

FCC PART 15.249

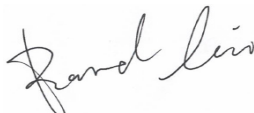
TEST REPORT

For

Airtouch (Shanghai) Intelligent Technology Co., Ltd

11th Floor, Building 4, Lane 388, Shengrong Road, Pudong New District, Shanghai, China

FCC ID: 2AVK2AT24MP1T2RS32A

Report Type:	Product Name:
Original Report	24GHz radar sensor
Report Number:	RKSB240903001-00A
Report Date:	2024-11-27
Reviewed By:	Bard Liu 
Approved By:	Kyle Xu 
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Kunshan) No.248 Chenghu Road, Kunshan, Jiangsu Province, China Tel: +86-512-86175000 Fax: +86-512-88934268 www.baclcorp.com.cn

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

TABLE OF CONTENTS

REPORT REVISION HISTORY	3
GENERAL INFORMATION.....	4
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	4
OBJECTIVE	4
TEST METHODOLOGY	4
MEASUREMENT UNCERTAINTY	5
TEST FACILITY	5
JUSTIFICATION	6
EUT EXERCISE SOFTWARE	6
SUPPORT EQUIPMENT LIST AND DETAILS	6
EXTERNAL I/O CABLE.....	6
BLOCK DIAGRAM OF TEST SETUP	7
SUMMARY OF TEST RESULTS.....	9
TEST EQUIPMENT LIST	10
§1.1307 (B) (3) & §2.1091 – RF EXPOSURE	12
APPLICABLE STANDARD	12
FCC§15.203 - ANTENNA REQUIREMENT.....	13
APPLICABLE STANDARD	13
ANTENNA CONNECTOR CONSTRUCTION	13
FCC §15.207 (A) - AC LINE CONDUCTED EMISSIONS	14
APPLICABLE STANDARD	14
TEST SYSTEM SETUP	14
EMI TEST RECEIVER SETUP.....	14
TEST PROCEDURE	15
TEST RESULTS SUMMARY	15
TEST DATA: SEE APPENDIX	15
FCC§15.205, §15.209&§15.249- RADIATED EMISSIONS& OUT OF BAND EMISSION.....	16
APPLICABLE STANDARD	16
TEST SYSTEM SETUP	16
TEST EQUIPMENT SETUP	19
TEST PROCEDURE	19
TEST RESULTS SUMMARY	20
TEST DATA: SEE APPENDIX	20
FCC §15.215(C) - 20 DB BANDWIDTH TESTING.....	21
APPLICABLE STANDARD	21
TEST PROCEDURE	21
TEST DATA: SEE APPENDIX	21
APPENDIX - TEST DATA.....	22
ENVIRONMENTAL CONDITIONS & TEST INFORMATION	22
CONDUCTED EMISSIONS	23
RADIATED EMISSIONS	25
FUNDAMENTAL AND BAND EDGE TEST	35
20 dB BANDWIDTH TESTING	37
EUT PHOTOGRAPHS.....	38
TEST SETUP PHOTOGRAPHS	39

REPORT REVISION HISTORY

Number of Revisions	Report No.	Issue Date	Description
0	RKSB240903001-00A	2024-11-27	Initial Release

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant:	Airtouch (Shanghai) Intelligent Technology Co., Ltd
Tested Model:	AT24MP1T2RS32A
Series Model:	AT24MP1T1RS32A, AT24MP1T2RS32B, AT24MP1T1RS32B, AT24MP2T4RS32A
Model Difference:	Model name
Product Name:	24GHz radar sensor
Power Supply:	DC 5V
RF Function:	24G SRD
Operating Band/Frequency:	24.005 GHz - 24.245 GHz
Maximum Field Strength of Fundamental:	101.99 dB μ V/m @3m
Modulation Type:	FMCW
Antenna Type:	Patch Antenna
★Maximum Antenna Gain:	5.0 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: RKSB240903001-1 (Assigned by the BACL (Kunshan). The EUT supplied by the applicant was received on 2024-09-03.)

