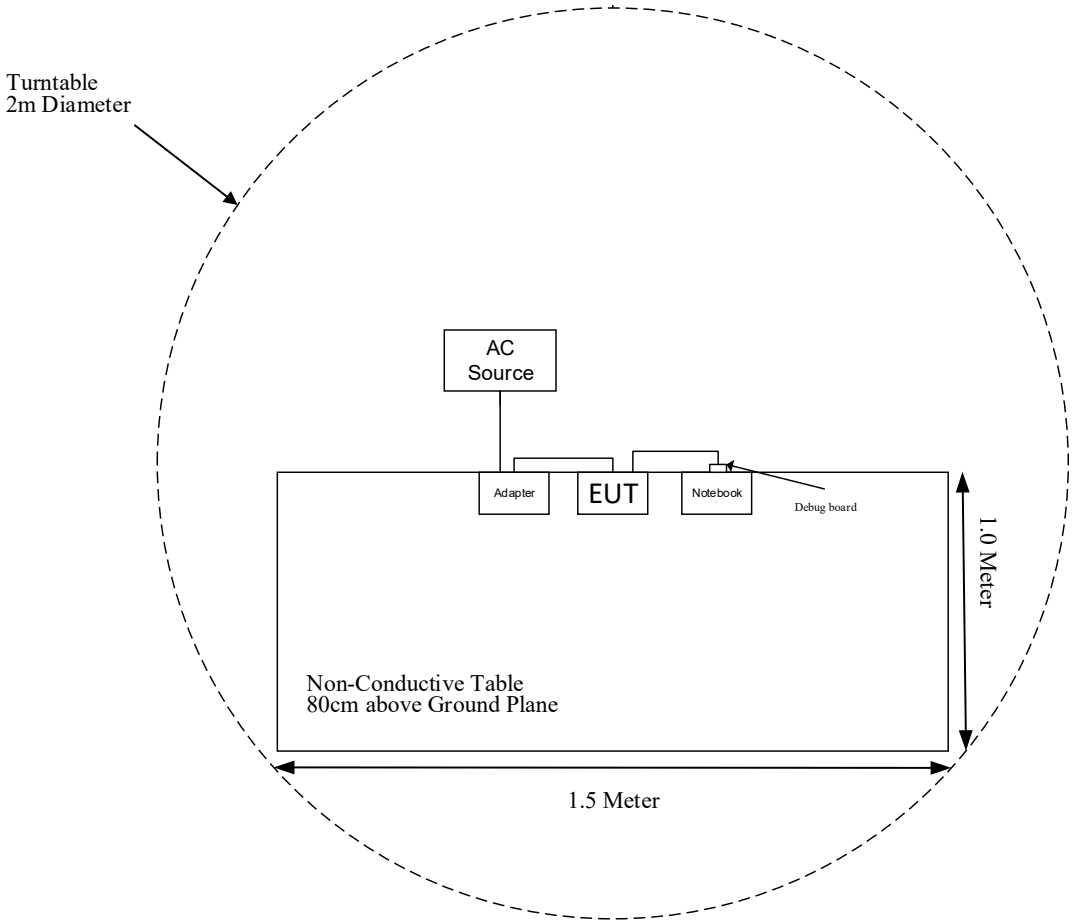
Cable Description	Length (m)	From Port	To
Power Cable 1	1.0	AC Source/LISN	Adapter
Power Cable 2	1.0	Adapter	EUT
USB Cable 1	0.1	EUT	Debug board
USB Cable 2	0.1	Notebook	Debug board

Block Diagram of Test Setup

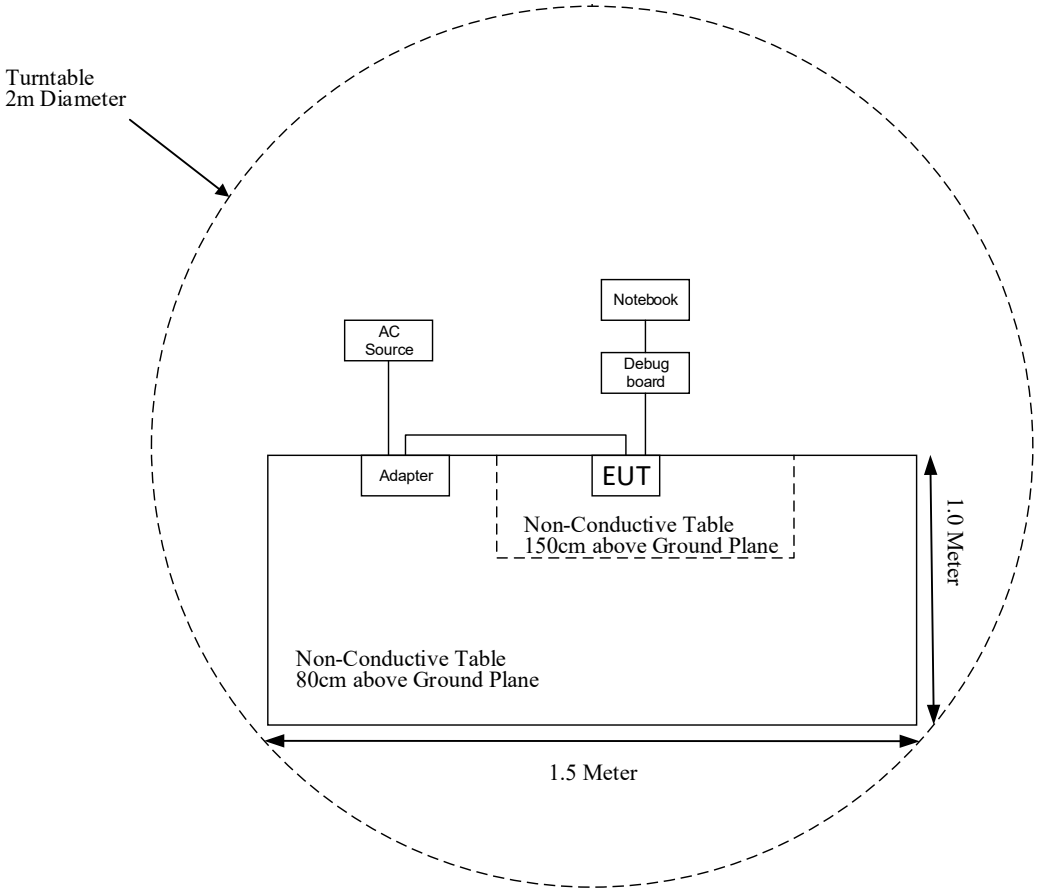
For Conducted Emissions:



For Radiated Emissions(Below 1GHz):



For Radiated Emissions (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	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
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	2024-04-25	2025-04-24
Narda	Attenuator	10dB	010	2024-04-25	2025-04-24
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	2024-04-23	2025-04-22
MICRO-COAX	Coaxial Cable	Cable-12	012	2024-04-23	2025-04-22
MICRO-COAX	Coaxial Cable	Cable-13	013	2024-04-23	2025-04-22
RF Conducted Test					
Rohde & Schwarz	Spectrum Analyzer	FSIQ26	100048	2024-04-24	2025-04-23
Narda	Attenuator	10dB	010	2024-04-23	2025-04-22
Anritsu	Power Sensor	MA24418A	12621	2023-09-27	2024-09-26
Conducted Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESR	101746	2024-04-23	2025-04-22
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	0357.8810.54	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 & §2.1093	RF EXPOSURE	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 & §2.1093 - RF EXPOSURE

Applicable Standard

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

According to KDB 447498 D01 General RF Exposure Guidance

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

[(max. power of channel, including tune-up tolerance, mW)/ (min. test separation distance, mm)] • [√f (GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

1. f (GHz) is the RF channel transmit frequency in GHz.

2. Power and distance are rounded to the nearest mW and mm before calculation.

3. The result is rounded to one decimal place for comparison.

4. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test Exclusion.

Measurement Result

Mode	Frequency Range (MHz)	Max Tune-up Conducted Power		Calculated Distance (mm)	Calculated Value	Threshold (1-g SAR)	SAR Test Exclusion
		(dBm)	(mW)				
SRD	2404-2478	5.0	3.16	5	0.99	3.0	Yes

Result: No SAR test is required.

