

FCC PART 15.247

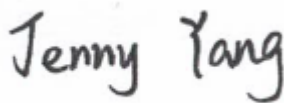
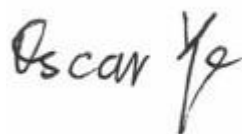
TEST REPORT

For

SwamCam LLC.

261 West Nyack Rd, West Nyack, New York, United States

FCC ID: 2AYO8-SCDS1

Report Type: Original Report	Product Name: Swamcam Door Sensor
Report Number: <u>RKSA240527001-00A</u>	
Report Date: <u>2024-09-23</u>	
Reviewed By: <u>Jenny Yang</u>	
Approved By: <u>Oscar Ye</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	RKSA240527001-00A	R1V1	2024-09-23	Initial Release

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant:	SwamCam LLC.
Tested Model:	SCDS1
Product Name:	Swamcam Door Sensor
Power Supply:	DC 3V
RF Function:	Zigbee
Maximum Peak Output Power:	2.88 dBm
Operating Band /Frequency:	2405-2480 MHz
Modulation Type:	O-QPSK
Channel Number:	16
Antenna Type:	PPC Antenna
★Maximum Antenna Gain:	2.7 dBi

Note: The maximum antenna gain is provided by the applicant.

All measurement and test data in this report was gathered from production sample serial number: RKSA240527001-1 (Assigned by the BACL (Kunshan). The EUT supplied by the applicant was received on 2024-05-27.)

Objective

This report is prepared for *SwamCam LLC.* in accordance with Part 2-Subpart J, Part 15-Subparts A and C of the Federal Communications Commission rules.

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

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices and FCC KDB 558074 D01 15.247 Meas Guidance v05r02.

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

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 emissions	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 for Zigbee mode:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
11	2405	19	2445
12	2410	20	2450
13	2415	21	2455
14	2420	22	2460
15	2425	23	2465
16	2430	24	2470
17	2435	25	2475
18	2440	26	2480

EUT was tested with channel 11, 18 and 26.

EUT Exercise Software

RF Test Tool: engineering mode

★Power level: Default

Note: The power level was declared by the applicant.

Special Accessories

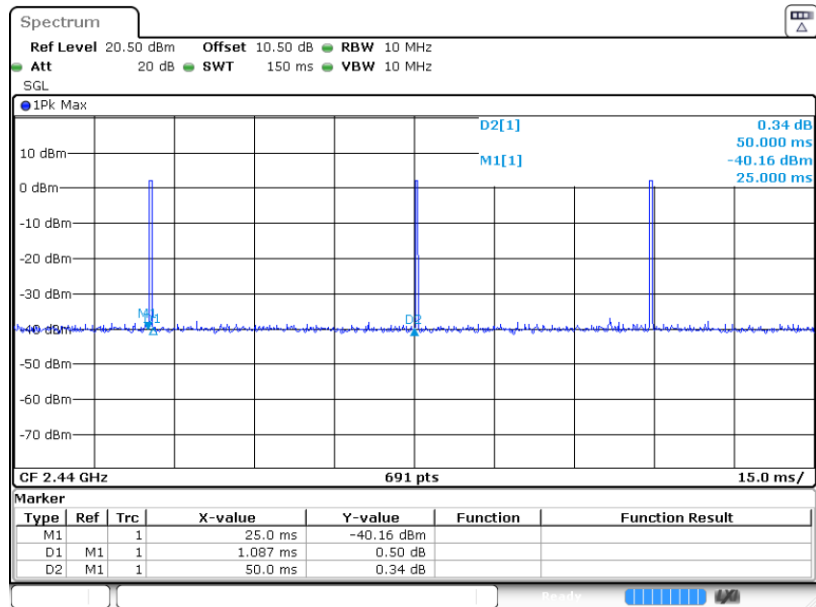
No special accessory.

Equipment Modifications

No modification was made to the EUT tested.

Duty Cycle:

Middle Channel



Project No.: RKSA240527001 Tester: Jason Lu
Date: 5 JUN 2024 14:34:52

Mode	Duty Cycle (%)	T _{on} (ms)	T _{on+off} (ms)	10log(1/x)
Zigbee	2.17	1.087	50	16.64

Note: “x” means the Duty Cycle.

Support Equipment List and Details

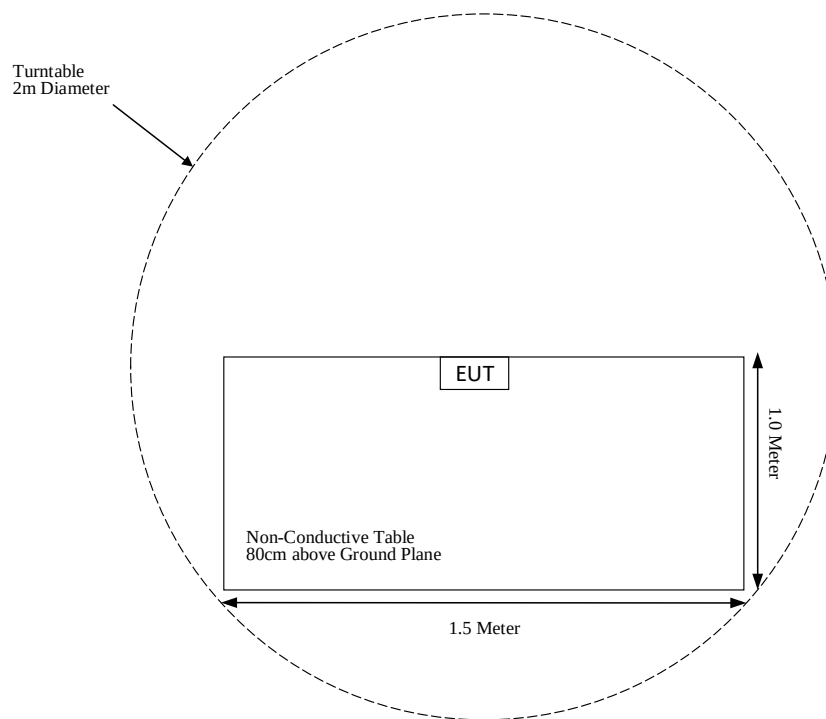
Manufacturer	Description	Model	Serial Number
/	/	/	/