Objective

This type approval report is prepared for *Airtouch (Shanghai) Intelligent Technology Co., Ltd* in accordance with Part 2-Subpart J, and Part 15-Subparts A and C of the Federal Communication Commission rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209, 15.215 and 15.249 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.

Measurement Uncertainty

Item		Uncertainty
AC Power Lines Conducted Emissions		3.19 dB
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
	40GHz ~50GHz	4.92dB
	50GHz ~75GHz	5.16dB
	75GHz ~100GHz	5.64dB
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**Justification**

Operation Frequency Details:

Sweep Start Frequency (MHz)	Sweep Stop Frequency (MHz)
24005	24245
The below frequencies were tested:	
Low Channel	24005
Middle Channel	24125
High Channel	24245

EUT Exercise Software

Engineer Mode was used during the test.

★Power level: Default

Note: The power level was declared by the applicant.

Support Equipment List and Details

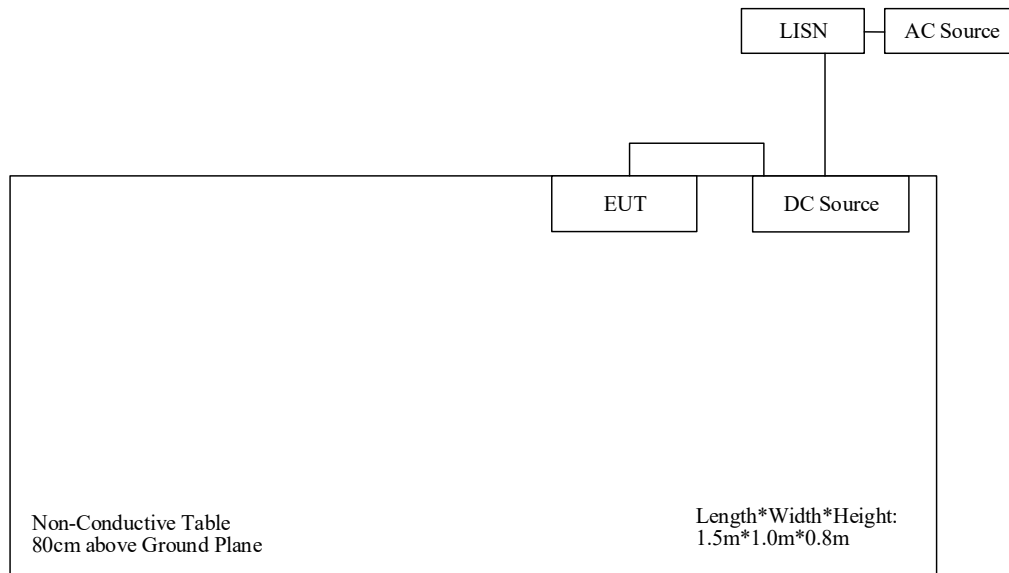
Manufacturer	Description	Model	Serial Number
ZHAOXIN	DC Source	RXN-605D	DC002