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 PCB antenna for SRD, and the antenna gain is -7.62 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

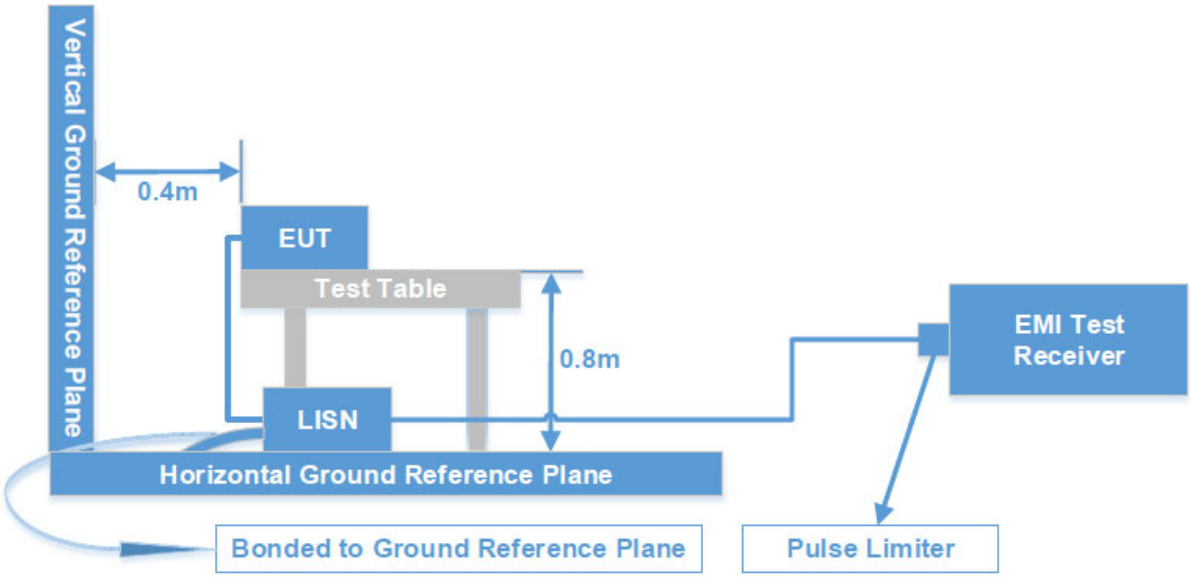
Result: Compliant.

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 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:

Factor (dB) = LISN VDF (dB) + Cable Loss (dB) + Transient Limiter Attenuation (dB)
Level (dBμV) = Read level (dBμV) + 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:

Over Limit (dB) = Level (dBμV) - Limit (dBμV)

Test Results Summary

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

Test Data: See Appendix

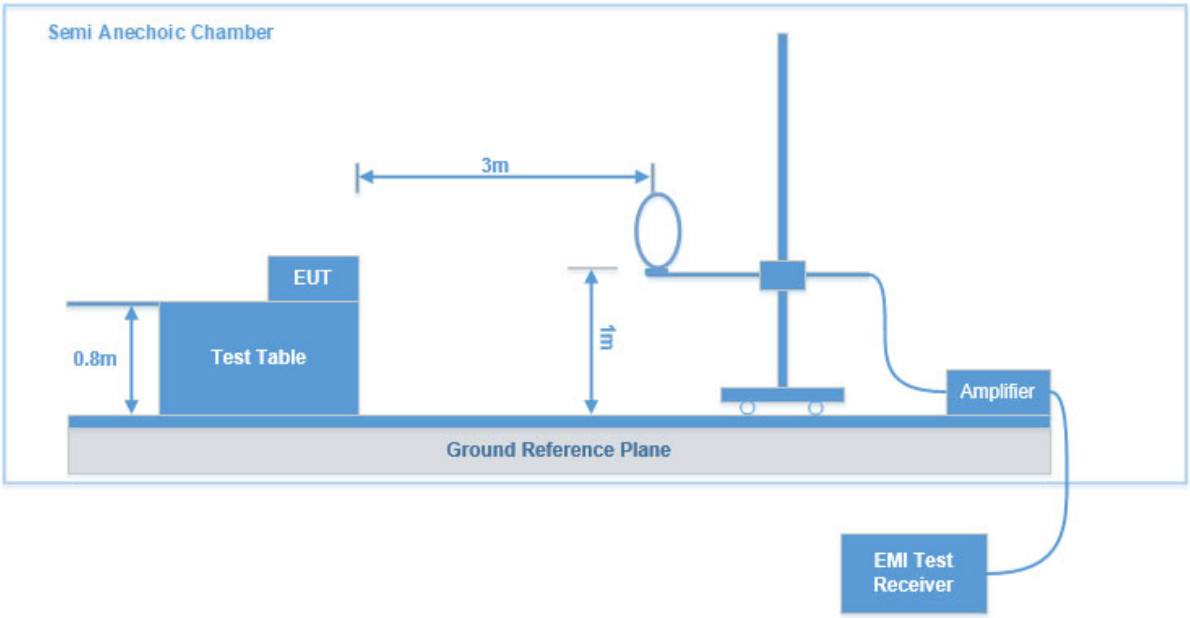
FCC §15.205, §15.209 & §15.247(d) – RADIATED EMISSIONS

Applicable Standard

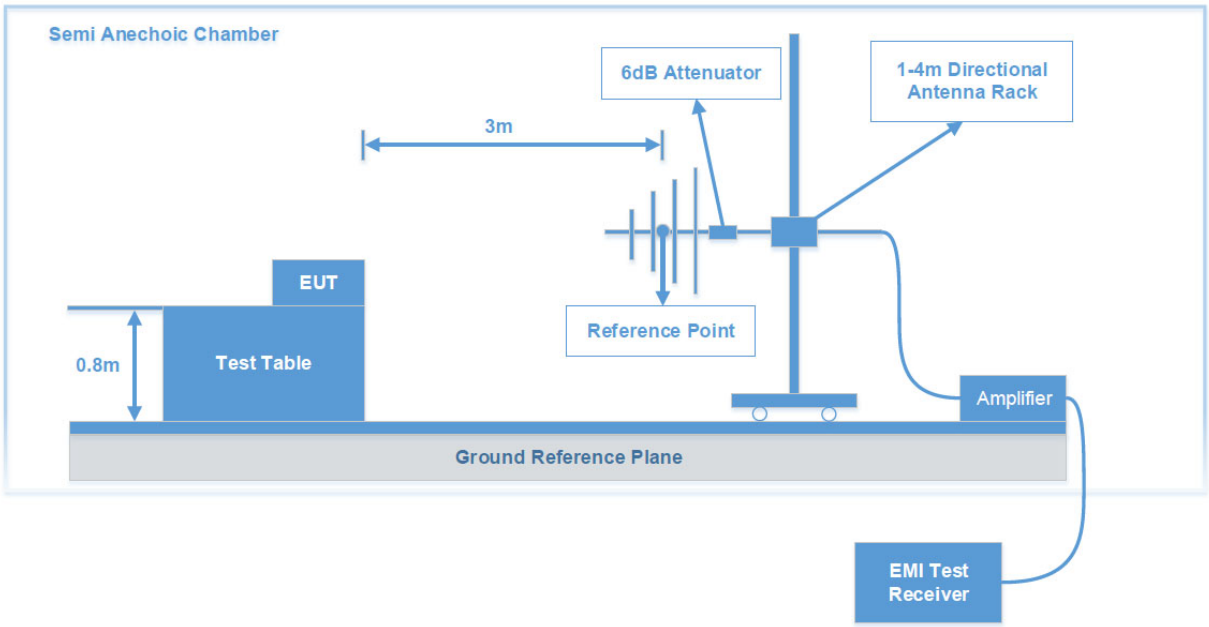
FCC §15.205; §15.209; §15.247(d)

Test System Setup

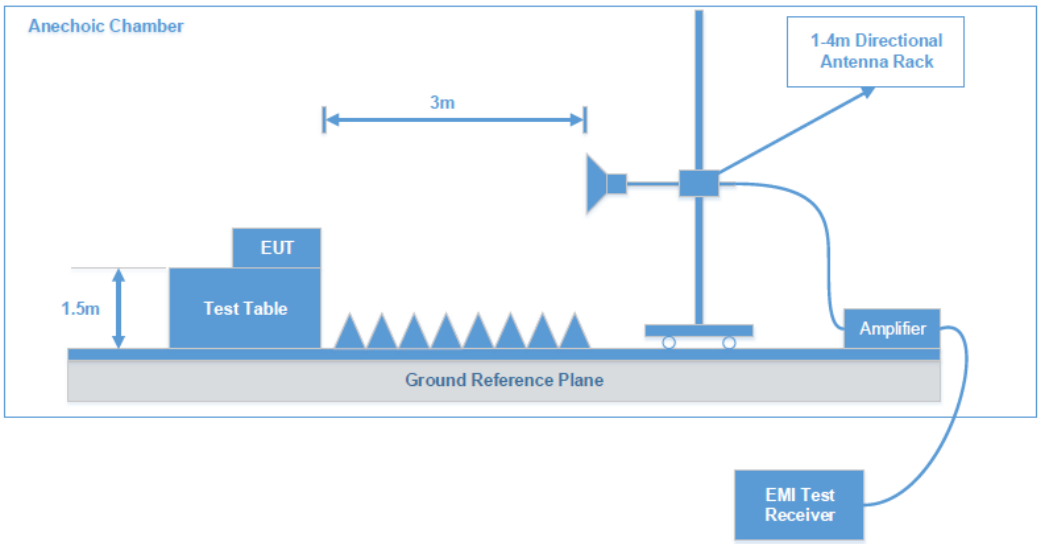
9kHz - 30MHz:



30 MHz - 1 GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters, using the setup accordance with the ANSI C63.10-2013. 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	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

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

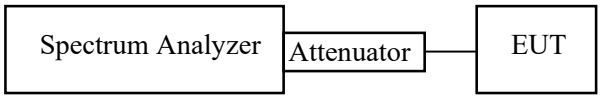
Frequency hopping systems shall have hoping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that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

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) ≥ 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

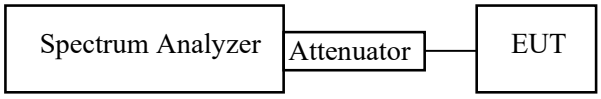
FCC §15.247(a) (1) – 20 dB EMISSION BANDWIDTH

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

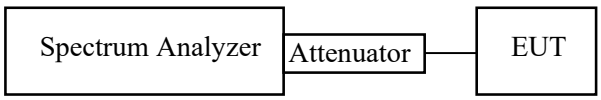
Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress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

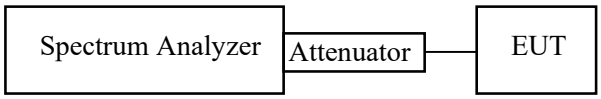
Applicable Standard

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 ≤ channel spacing and where possible RBW should be set ≥ 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

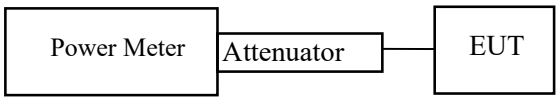
According to §15.247(b) (1), for frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. And for all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125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

Test Procedure

According to ANSI C63.10-2013 sub-clause 11.9.1.3

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall use a fast-responding diode detector.