External I/O Cable

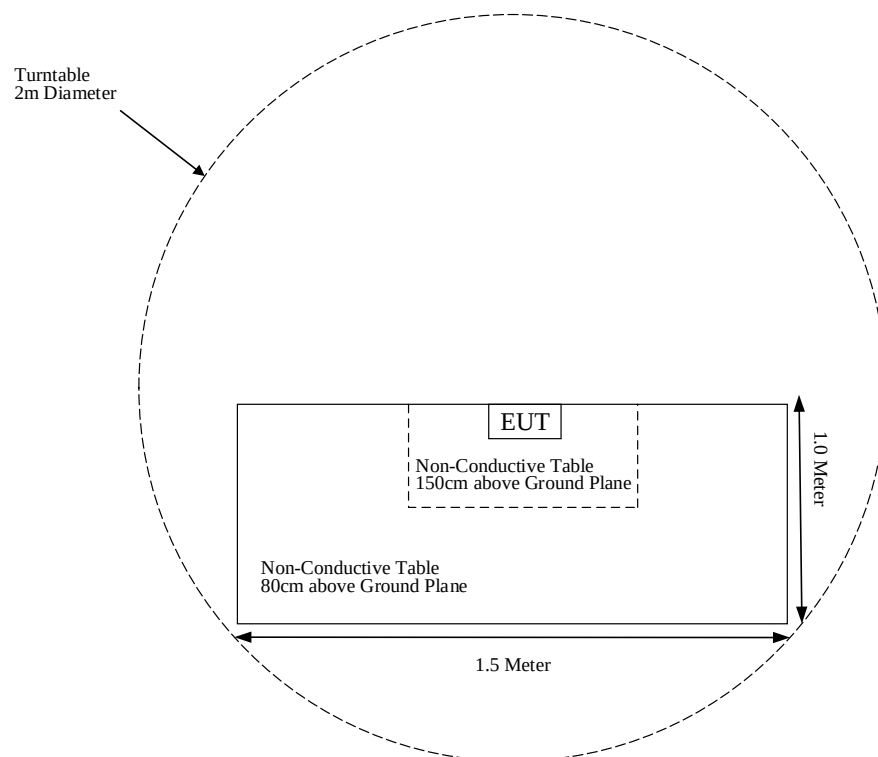
Cable Description	Length (m)	From Port	To
/	/	/	/

Block Diagram of Test Setup

For Radiated Emissions(Below 1 GHz):



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
ETS-LINDGREN	Loop Antenna	6512	108100	2023-11-09	2024-11-08
Narda	6 dB Attenuator	773-6	10690812-2-3	2023-11-11	2024-11-10
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
MICRO-TRONICS	Band Reject Filter	BRM50702	G024	2024-04-25	2025-04-24
Narda	Attenuator	10dB	010	2024-04-25	2025-04-24
SELECTOR	Amplifier	EM18G40G	60726	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
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
XHFDZ	RG178 Coaxial Cable	SMA-178	XHF-1102	Each time	N/A

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	Not Applicable (See Note)
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliant
§15.247 (a)(2)	6 dB Emission Bandwidth	Compliant
§15.247(b)(3)	Maximum Conducted Output Power	Compliant
§15.247(d)	Band Edge	Compliant
§15.247(e)	Power Spectral Density	Compliant

Note: The EUT powered by battery.

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)			
Zigbee	2405~2480	2.7	1.86	3.0	2.00	20	0.0007	1.0

Note:

1. For the above tune up power were declared by the manufacturer.

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.

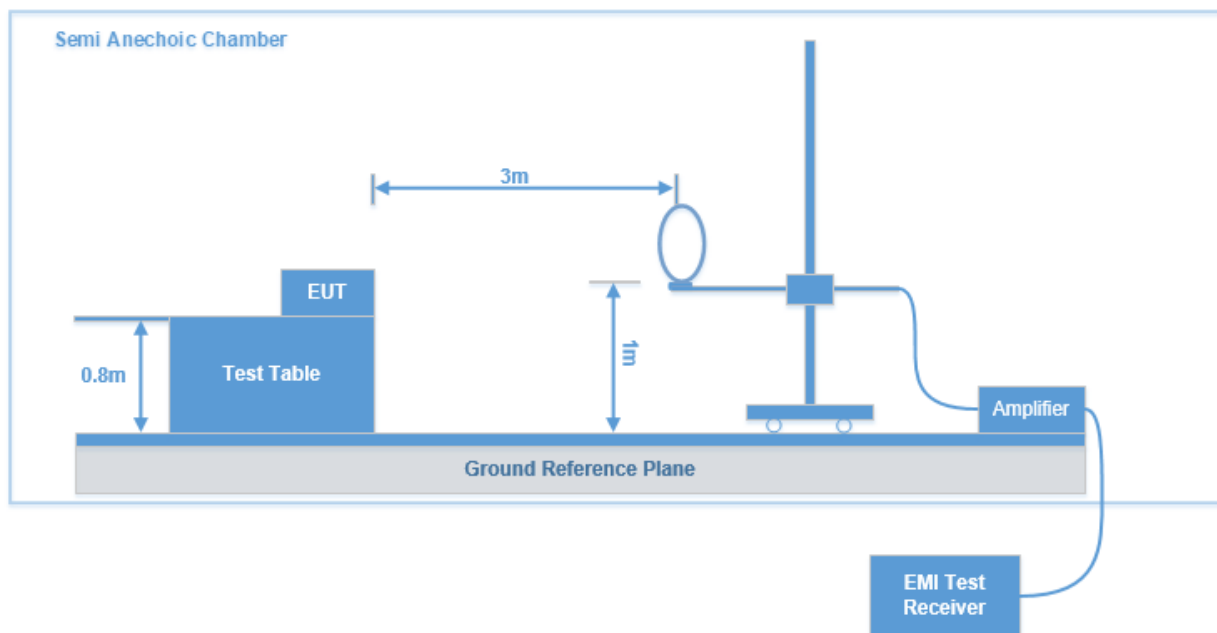
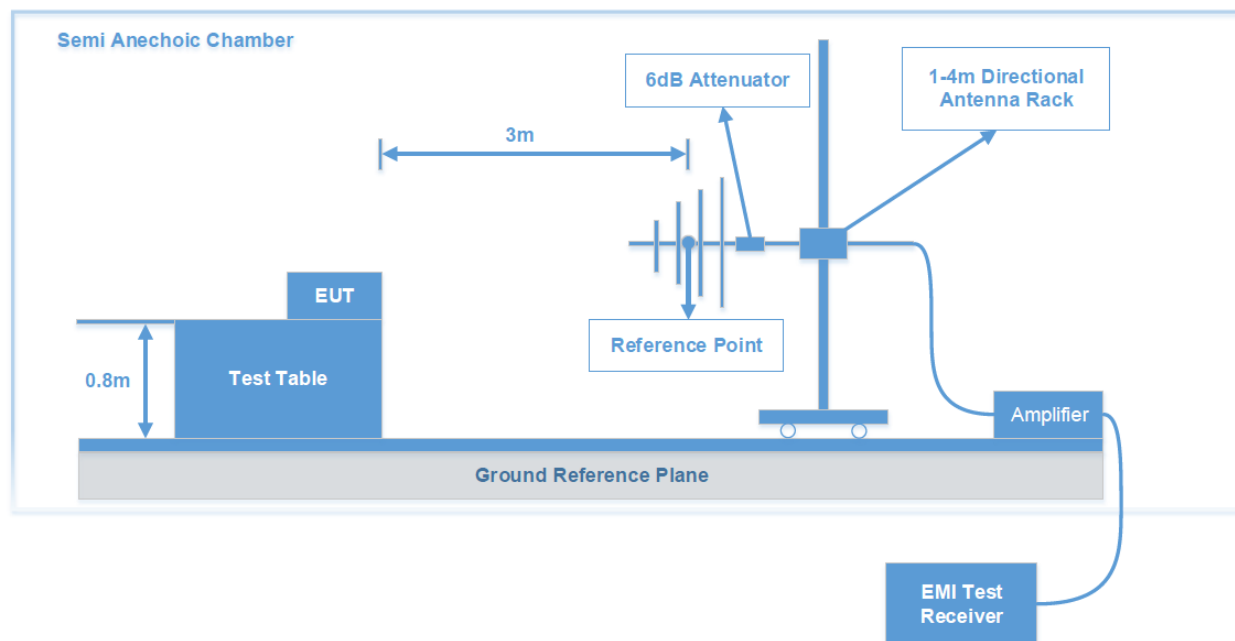
Antenna Connector Construction