External I/O Cable

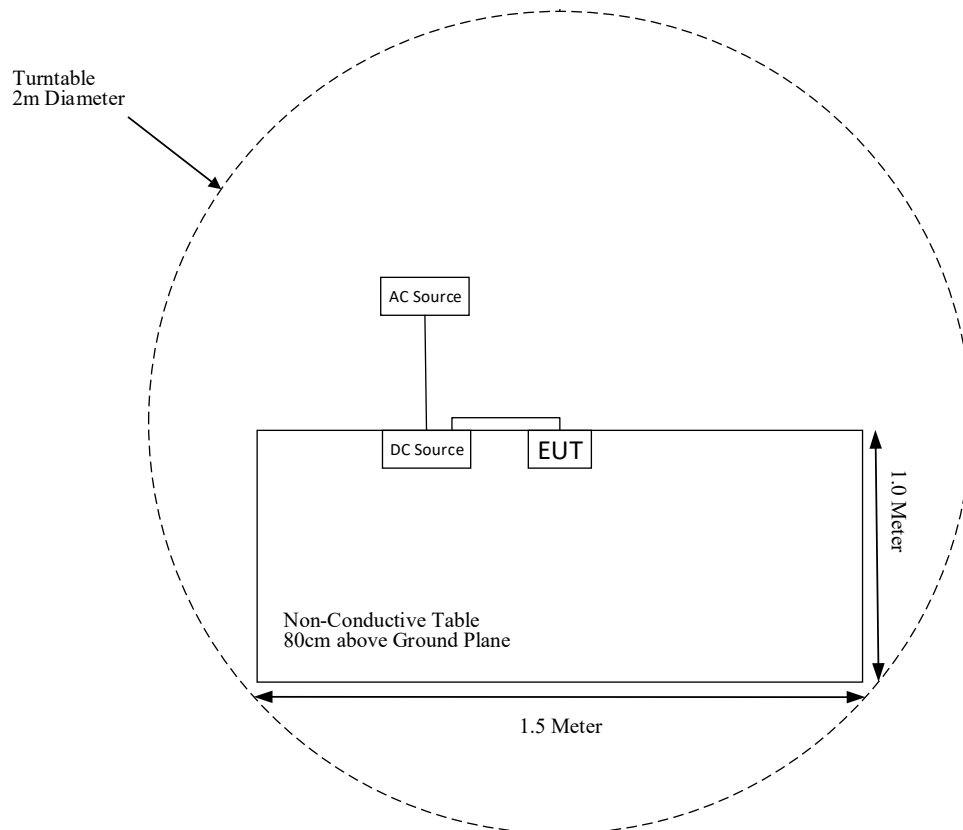
Cable Description	Length (m)	From Port	To Port
Power Cable 1	1.0	EUT	DC Source
Power Cable 2	1.0	DC Source	LISN/AC Source

Block Diagram of Test Setup

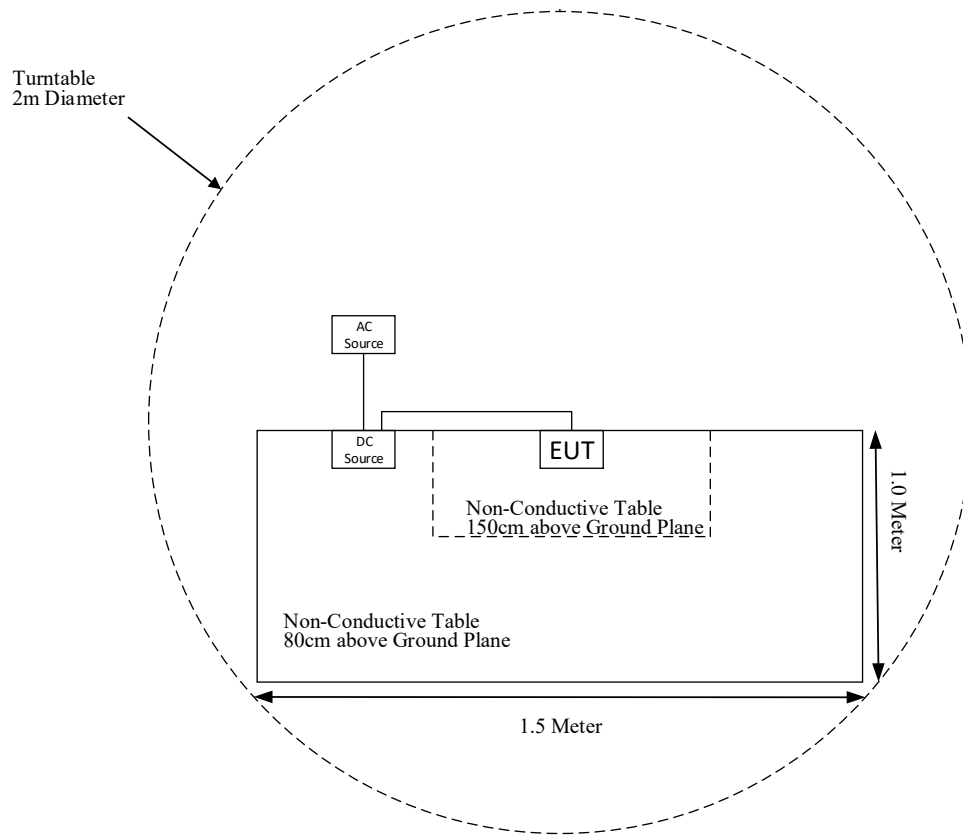
For Conducted Emissions:



For Radiated Emissions(Below 1GHz):



For Radiated Emissions(Above 1GHz):



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§ 1.1307 (b) (3) & §2.1091	RF EXPOSURE	Compliant
§15.203	Antenna Requirement	Compliant
§15.207 (a)	AC Line Conducted Emissions	Compliant
15.205, §15.209, §15.249	Radiated Emissions& Out of Band Emission	Compliant
§15.215 (c)	20 dB Bandwidth	Compliant

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	Hybrid Antenna	JB3	A090314-1	2024-11-08	2027-11-07
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
ETS-LINDGREN	Loop Antenna	6512	108100	2023-11-09	2024-11-08
Narda	6 dB Attenuator	773-6	10690812-2-1	2024-11-08	2027-11-07
Radiated Emission Test (Chamber 2#)					
Rohde & Schwarz	EMI Test Receiver	ESU40	100207	2024-04-25	2025-04-24
ETS-LINDGREN	Horn Antenna	3115	9207-3900	2023-06-27	2026-06-26
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
Rohde & Schwarz	Auto test Software	EMC32	100361	N/A	N/A
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
FMI	Horn Antenna	24245-AB	51	2024-04-25	2025-04-24
HP	Harmonic Mixer	11970U	2332A00837	2024-04-25	2025-04-24
SAGE	WR-15 Rectangular Gain Horn	SAR-2408-15-S2	13563-08	2024-04-25	2025-04-24
HP	Harmonic Mixer	11970V	611	2024-04-25	2025-04-24
SAGE	Horn Antenna	SAR-2309-10-S2	15633-04	2024-04-25	2025-04-24
HP	Harmonic Mixer	11970W	2521A00535	2024-04-25	2025-04-24
Narda	Attenuator	10dB	10dB-01	2024-04-24	2025-04-23
Rohde & Schwarz	Auto test Software	EMC32	100361	N/A	N/A
MICRO-COAX	Coaxial Cable	Cable-6	006	2024-04-25	2025-04-24

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESR	1316.3003K03-101746-zn	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	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).

§1.1307 (b) (3) & §2.1091 – RF EXPOSURE

Applicable Standard

According to subpart 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

According to KDB 447498 D04 Interim General RF Exposure Guidance

MPE-Based Exemption:

General frequency and separation-distance dependent MPE-based effective radiated power(ERP) thresholds are in Table B.1 [Table 1 of § 1.1307(b)(1)(i)(C)] to support an exemption from further evaluation from 300 kHz through 100 GHz.

Table 1 to § 1.1307(b)(3)(i)(C) - Single RF Sources Subject to Routine Environmental Evaluation

RF Source frequency (MHz)	Threshold ERP (watts)
0.3-1.34	$1,920 R^2$.
1.34-30	$3,450 R^2 / f^2$.
30-300	$3.83 R^2$.
300-1,500	$0.0128 R^2 f$.
1,500-100,000	$19.2 R^2$.

R is the minimum separation distance in meters

f = frequency in MHz

Result

Mode	Frequency Range (GHz)	★Tune up EIRP (dBm)	ERP		Evaluation Distance (m)	ERP Limit (W)
			(dBm)	(W)		
LoRa	24.005-24.245	7	4.85	0.00305	0.2	0.768

Note:

1. For SRD, the power of EUT: E Field@3m is 101.99 dBuV/m = 6.79 dBm
2. $E[\text{dB}\mu\text{V}/\text{m}] = \text{EIRP}[\text{dBm}] + 95.2$ for $d = 3$ m.
3. The tune-up power provide by applicant.

Result: Compliance

FCC§15.203 - ANTENNA REQUIREMENT

Applicable Standard

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used.