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



Test Datd: See Appendix

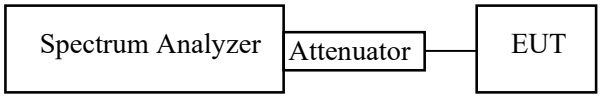
FCC §15.247(d) - BAND EDGES TESTING

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

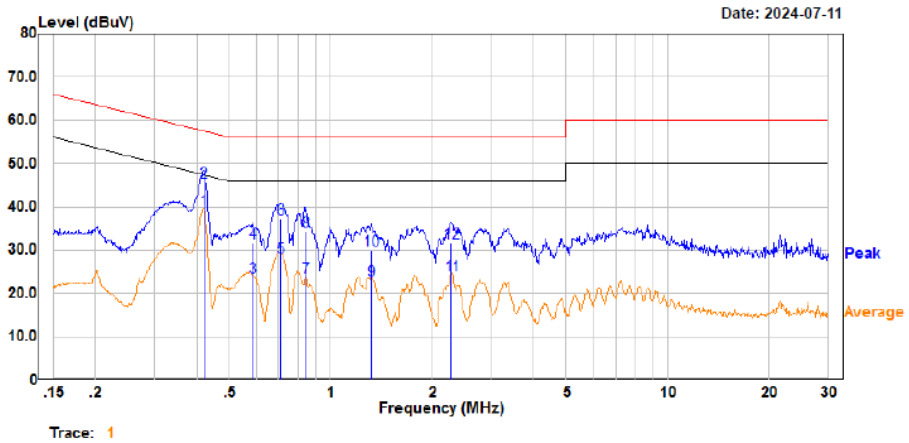
Test Item:	AC LINE CONDUCTED EMISSIONS	RADIATED EMISSIONS			CHANNEL SEPARATION TEST
		9kHz - 1GHz	1 GHz - 18 GHz	18 GHz - 25 GHz	
Test Date:	2024-07-11	2024-06-22	2024-06-29	2024-06-12	2024-07-05
Temperature:	26.8 ℃	24.8 ℃	24.3 ℃	22.5 ℃	23.3 ℃
Relative Humidity:	58 %	57 %	52 %	56 %	55 %
ATM Pressure:	100.4 kPa	100.2 kPa	100.5kPa	100.6 kPa	100.6 kPa
Test Result:	Pass	Pass	Pass	Pass	Pass
Test Engineer:	Leah Li	Leah Li	Klein Zhu	Hugh Wu	Hardy Huang

Test Item:	20 DB BANDWIDTH TEST	Quantity Of Hopping Channel Test	Time Of Occupancy (Dwell Time)	PEAK OUTPUT POWER MEASUREMENT	BAND EDGES TESTING
Test Date:	2024-07-04 to 2024-07-17	2024-07-03	2024-07-03	2024-07-03	2024-07-05 to 2024-07-17
Temperature:	24.0-24.9 ℃	23.9 ℃	23.9 ℃	23.9 ℃	24.3-24.9 ℃
Relative Humidity:	52-56 %	55 %	55 %	55 %	55-56 %
ATM Pressure:	100.3-100.4 kPa	100.6 kPa	100.6 kPa	100.6 kPa	100.3-100.6 kPa
Test Result:	Pass	Pass	Pass	Pass	Pass
Test Engineer:	Hardy Huang	Hardy Huang	Hardy Huang	Hardy Huang	Hardy Huang

AC LINE CONDUCTED EMISSIONS

EUT operation mode: Transmitting in SRD Mode High channel (maximum output power mode)

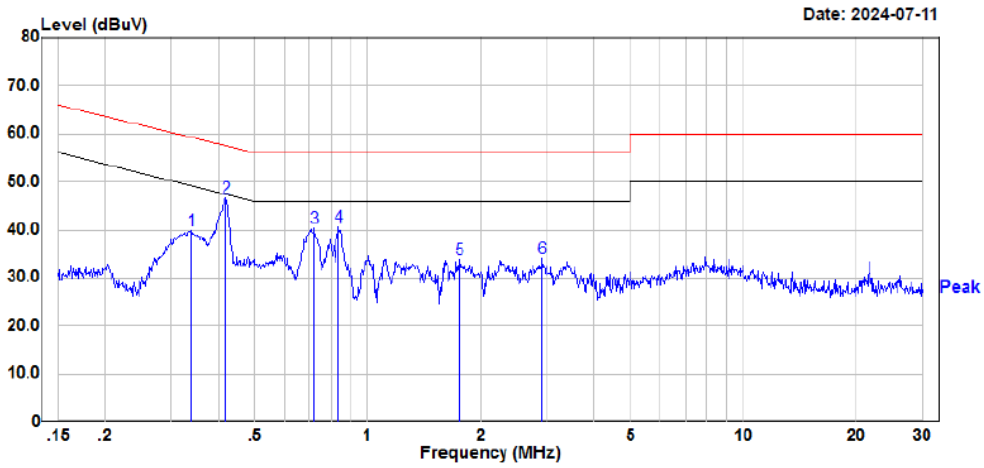
AC 120V/60 Hz, Line




```
Site                  : CE
Condition             : limit\FCC PART 15.207
                      : DET:Peak
Project No.           : RKSA240521001
Model                 : ET-030
Phase                 : L
Voltage               : 120V/60Hz
Mode                  : SRD
Test Equipment        : ENV216,ESR
Temperature           : 26.8℃
Humidity              : 58%
Atmospheric pressure: 100.4kPa
Test Engineer         : Leah Li
```

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.421	19.21	20.21	39.42	47.43	-8.01	Average
2	0.421	25.41	20.21	45.62	57.43	-11.81	QP
3	0.588	3.70	20.10	23.80	46.00	-22.20	Average
4	0.588	11.50	20.10	31.60	56.00	-24.40	QP
5	0.710	8.30	20.06	28.36	46.00	-17.64	Average
6	0.710	17.20	20.06	37.26	56.00	-18.74	QP
7	0.846	3.70	19.88	23.58	46.00	-22.42	Average
8	0.846	14.40	19.88	34.28	56.00	-21.72	QP
9	1.318	3.00	19.89	22.89	46.00	-23.11	Average
10	1.318	10.20	19.89	30.09	56.00	-25.91	QP
11	2.280	3.90	20.18	24.08	46.00	-21.92	Average
12	2.280	11.50	20.18	31.68	56.00	-24.32	QP

AC 120V/60 Hz, Neutral




```
Site                  : CE
Condition             : limit\FCC PART 15.207
                      : DET:Peak
Project No.           : RKSA240521001
Model                 : ET-030
Phase                 : N
Voltage               : 120V/60Hz
Mode                  : SRD
Test Equipment        : ENV216,ESR
Temperature           : 26.8℃
Humidity              : 58%
Atmospheric pressure: 100.4kPa
Test Engineer         : Leah Li
```

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.338	19.74	20.19	39.93	59.25	-19.32	Peak
2	0.419	26.47	20.21	46.68	57.47	-10.79	Peak
3	0.721	20.22	20.04	40.26	56.00	-15.74	Peak
4	0.837	20.61	19.89	40.50	56.00	-15.50	Peak
5	1.751	13.70	20.07	33.77	56.00	-22.23	Peak
6	2.911	13.97	20.22	34.19	56.00	-21.81	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:

9 kHz-30 MHz: *(Transmitting maximum output power SRD mode high channel)*

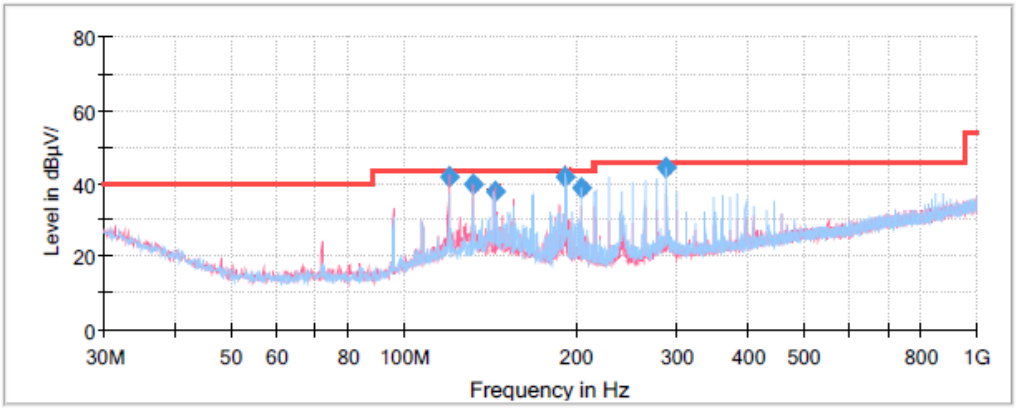
The amplitude of spurious emissions attenuated more than 20 dB below the limit was not be recorded.