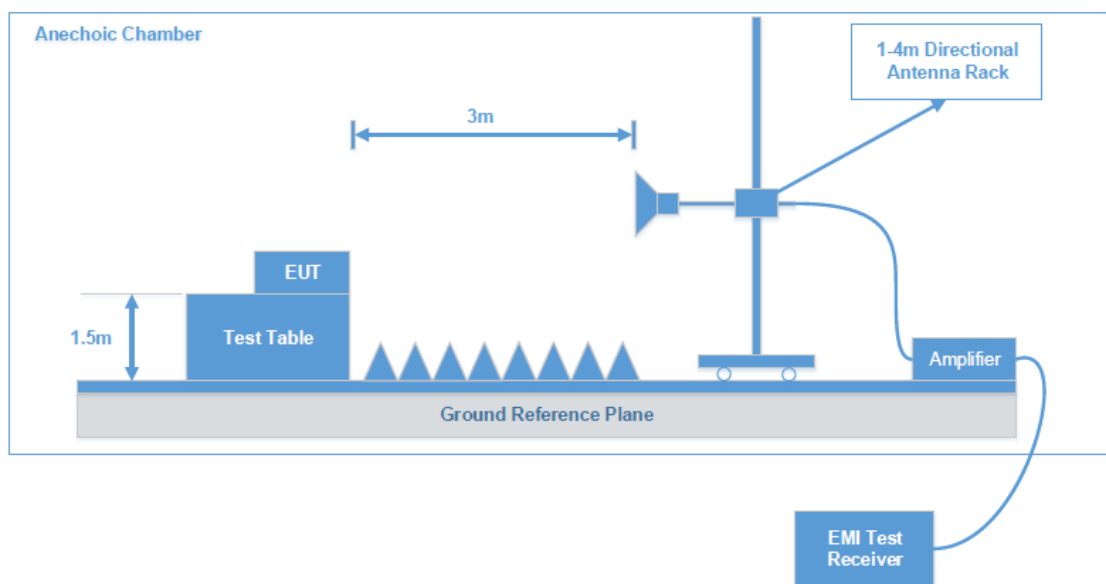
The EUT has an FPC antenna for Zigbee, and the antenna gain is 2.7 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

Result: Compliant.

FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS**Applicable Standard**

FCC §15.247 (d); §15.209; §15.205;

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

Above 1 GHz:

The radiated emission tests were performed in the 3 meters test site, 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

For 9 kHz-30 MHz 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.

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.

Corrected Amplitude & Margin Calculation

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

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

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

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

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

Test Results Summary

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

Test Data: See Appendix

FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH

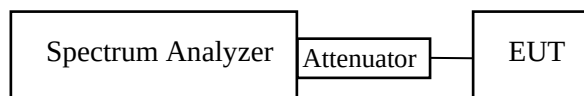
Applicable Standard

Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

Test Procedure

According to ANSI C63.10-2013 sub-clause 11.8.1

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) $\geq 3 * \text{RBW}$.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.



Test Data: See Appendix

FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER

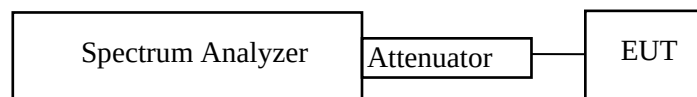
Applicable Standard

According to FCC §15.247(b) (3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

Test Procedure

According to ANSI C63.10-2013 sub-clause 11.9.1.1

1. Set the RBW $\geq$ DTS bandwidth.
2. Set VBW $\geq 3 * \text{RBW}$.
3. Set span $\geq 3 * \text{RBW}$
4. Sweep time = auto couple.
5. Detector = peak.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use peak marker function to determine the peak amplitude level.



Test Data: See Appendix

FCC §15.247(d) – BAND EDGE

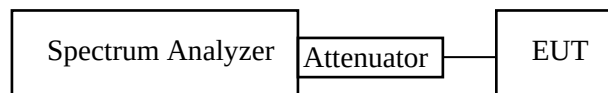
Applicable Standard

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 C63.10-2013 sub-clause 6.10.

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.



Test Data: See Appendix

FCC §15.247(e) - POWER SPECTRAL DENSITY

Applicable Standard

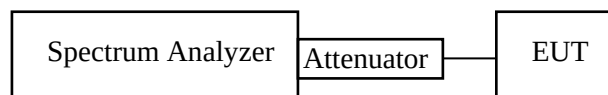
For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

Test Procedure

According to ANSI C63.10-2013 sub-clause 11.10.2

The following procedure shall be used if maximum peak conducted output power was used to determine compliance, and it is optional if the maximum conducted (average) output power was used to determine compliance:

1. Set the RBW to: $3\text{kHz} \leq \text{RBW} \leq 100\text{ kHz}$.
2. Set the VBW $\geq 3 * \text{RBW}$.
3. Set the span to 1.5 times the DTS bandwidth.
4. Detector = peak.
5. Sweep time = auto couple.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use the peak marker function to determine the maximum amplitude level within the RBW.
9. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.