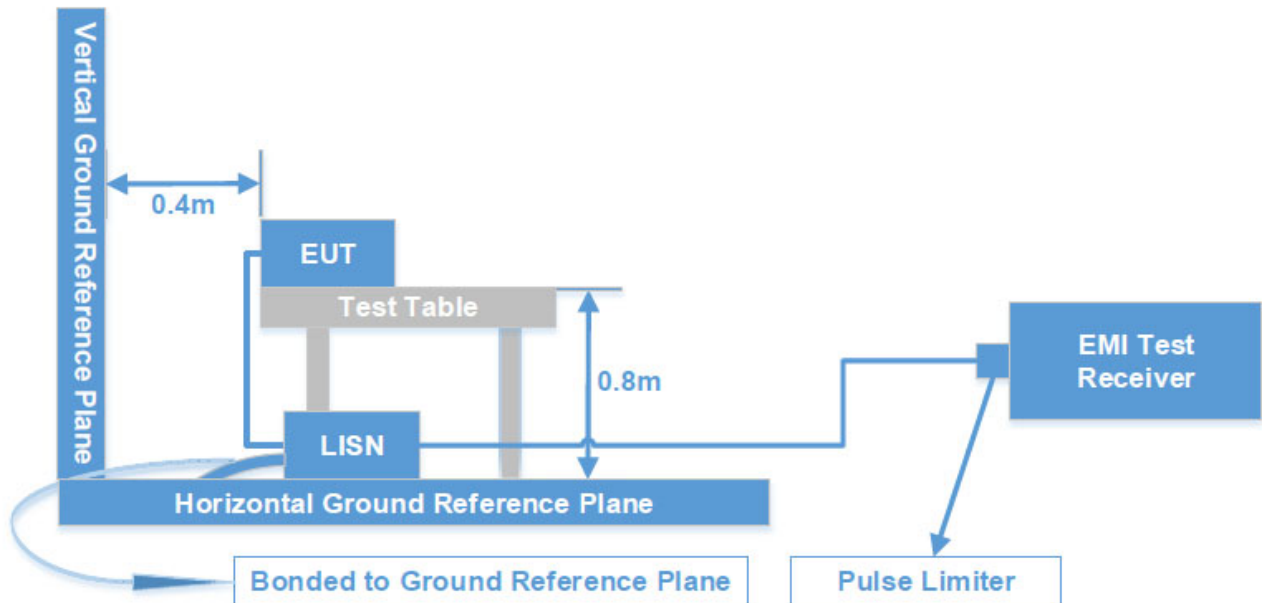
Antenna Connector Construction

The EUT has one patch antenna for TX and two antenna for RX, which were permanently attached 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 C63.10-2013. The related limit was specified in FCC Part 15.207.

The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

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

Frequency Range	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 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&§15.249- RADIATED EMISSIONS& OUT OF BAND EMISSION

Applicable Standard

As per FCC§15.249 (a), except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