30 MHz - 1 GHz:

Low Channel: 2404 MHz

Common Information

Project No:	RKSA240521001
EUT Model:	ET-030
Test Mode:	Transmitting in SRD mode low channel
Standard:	FCC Part 15.205 & FCC Part 15.209 &FCC Part 15.247
Test Equipment:	ESCI, JB3, 310N
Temperature:	24.8℃
Humidity:	57%
Barometric Pressure:	100.2kPa
Test Engineer:	Leah Li
Test Date:	2024/6/22



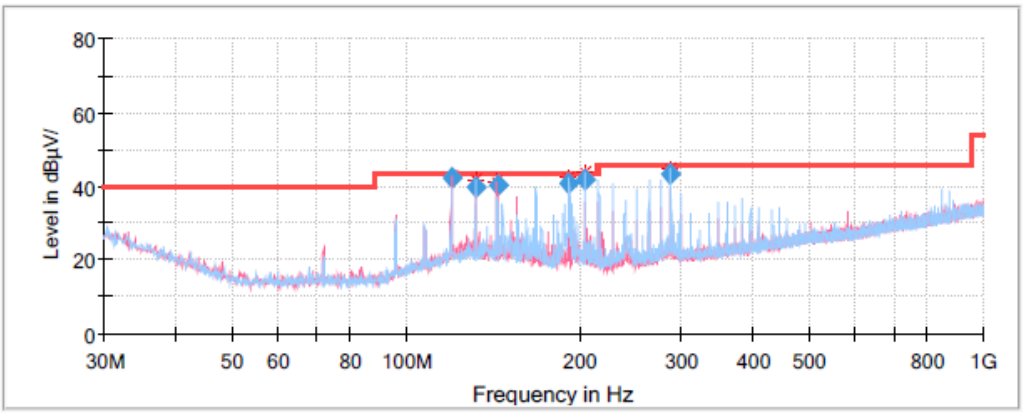
Final_Result

Frequency (MHz)	QuasiPeak (dBµ V/m)	Limit (dBµ V/m)	Margin (dB)	Pol	Corr. (dB/m)
120.039200	41.66	43.50	1.84	V	-10.9
132.015950	39.86	43.50	3.64	V	-11.2
144.025400	37.94	43.50	5.56	V	-11.6
192.012500	42.00	43.50	1.50	H	-12.5
204.043550	38.64	43.50	4.86	H	-12.5
288.031400	44.32	46.00	1.68	H	-10.6

Middle Channel: 2442 MHz

Common Information

Project No:	RKSA240521001
EUT Model:	ET-030
Test Mode:	Transmitting in SRD mode Middle channel
Standard:	FCC Part 15.205 & FCC Part 15.209 &FCC Part 15.247
Test Equipment:	ESCI, JB3, 310N
Temperature:	24.8℃
Humidity:	57%
Barometric Pressure:	100.2kPa
Test Engineer:	Leah Li
Test Date:	2024/6/22



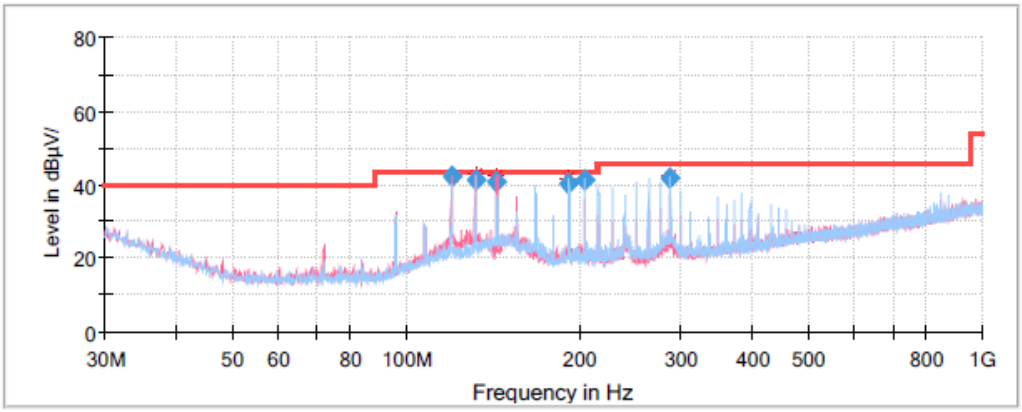
Final_Result

Frequency (MHz)	QuasiPeak (dBµ V/m)	Limit (dBµ V/m)	Margin (dB)	Pol	Corr. (dB /m)
120.019400	42.44	43.50	1.06	V	-10.9
131.997950	39.97	43.50	3.53	V	-11.2
144.021800	40.34	43.50	3.16	V	-11.6
192.013700	40.94	43.50	2.56	H	-12.5
204.016550	41.90	43.50	1.60	H	-12.5
287.967200	43.17	46.00	2.83	H	-10.6

High Channel:2478 MHz

Common Information

Project No:	RKSA240521001
EUT Model:	ET-030
Test Mode:	Transmitting in SRD mode High channel
Standard:	FCC Part 15.205 & FCC Part 15.209 &FCC Part 15.247
Test Equipment:	ESCI, JB3, 310N
Temperature:	24.8℃
Humidity:	57%
Barometric Pressure:	100.2kPa
Test Engineer:	Leah Li
Test Date:	2024/6/22



Final_Result

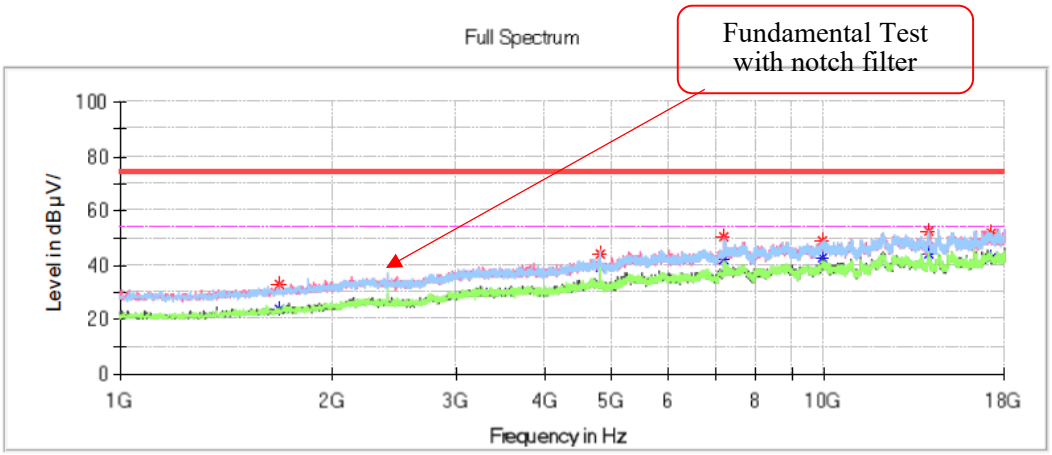
Frequency (MHz)	QuasiPeak (dBµ V/m)	Limit (dBµ V/m)	Margin (dB)	Pol	Corr. (dB/m)
120.003200	42.23	43.50	1.27	V	-10.9
132.003050	41.22	43.50	2.28	V	-11.2
144.009500	40.77	43.50	2.73	V	-11.6
192.023000	40.41	43.50	3.09	H	-12.5
204.019850	41.47	43.50	2.03	H	-12.5
288.015800	41.83	46.00	4.17	H	-10.6

1 GHz - 18 GHz:

Low Channel: 2404 MHz

Common Information

Project No.:	RKSA240521001
Test Mode:	Transmitting in SRD mode low channel
Standard:	FCC Part 15.205 & FCC Part 15.209 &FCC Part 15.247
Test Engineer:	Klein Zhu