Test Data: See Appendix

Appendix - TEST DATA

Environmental Conditions & Test Information

Test Item:	SPURIOUS EMISSIONS		
	9kHz - 1GHz	1 GHz - 18 GHz	18 GHz - 25 GHz
Test Date:	2024-06-06	2024-06-13	2024-09-23
Temperature:	19.4 °C	20.3 °C	22.3 °C
Relative Humidity:	58 %	52 %	52 %
ATM Pressure:	100.5 kPa	100.5 kPa	101.6 kPa
Test Result:	Pass	Pass	Pass
Test Engineer:	Leah Li	Hugh Wu	Hugh Wu

Test Item:	DUTY CYCLE	6 DB EMISSION BANDWIDTH	MAXIMUM CONDUCTED OUTPUT POWER	BAND EDGE	POWER SPECTRAL DENSITY
Test Date:	2024-06-05	2024-06-05	2024-06-05	2024-06-05	2024-06-05
Temperature:	21.2 °C	21.2 °C	21.2 °C	21.2 °C	21.2 °C
Relative Humidity:	55 %	55 %	55 %	55 %	55 %
ATM Pressure:	100.4 kPa	100.4 kPa	100.4 kPa	100.4 kPa	100.4 kPa
Test Result:	Pass	Pass	Pass	Pass	Pass
Test Engineer:	Jason Lu	Jason Lu	Jason Lu	Jason Lu	Jason Lu

SPURIOUS EMISSIONS

Test Result: Compliant.

EUT operation mode: Transmitting

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

9 kHz-30MHz: (Transmitting in maximum output power Zigbee mode and high channel)

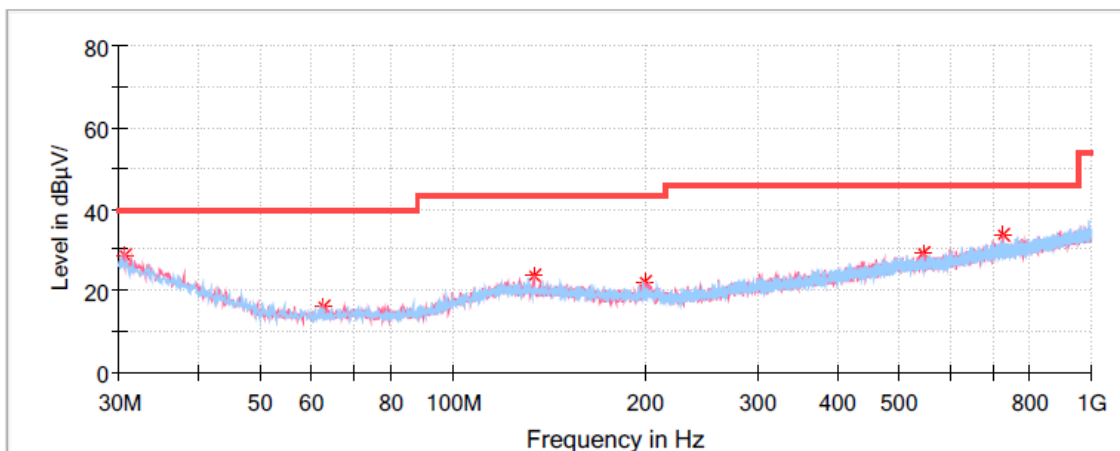
The amplitude of spurious emissions attenuated more than 20 dB below the limit was not be recorded.

30 MHz-1 GHz:

Low Channel: 2405 MHz

Common Information

Project No:	RKSA240527001
Test Mode:	Transmitting in ZigBee mode low channel
Standard:	FCC Part 15.205 & FCC Part 15.209& FCC Part 15.247
Test Engineer:	Leah Li

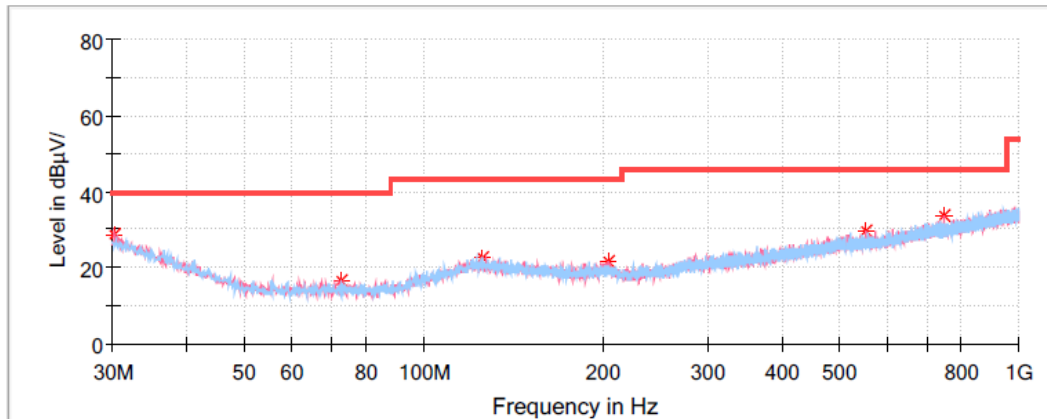


Critical Freqs

Frequency (MHz)	MaxPeak (dBμ V/m)	Limit (dBμ V/m)	Margin (dB)	Pol	Corr. (dB/m)
30.727500	28.61	40.00	11.39	V	-5.2
62.980000	16.24	40.00	23.76	V	-17.4
133.790000	23.56	43.50	19.94	V	-11.2
200.235000	22.26	43.50	21.24	V	-12.2
545.312500	29.04	46.00	16.96	V	-4.9
729.370000	33.56	46.00	12.44	V	-1.7

Middle Channel: 2440 MHz**Common Information**

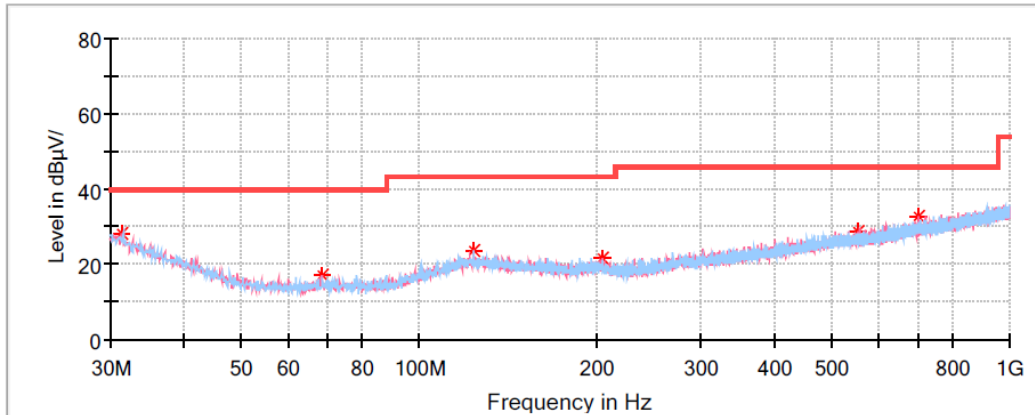
Project No: RKSA240527001
 Test Mode: Transmitting in ZigBee mode middle channel
 Standard: FCC Part 15.205 & FCC Part 15.209 & FCC Part 15.247
 Test Engineer: Leah Li