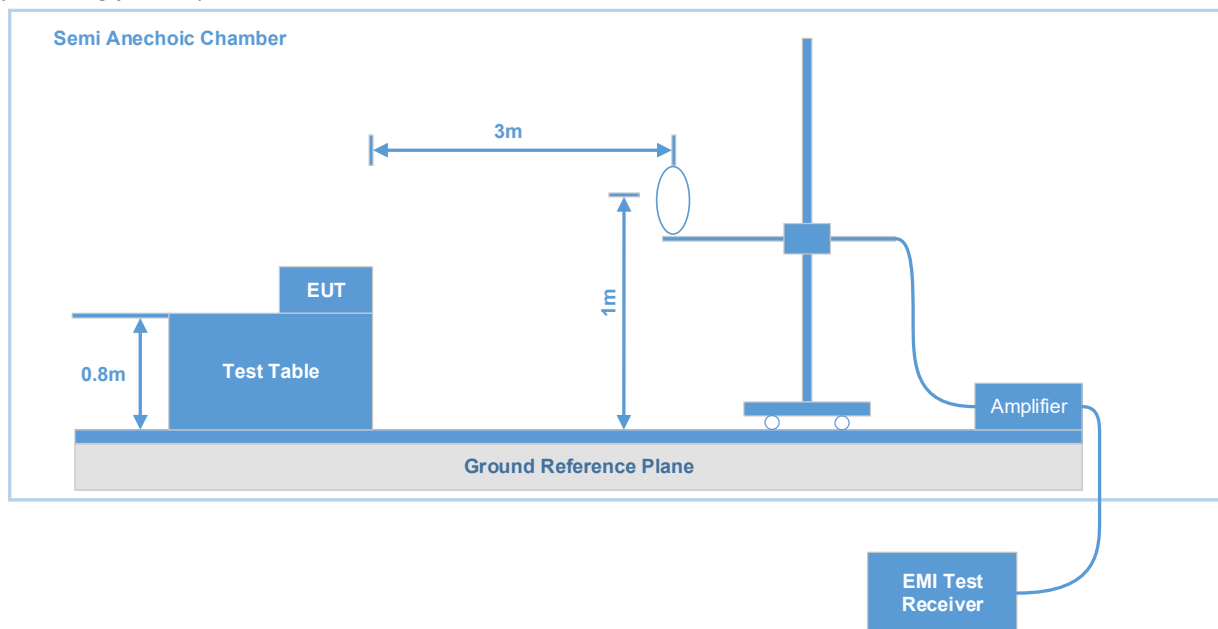
Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24GHz-24.25GHz	250	2500

As per FCC§15.249 (c), Field strength limits are specified at a distance of 3 meters.

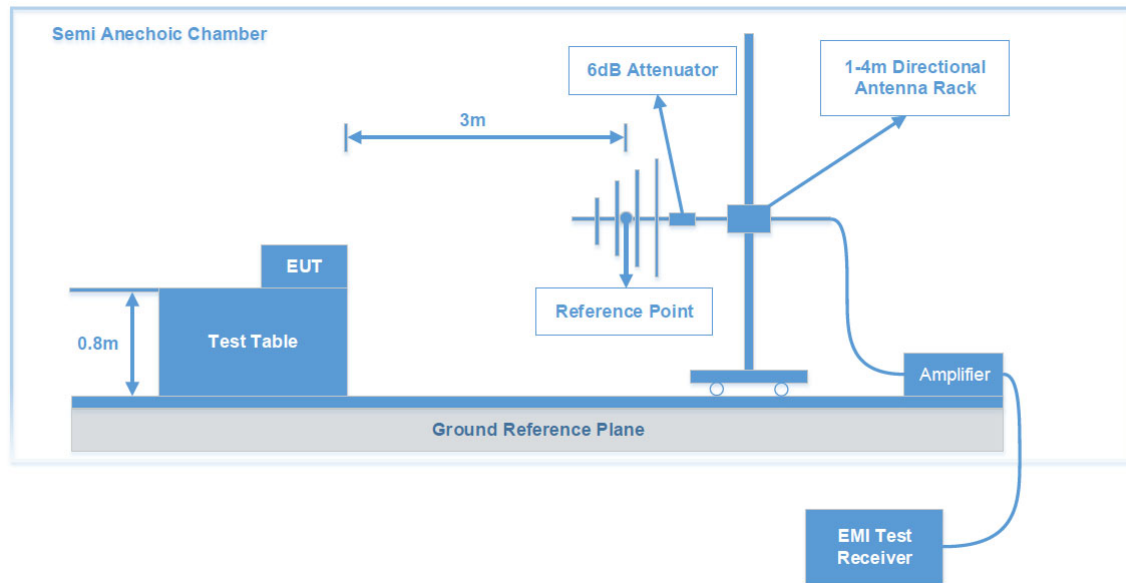
(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