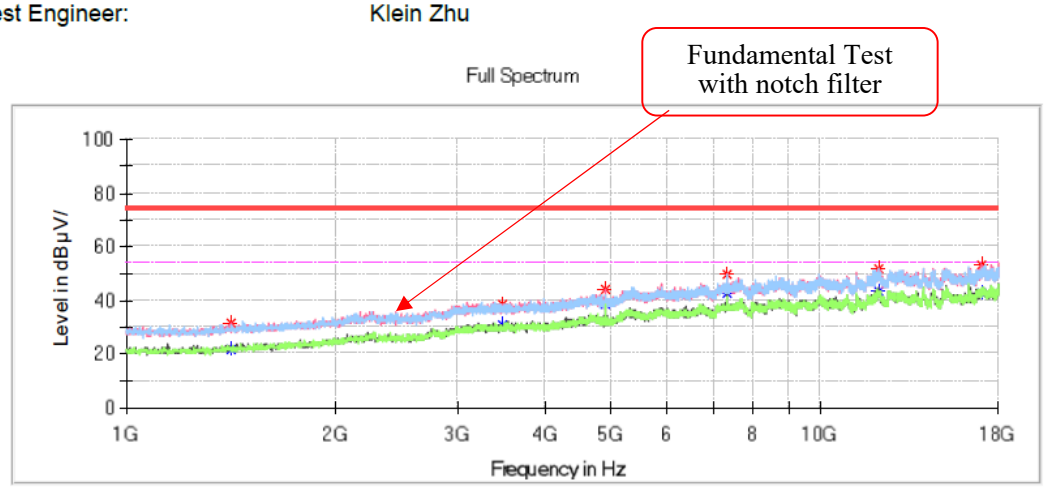
Critical_Freqs

Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
1685.100000	---	23.45	54.00	30.55	H	-13.6
1685.100000	32.63	---	74.00	41.37	H	-13.6
4806.300000	---	39.10	54.00	14.90	H	-3.1
4806.300000	44.03	---	74.00	29.97	H	-3.1
7210.100000	---	41.89	54.00	12.11	V	3.2
7210.100000	50.00	---	74.00	24.00	V	3.2
9952.200000	---	42.33	54.00	11.67	V	7.0
9952.200000	48.98	---	74.00	25.02	V	7.0
14003.300000	---	44.30	54.00	9.70	H	9.8
14003.300000	52.48	---	74.00	21.52	H	9.8
17184.000000	---	42.87	54.00	11.13	V	12.0
17184.000000	51.84	---	74.00	22.16	V	12.0

Middle Channel: 2442 MHz

Common Information

Project No.:	RKSA240521001
Test Mode:	Transmitting in SRD mode Middle channel
Standard:	FCC Part 15.205 & FCC Part 15.209 &FCC Part 15.247
Test Engineer:	Klein Zhu



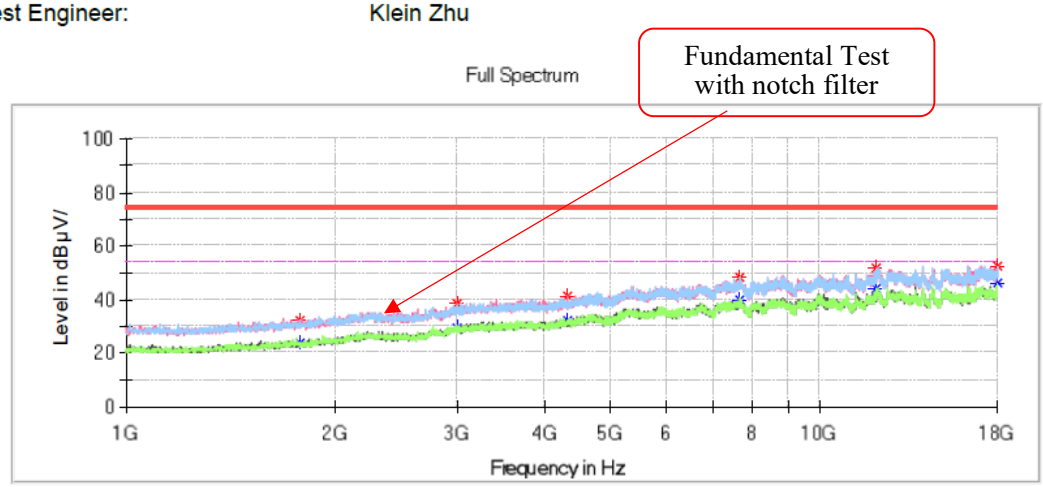
Critical_Freqs

Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
1416.500000	---	21.66	54.00	32.34	V	-14.9
1416.500000	31.65	---	74.00	42.35	V	-14.9
3480.300000	---	30.78	54.00	23.22	V	-6.4
3480.300000	38.48	---	74.00	35.52	V	-6.4
4882.800000	---	38.62	54.00	15.38	V	-2.9
4882.800000	43.71	---	74.00	30.29	V	-2.9
7324.000000	---	42.51	54.00	11.49	H	3.4
7324.000000	49.75	---	74.00	24.25	H	3.4
12118.000000	---	43.07	54.00	10.93	H	9.1
12118.000000	51.62	---	74.00	22.38	H	9.1
17017.400000	---	42.45	54.00	11.55	V	12.3
17017.400000	53.28	---	74.00	20.72	V	12.3

High Channel: 2478 MHz

Common Information

Project No.:	RKSA240521001
Test Mode:	Transmitting in SRD mode High channel
Standard:	FCC Part 15.205 & FCC Part 15.209 &FCC Part 15.247
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)
1782.000000	---	23.76	54.00	30.24	V	-13.0
1782.000000	32.35	---	74.00	41.65	V	-13.0
2992.400000	---	29.07	54.00	24.93	V	-8.5
2992.400000	38.69	---	74.00	35.31	V	-8.5
4320.100000	---	32.09	54.00	21.91	V	-4.9
4320.100000	40.92	---	74.00	33.08	V	-4.9
7652.100000	---	39.74	54.00	14.26	H	3.9
7652.100000	48.37	---	74.00	25.63	H	3.9
12056.800000	---	43.90	54.00	10.10	V	9.0
12056.800000	51.65	---	74.00	22.35	V	9.0
17998.300000	52.22	---	74.00	21.78	H	12.0
17998.300000	---	46.05	54.00	7.95	H	12.0

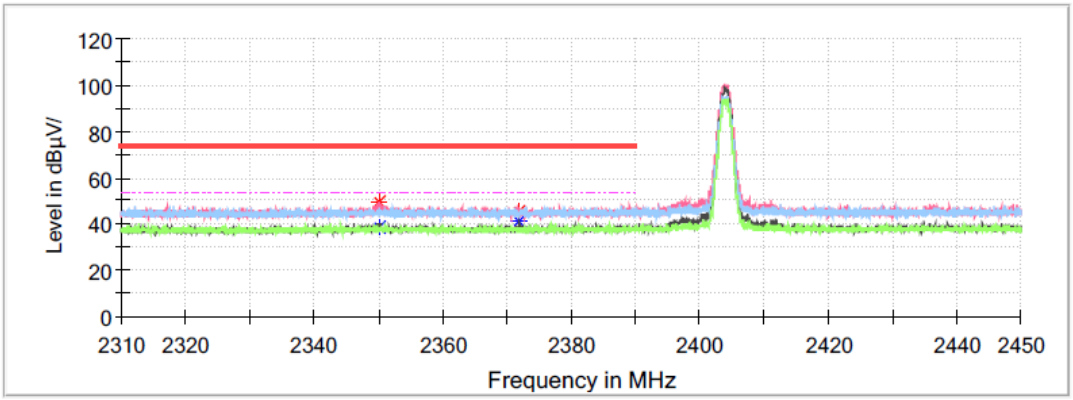
Band Edge:

Left Side

Common Information

Project No.:	RKSA240521001
Test Mode:	Transmitting in SRD mode low channel
Standard:	FCC Part 15.205 & FCC Part 15.209 &FCC Part 15.247
Test Engineer:	Klein Zhu

Full Spectrum



Critical_Freqs

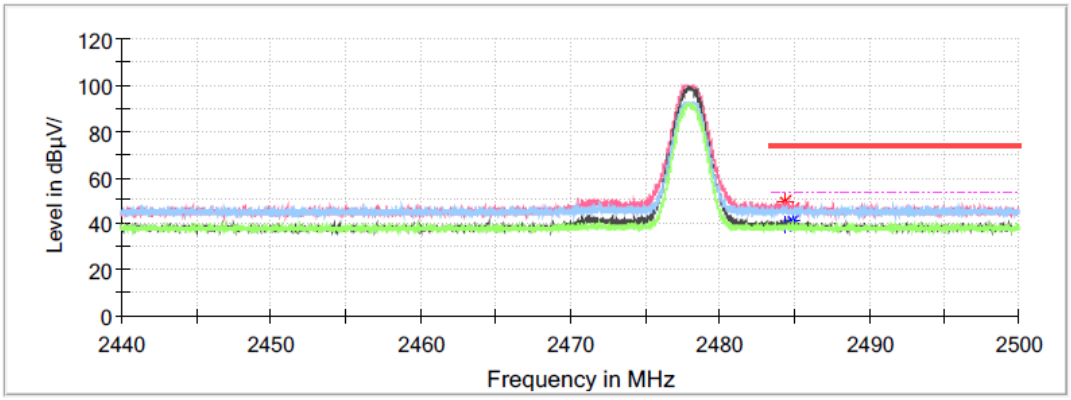
Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
2350.012000	49.90	---	74.00	24.10	V	-0.7
2350.012000	---	38.61	54.00	15.39	V	-0.7
2371.992000	44.95	---	74.00	29.05	V	-0.6
2371.992000	---	40.85	54.00	13.15	V	-0.6