**Critical Freqs**

Frequency (MHz)	MaxPeak (dBμ V/m)	Limit (dBμ V/m)	Margin (dB)	Pol	Corr. (dB/m)
30.242500	28.70	40.00	11.30	V	-4.9
72.801250	16.52	40.00	23.48	V	-17.1
125.545000	22.50	43.50	21.00	H	-11.0
203.993750	21.78	43.50	21.72	V	-12.5
554.527500	29.55	46.00	16.45	V	-4.8
747.193750	33.77	46.00	12.23	V	-1.5

High Channel:2480 MHz**Common Information**

Project No: RKSA240527001
Test Mode: Transmitting in ZigBee mode high channel
Standard: FCC Part 15.205 & FCC Part 15.209& FCC Part 15.247
Test Engineer: Leah Li

**Critical_Freqs**

Frequency (MHz)	MaxPeak (dBμ V/m)	Limit (dBμ V/m)	Margin (dB)	Pol	Corr. (dB/m)
31.333750	28.08	40.00	11.92	V	-5.6
68.678750	17.35	40.00	22.65	V	-17.1
123.968750	23.81	43.50	19.69	H	-11.0
204.357500	21.59	43.50	21.91	V	-12.5
553.800000	28.87	46.00	17.13	V	-4.8
702.937500	32.92	46.00	13.08	V	-1.9

1GHz-18GHz:**Low Channel: 2405 MHz****Common Information**

Project No.:

RKSA240527001

Test Mode:

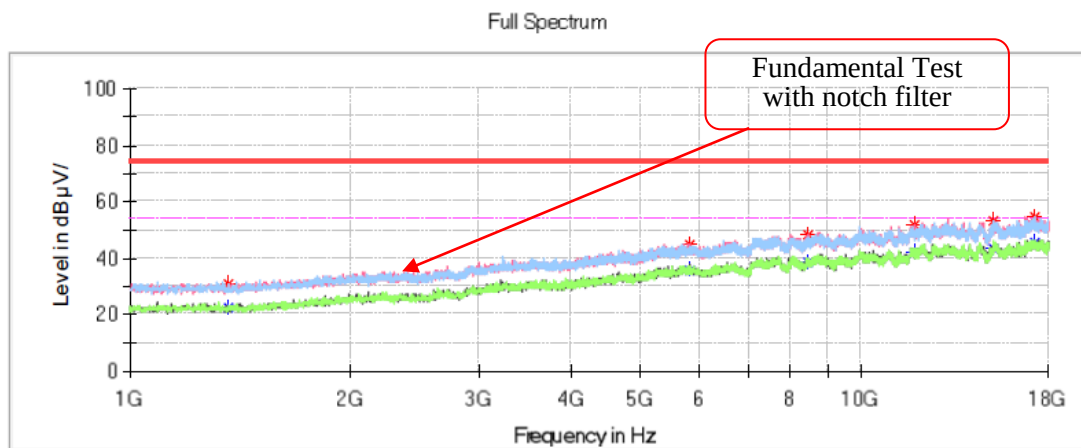
Zigbee mode of low channel

Standard:

FCC Part 15.205&FCC Part 15.209&FCC Part 15.247

Test Engineer:

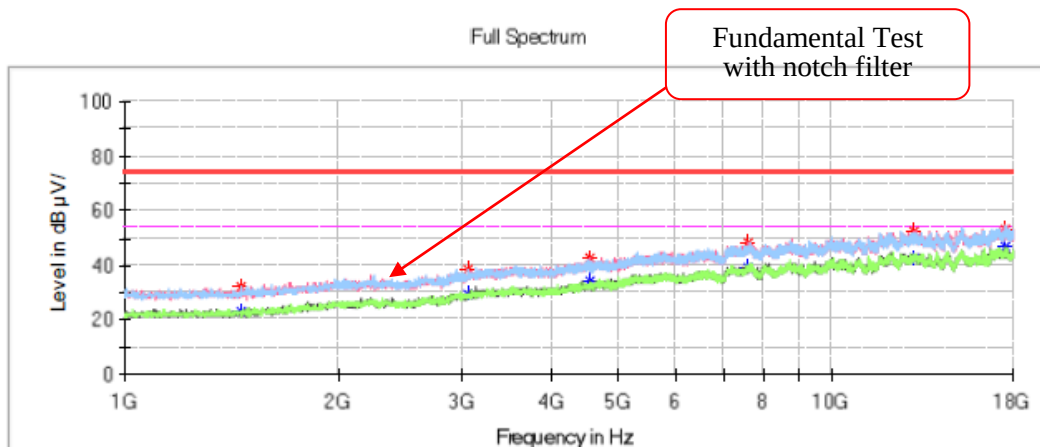
Hugh Wu

**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)
1362.100000	30.59	---	74.00	43.41	H	-14.9
1362.100000	---	22.41	54.00	31.59	H	-14.9
5834.800000	44.87	---	74.00	29.13	V	-0.1
5834.800000	---	35.89	54.00	18.11	V	-0.1
8449.400000	48.48	---	74.00	25.52	V	5.3
8449.400000	---	38.48	54.00	15.52	V	5.3
11806.900000	52.03	---	74.00	21.97	V	8.9
11806.900000	---	42.11	54.00	11.89	V	8.9
15094.700000	53.38	---	74.00	20.62	V	9.4
15094.700000	---	43.08	54.00	10.92	V	9.4
17207.800000	---	45.64	54.00	8.36	V	12.0
17207.800000	54.39	---	74.00	19.61	V	12.0

Middle Channel: 2440 MHz**Common Information**

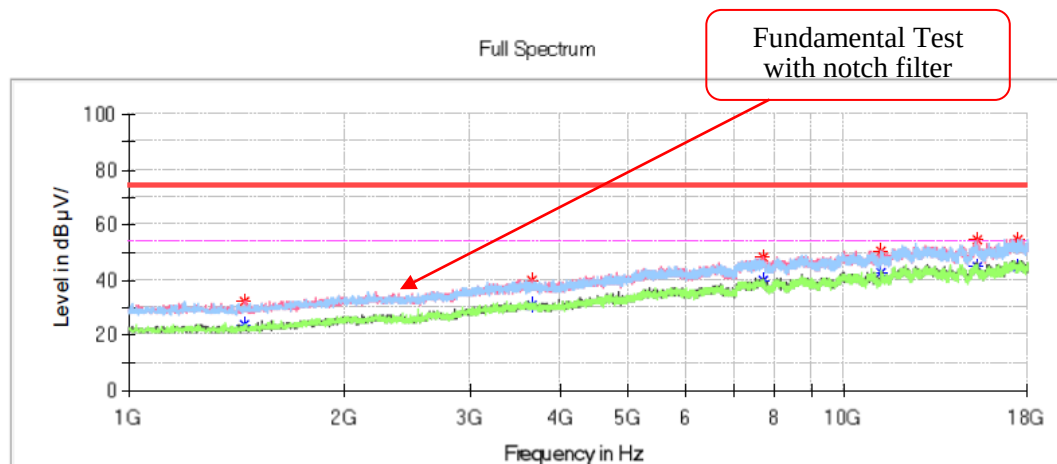
Project No.: RKSA240527001
 Test Mode: Zigbee mode of middle channel
 Standard: FCC Part 15.205&FCC Part 15.209&FCC Part 15.247
 Test Engineer: Hugh Wu

**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)
1459.000000	32.17	---	74.00	41.83	H	-14.8
1459.000000	---	23.07	54.00	30.93	H	-14.8
3060.400000	38.71	---	74.00	35.29	H	-8.2
3060.400000	---	29.29	54.00	24.71	H	-8.2
4542.800000	42.78	---	74.00	31.22	V	-4.1
4542.800000	---	34.48	54.00	19.52	V	-4.1
7607.900000	---	39.47	54.00	14.53	V	3.9
7607.900000	48.20	---	74.00	25.80	V	3.9
13075.100000	---	42.94	54.00	11.06	V	9.7
13075.100000	52.28	---	74.00	21.72	V	9.7
17600.500000	53.03	---	74.00	20.97	V	11.6
17600.500000	---	47.20	54.00	6.80	V	11.6

High Channel: 2480 MHz**Common Information**

Project No.: RKSA240527001
 Test Mode: Zigbee mode of high channel
 Standard: FCC Part 15.205&FCC Part 15.209&FCC Part 15.247
 Test Engineer: Hugh Wu

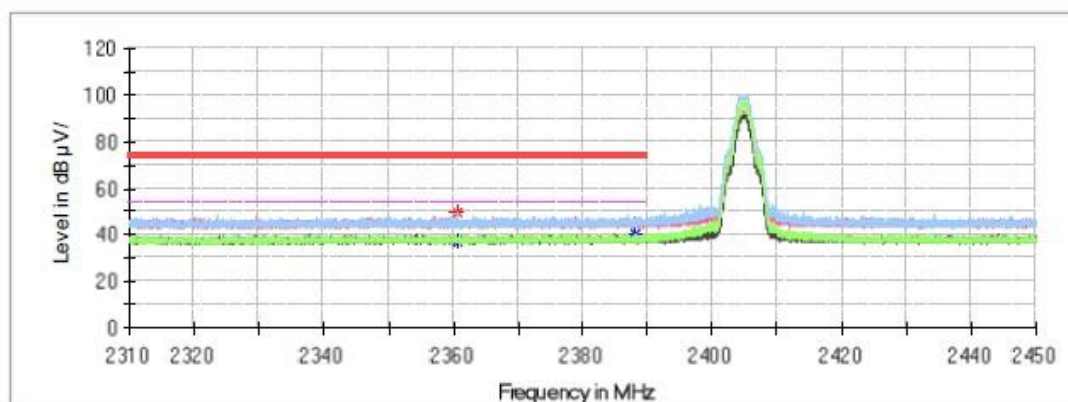
**Critical_Freqs**

Frequency (MHz)	MaxPeak (dB μ V/m)	Average (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Pol	Corr. (dB/m)
1453.900000	32.48	---	74.00	41.52	V	-14.8
1453.900000	---	23.64	54.00	30.36	V	-14.8
3658.800000	39.55	---	74.00	34.45	V	-6.2
3658.800000	---	30.57	54.00	23.43	V	-6.2
7679.300000	47.93	---	74.00	26.07	V	3.9
7679.300000	---	40.04	54.00	13.96	V	3.9
11208.500000	50.59	---	74.00	23.41	V	8.0
11208.500000	---	42.52	54.00	11.48	V	8.0
15298.700000	54.42	---	74.00	19.58	V	9.6
15298.700000	---	44.66	54.00	9.34	V	9.6
17473.000000	---	44.42	54.00	9.58	H	11.6
17473.000000	54.88	---	74.00	19.12	H	11.6

Restricted Bands Emission:**Left Side****Common Information**

Project No.: RKSA240527001
Test Mode: Zigbee mode of low channel
Standard: FCC Part 15.205&FCC Part 15.209&FCC Part 15.247
Test Engineer: Hugh Wu

Full Spectrum

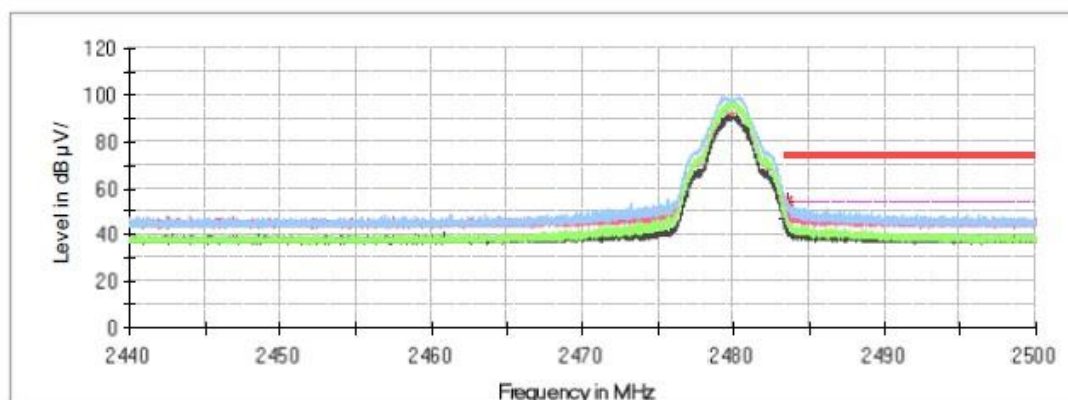
**Critical Freqs**

Frequency (MHz)	MaxPeak (dB μ V/m)	Average (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Pol	Corr. (dB/m)
2360.610000	49.67	---	74.00	24.33	H	-0.7
2360.610000	---	37.04	54.00	16.96	H	-0.7
2388.106000	44.79	---	74.00	29.21	H	-0.6
2388.106000	---	40.54	54.00	13.46	H	-0.6