Right Side

Common Information

Project No.:	RKSA240521001
Test Mode:	Transmitting in SRD mode high channel
Standard:	FCC Part 15.205 & FCC Part 15.209 &FCC Part 15.247
Test Engineer:	Klein Zhu

Full Spectrum

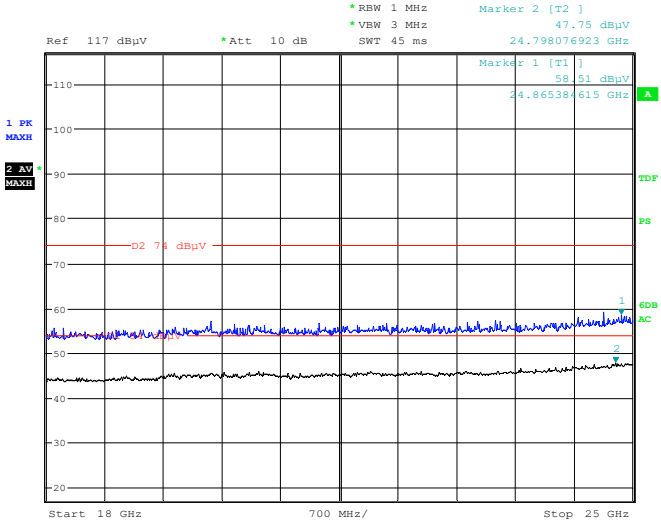


Critical_Freqs

Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
2484.376000	---	39.72	54.00	14.28	V	-0.3
2484.376000	49.23	---	74.00	24.77	V	-0.3
2484.844000	---	41.20	54.00	12.80	V	-0.3
2484.844000	45.98	---	74.00	28.02	V	-0.3

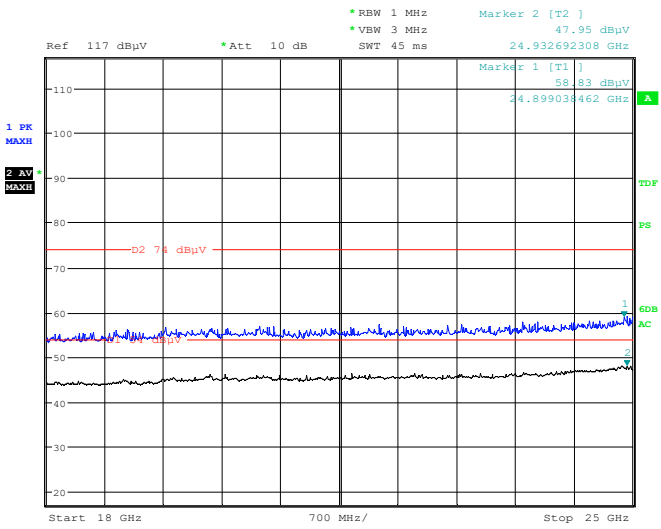
18 GHz - 25 GHz (SRD Mode low channel):

Horizontal



Project No : RKSA240521001 Tester :Hugh Wu
Date: 12.JUN.2024 20:31:10

Vertical



Project No : RKSA240521001 Tester :Hugh Wu
Date: 12.JUN.2024 20:47:08

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

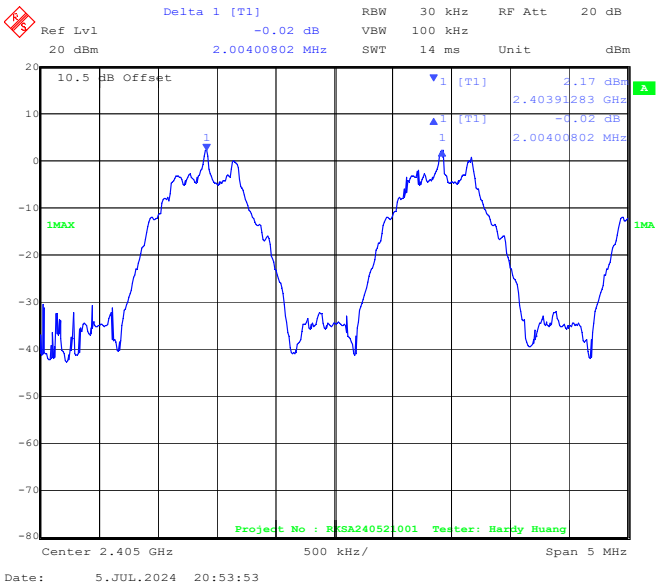
CHANNEL SEPARATION TEST

EUT operation mode: Transmitting

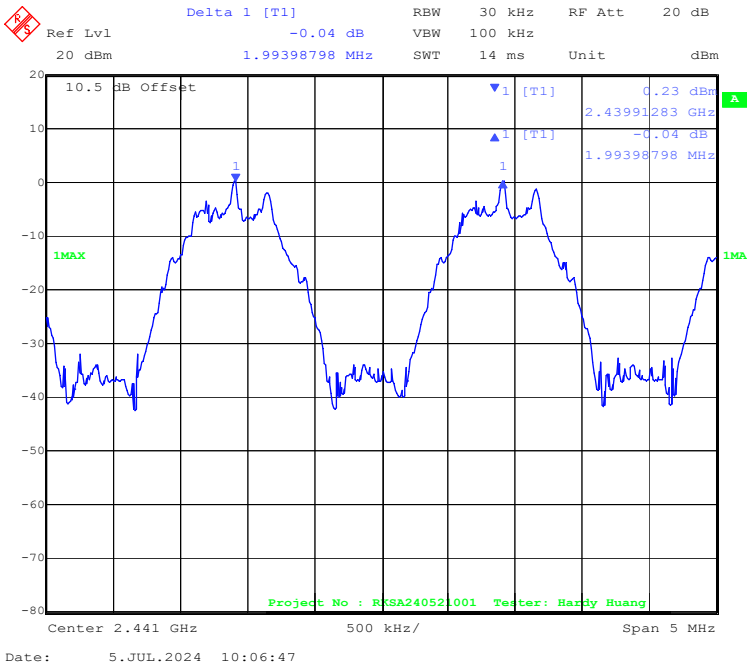
Test Mode	Channel Frequency	Result (MHz)	Limit (MHz)	Verdict
SRD	2404~2406	2.004	≥0.725	PASS
	2442~2444	1.994	≥0.729	PASS
	2476~2478	1.994	≥0.721	PASS