Right Side**Common Information**

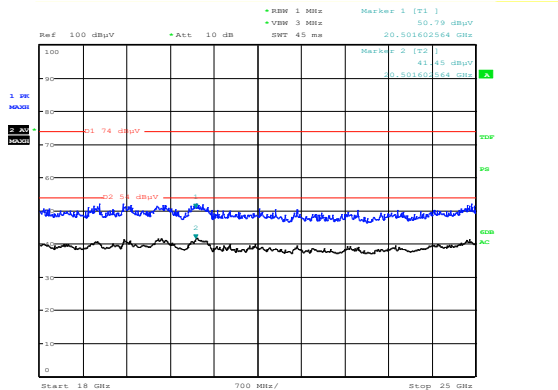
Project No.: RKSA240527001
Test Mode: Zigbee mode of high channel
Standard: FCC Part 15.205&FCC Part 15.209&FCC Part 15.247
Test Engineer: Hugh Wu

Full Spectrum

**Critical Freqs**

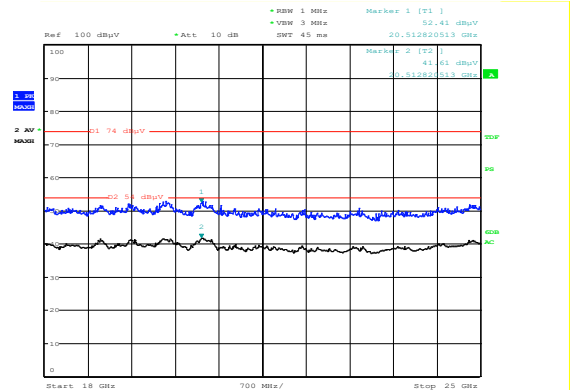
Frequency (MHz)	MaxPeak (dB μ V/m)	Average (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Pol	Corr. (dB/m)
2483.554000	---	47.13	54.00	6.87	H	-0.3
2483.554000	52.85	---	74.00	21.15	H	-0.3
2483.560000	---	46.59	54.00	7.41	H	-0.3
2483.560000	54.22	---	74.00	19.78	H	-0.3

**18 GHz - 25 GHz (high channel was worst):
Horizontal**



Project No :RKSA240527001
Date: 23.SEP.2024 14:17:22
Tester :Hugh Wu

Vertical



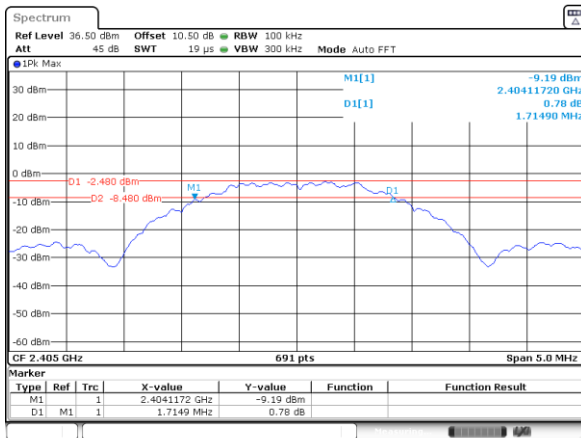
Project No :RKSA240527001
Date: 23.SEP.2024 14:31:29
Tester :Hugh Wu

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

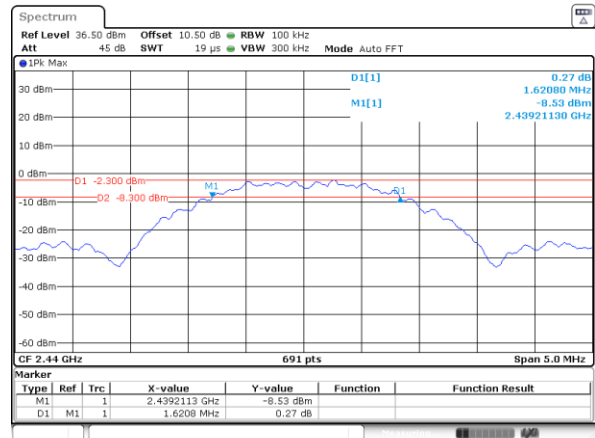
6 dB EMISSION BANDWIDTH

Mode	Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	Limit (MHz)
Zigbee	Low	2405	1.715	≥ 0.5
	Middle	2440	1.621	≥ 0.5
	High	2480	1.585	≥ 0.5

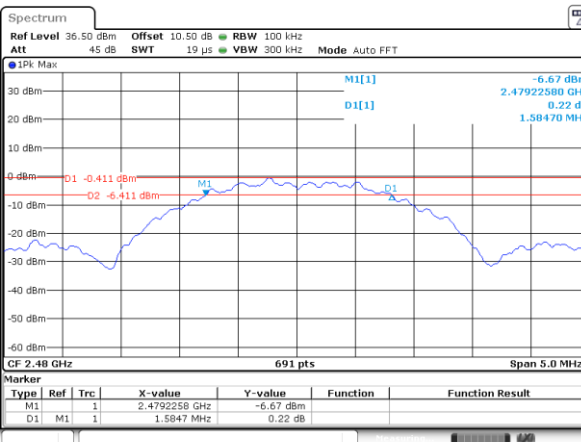
Low Channel



Middle Channel

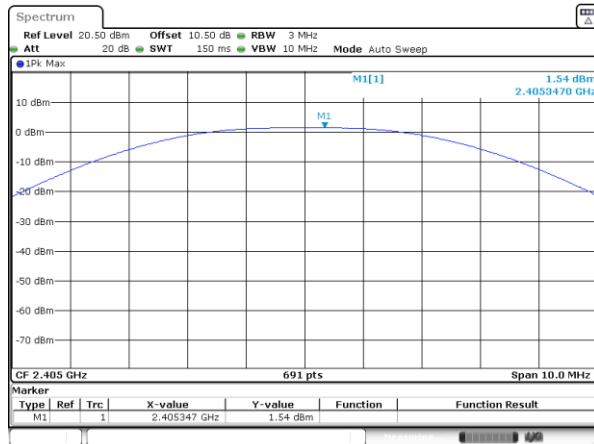


High Channel

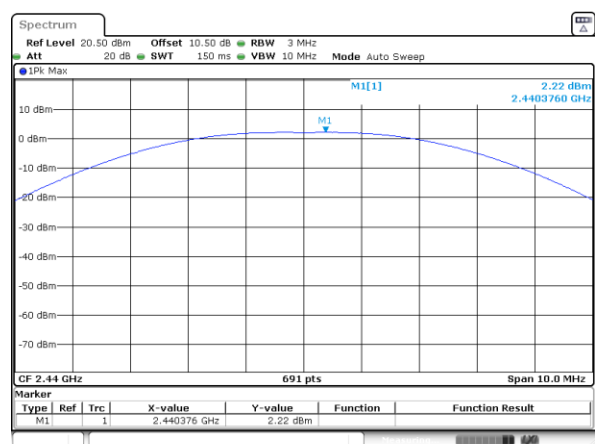


MAXIMUM CONDUCTED OUTPUT POWER**Test Result:** Compliant.*EUT operation mode: Transmitting*