Note: Limit = 20 dB bandwidth*2/3

2404-2406 MHz

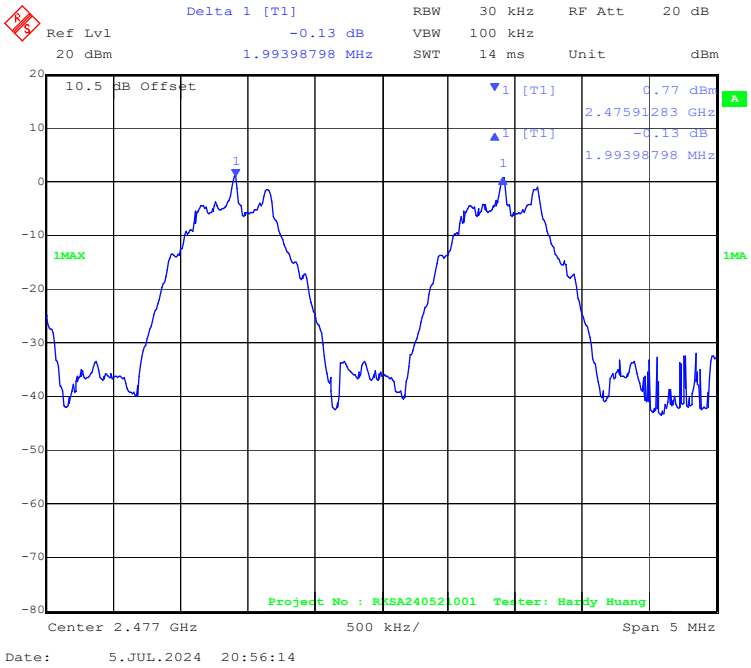


2442-2444 MHz



Date: 5.JUL.2024 10:06:47

2476-2478 MHz



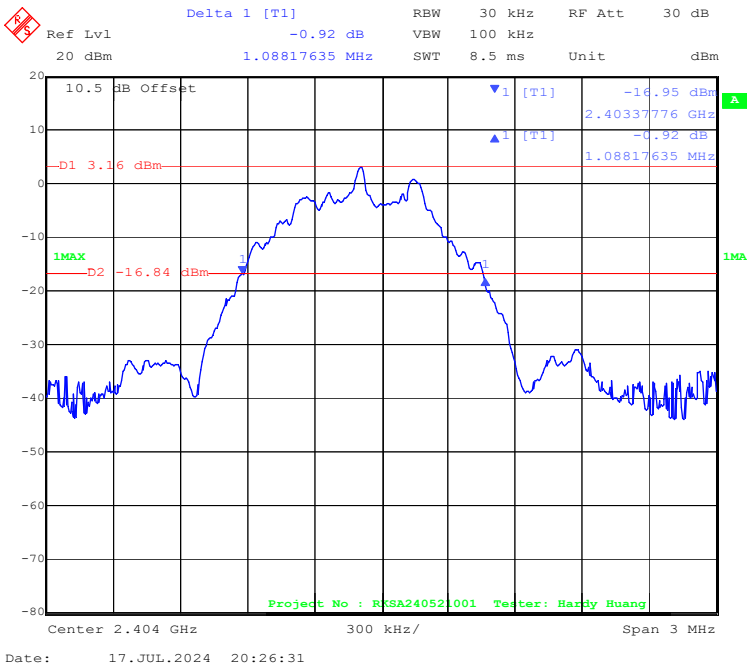
Date: 5.JUL.2024 20:56:14

20 dB BANDWIDTH TEST

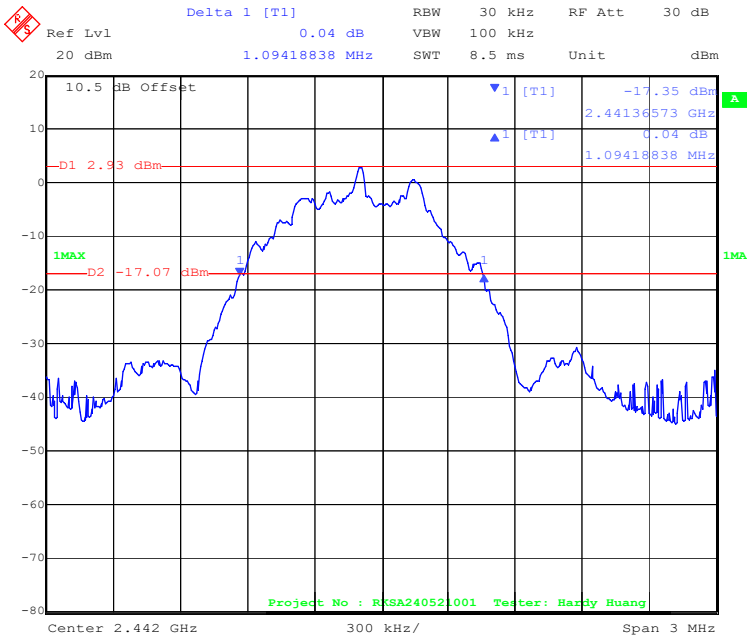
EUT operation mode: Transmitting

Test Mode	Channel (MHz)	20db EBW (MHz)
SRD	2404	1.088
	2442	1.094
	2478	1.082

Channel: 2404 MHz

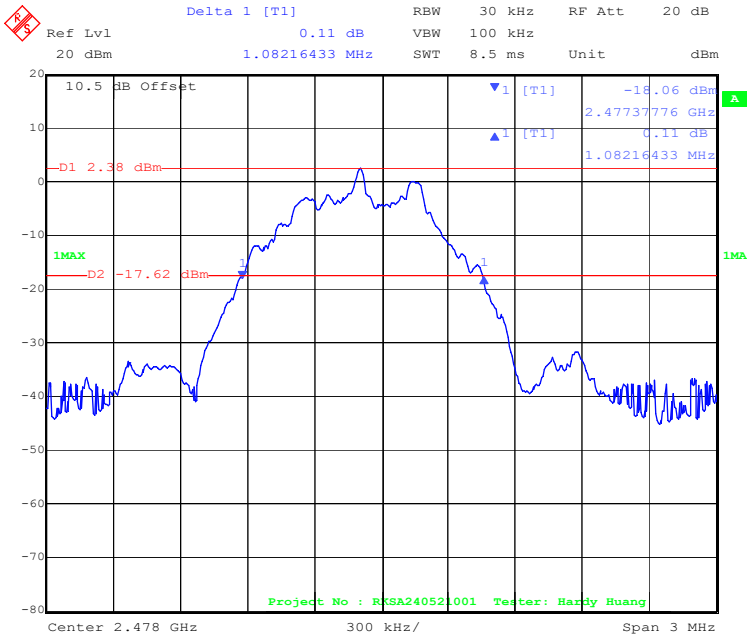


Channel: 2442 MHz



Date: 17.JUL.2024 20:28:25

Channel: 2478 MHz



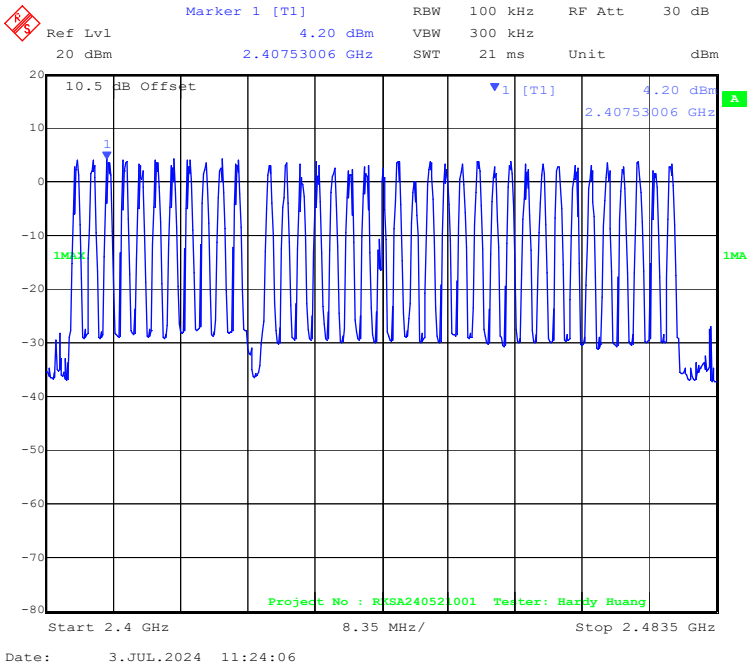
Date: 4.JUL.2024 17:54:01

QUANTITY OF HOPPING CHANNEL TEST

EUT operation mode: Hopping

Test Mode	Channel	Result (Num)	Limit (Num)	Verdict
SRD	Hop	37	≥15	PASS

Number of Hopping Channels

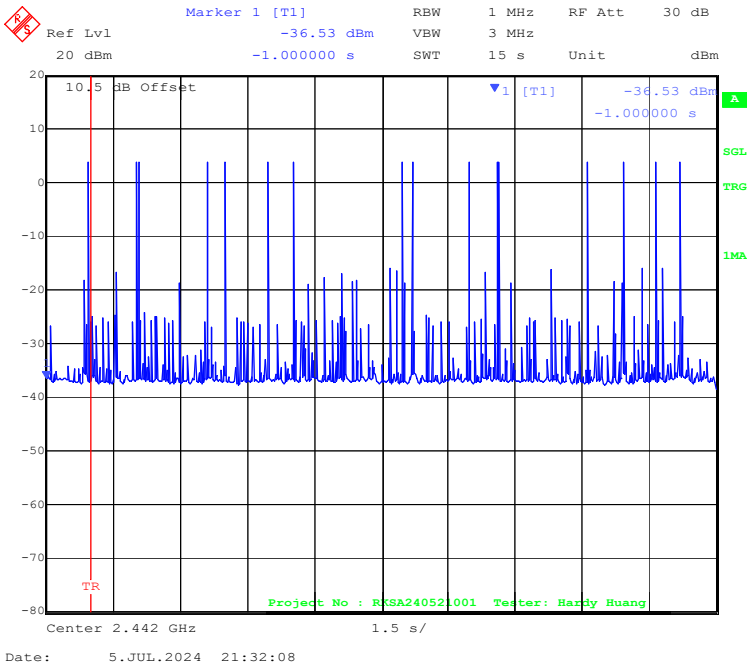


TIME OF OCCUPANCY (DWELL TIME)

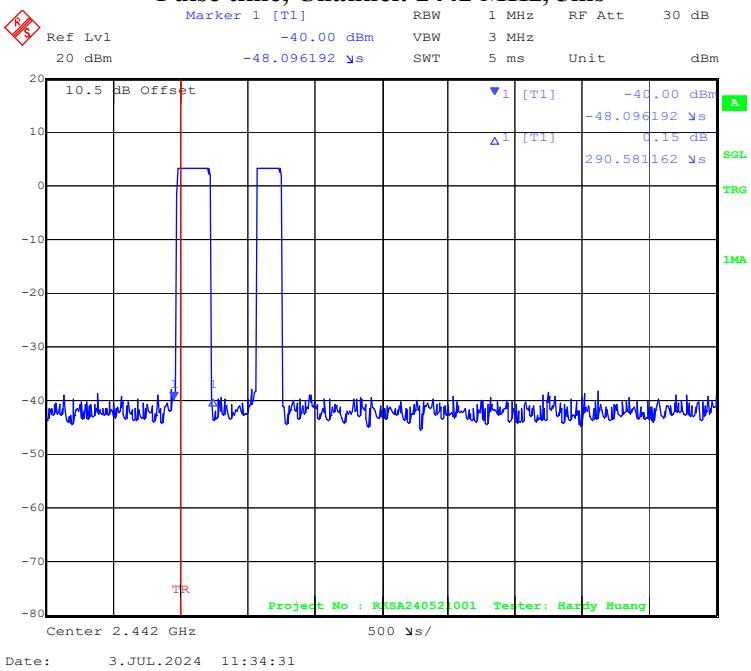
EUT operation mode: Hopping

Test Mode	Channel	BurstWidth (ms)	TotalHops (Num)	Result (s)	Limit (s)	Verdict
SRD	2442	0.51	14	0.00714	≤0.4	PASS

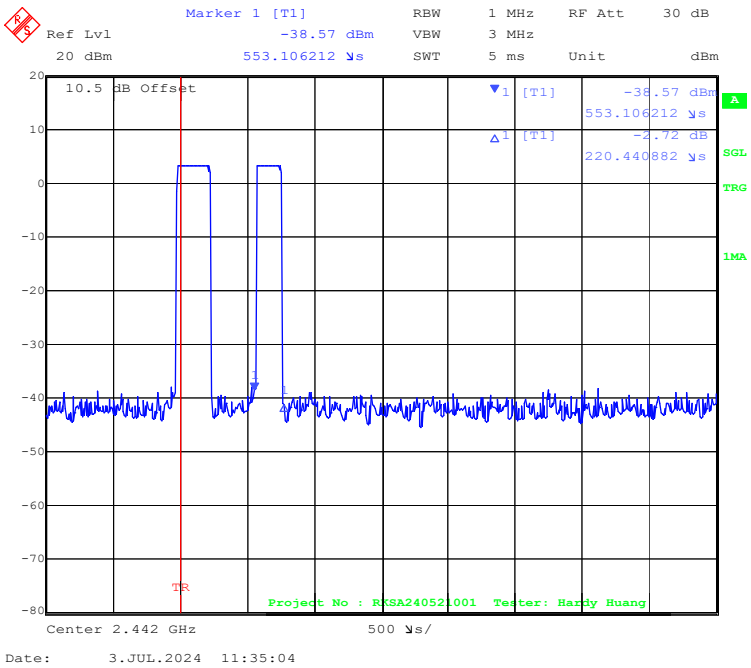
Pulse time, Channel: 2442 MHz, 14.8s



Pulse time, Channel: 2442 MHz, 5ms



Pulse time, Channel: 2442 MHz, 5ms



PEAK OUTPUT POWER MEASUREMENT

EUT operation mode: Transmitting

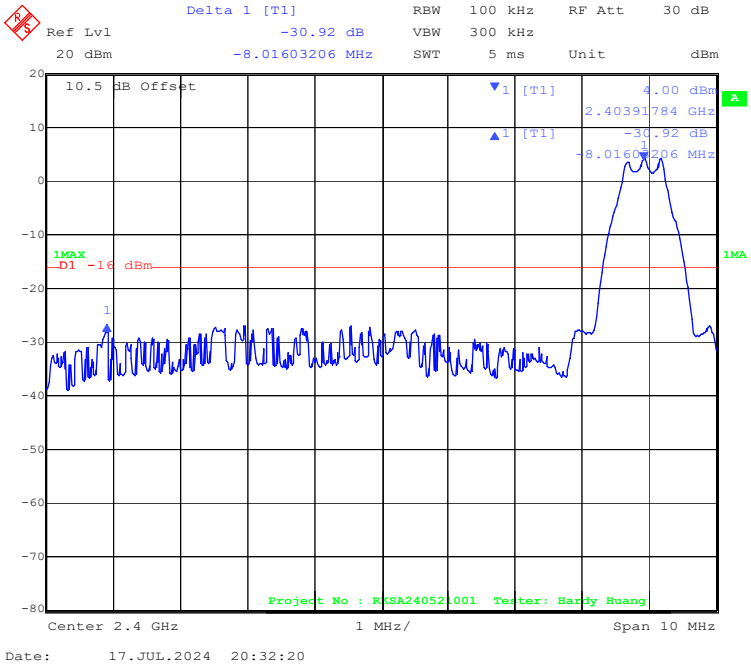
Mode	Channel	Frequency (MHz)	Result (dBm)	Limit (dBm)
SRD	Low	2404	4.37	20.97
	Middle	2442	4.25	
	High	2478	4.89	

BAND EDGES

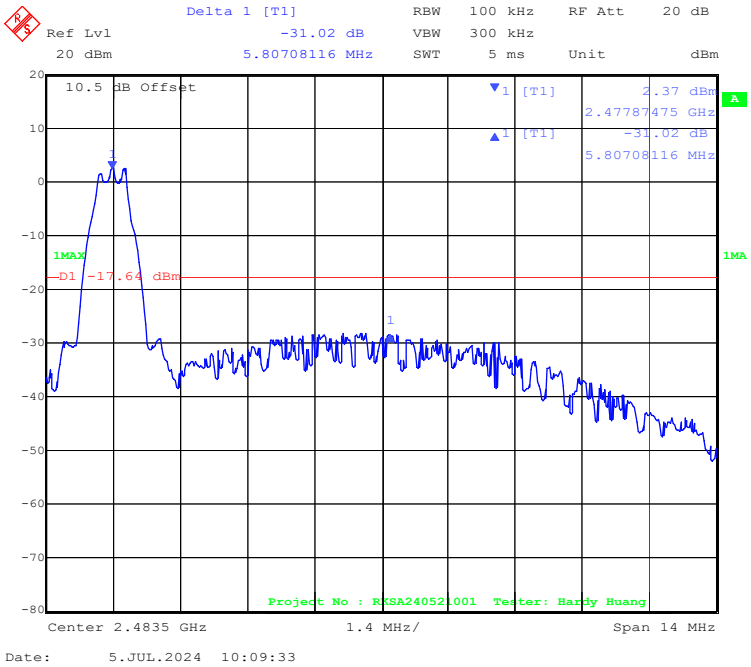
EUT operation mode: Transmitting & Hopping
Test Result: Compliant.

Band Edge

Left Side - Transmitting

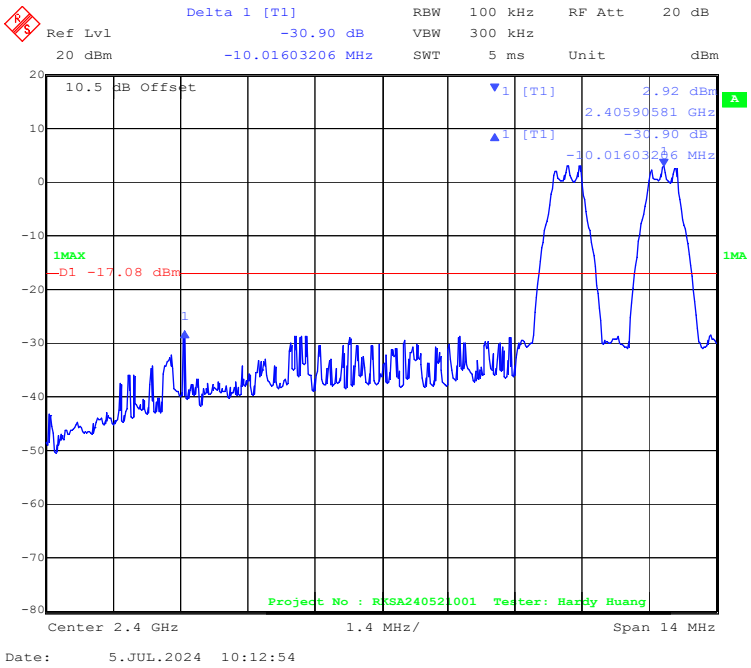


Right Side - Transmitting

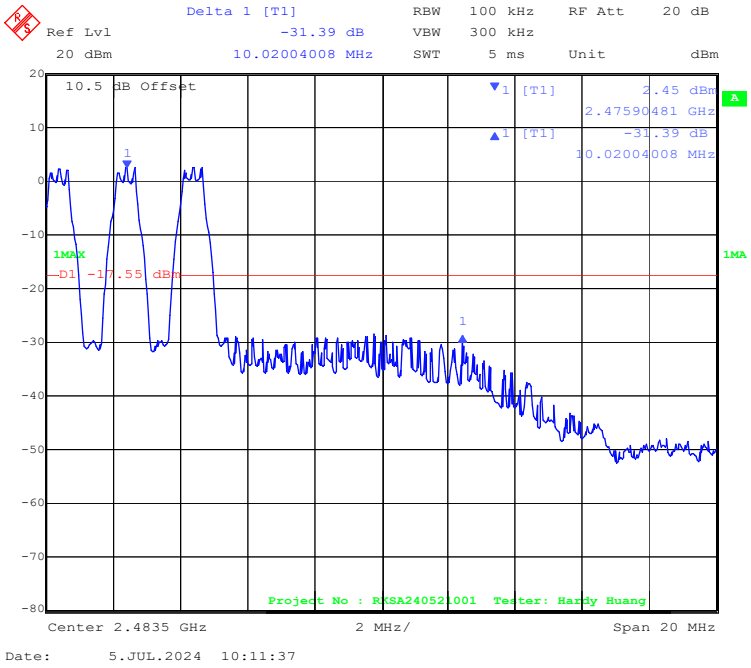


Band Edge

Left Side - Hopping



Right Side - Hopping



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 *******