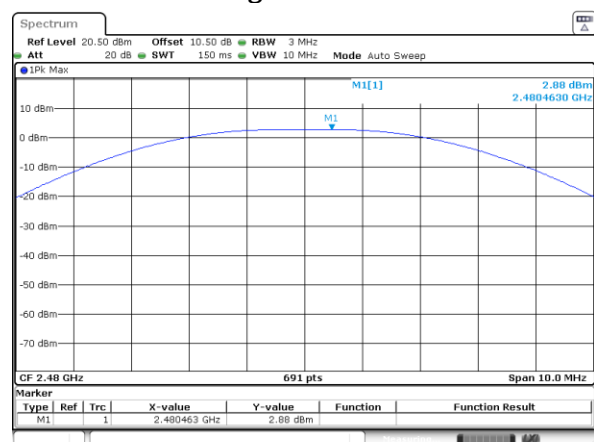
Mode	Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Limit (dBm)	Result
Zigbee	Low	2405	1.54	30	Pass
	Middle	2440	2.22	30	Pass
	High	2480	2.88	30	Pass

Low Channel

Project No.: RKSA240527001 Tester: Jason Lu
Date: 5 JUN 2024 14:40:55

Middle Channel

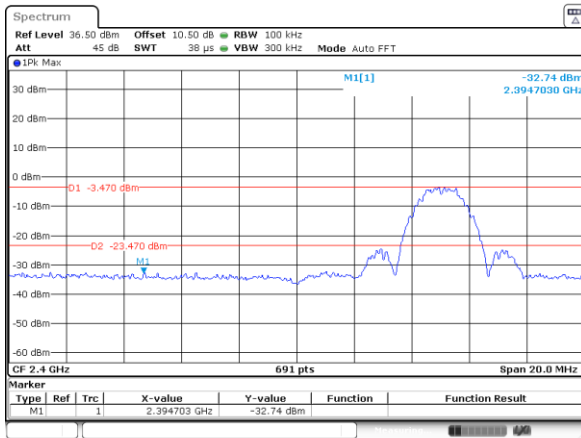
Project No.: RKSA240527001 Tester: Jason Lu
Date: 5 JUN 2024 14:37:14

High Channel

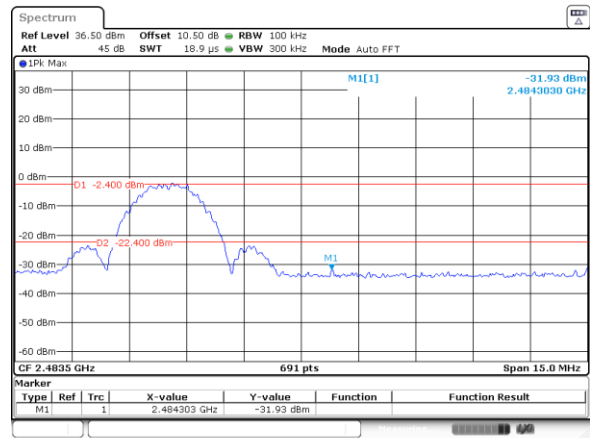
Project No.: RKSA240527001 Tester: Jason Lu
Date: 5 JUN 2024 14:39:00

BAND EDGE**Test Result:** Compliant.*EUT operation mode: Transmitting*

Mode	Channel	Frequency (MHz)	Result (dBc)	Limit (dBc)
Zigbee	Low	2405	29.27	20
	High	2480	29.53	

Left Side

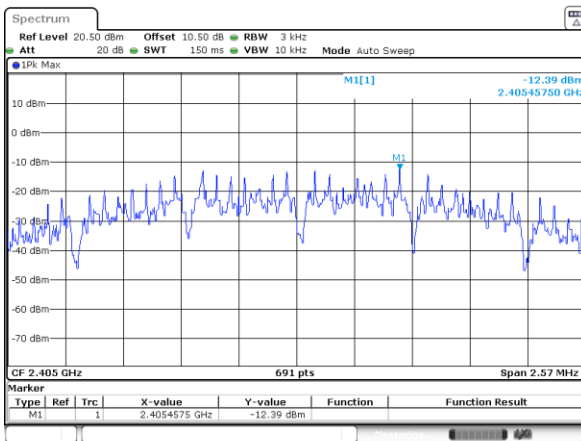
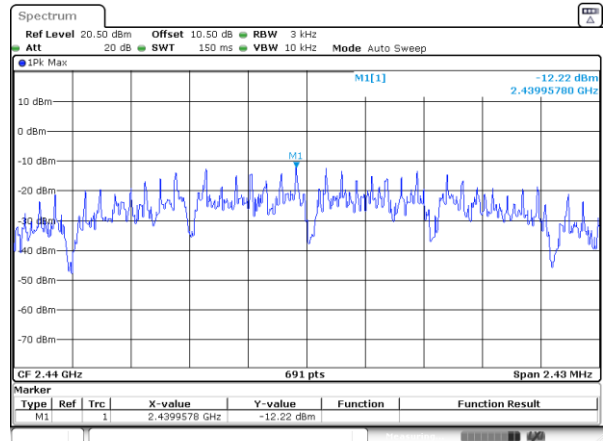
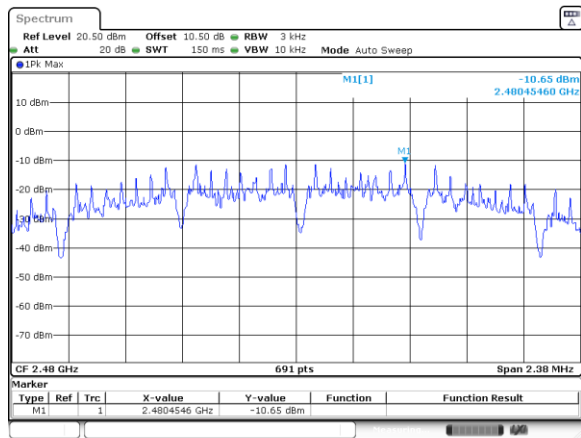
Project No. RKSA240527001 Tester: Jason Lu
Date: 5 JUN 2024 13:55:27

Right Side

Project No. RKSA240527001 Tester: Jason Lu
Date: 5 JUN 2024 13:56:49

POWER SPECTRAL DENSITY**Test Result:** Compliant.*EUT operation mode: Transmitting*

Mode	Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
Zigbee	Low	2405	-12.39	≤8
	Middle	2440	-12.22	≤8
	High	2480	-10.65	≤8

Low Channel**Middle Channel****High Channel**

EUT PHOTOGRAPHS

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

TEST SETUP PHOTOGRAPHS

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

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 *******