Test System Setup

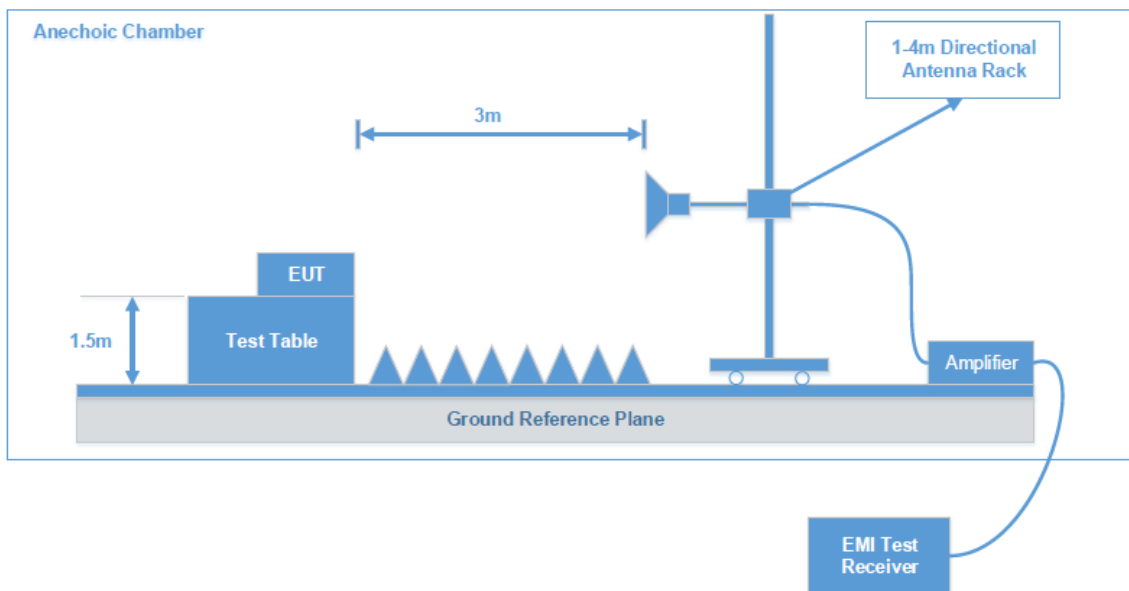
9 kHz - 30 MHz:

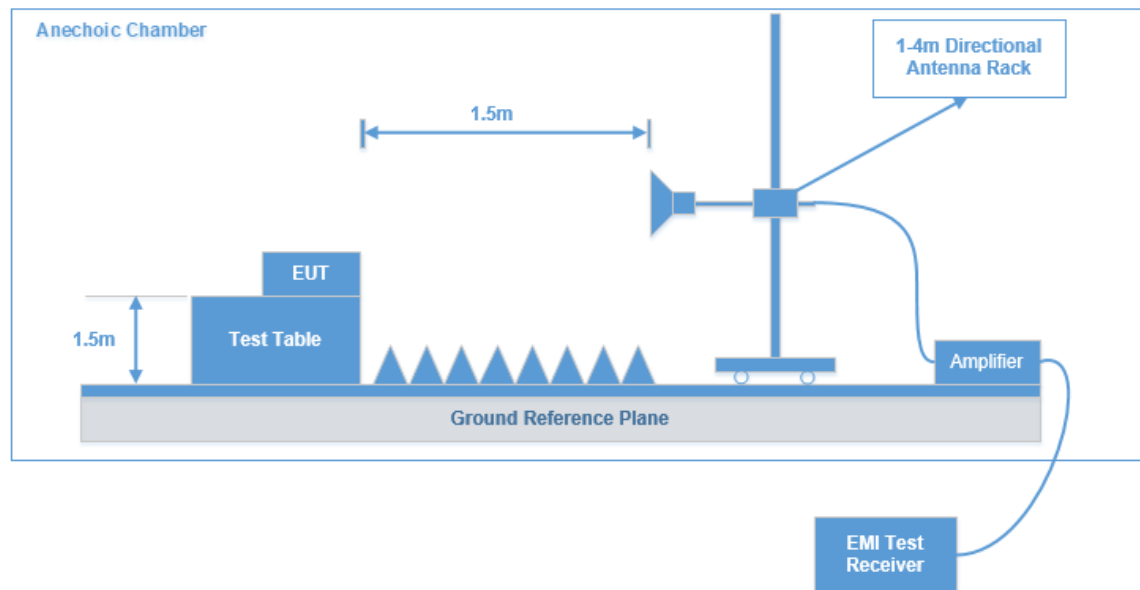
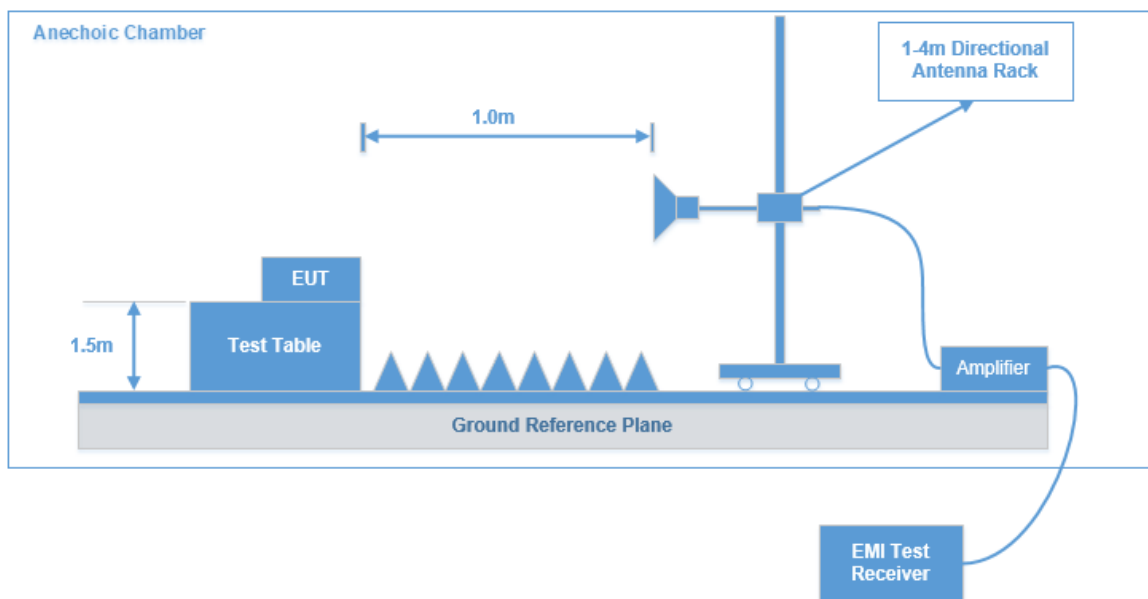


30 MHz - 1 GHz:



1 GHz - 18 GHz:



18 GHz - 40 GHz:**40 GHz - 100 GHz:**

The radiated emission and out of band emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209/15.205 and FCC 15.249 limits. The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

Test Equipment Setup

The system was investigated from 9 kHz to 100 GHz.

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

Frequency Range	RBW	VBW	IF B/W	Detector	Measurement
9 kHz - 150 kHz	200 Hz	1 kHz	200 Hz	QP/Average	QP/Average
150 kHz - 30 MHz	9 kHz	30 kHz	9 kHz	QP/ Average	QP/ Average
30 MHz - 1000 MHz	120 kHz	300 kHz	/	Peak	Peak
	/	/	120 kHz	QP	QP
1 GHz-40 GHz	1MHz	3 MHz	/	Peak	Peak
	1MHz	3 MHz	/	Average	Average
40 GHz-100 GHz	1MHz	3 MHz	/	Peak	Peak
	1MHz	10Hz	/	Peak	Average

Note: If the maximized peak measured value complies with under the QP/Average limit more than 6dB, then it is unnecessary to perform a QP/Average measurement.

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 10 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)

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

The “**Margin/ Over Limit**” 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)
Over Limit (dB) = Level (dBμV/m) - Limit (dBμV/m)

Test Results Summary

According to the data in the following table, the EUT complied with the FCC Part 15.209 &15.205 & 15.249.

Test Data: See Appendix

FCC §15.215(c) - 20 dB BANDWIDTH TESTING

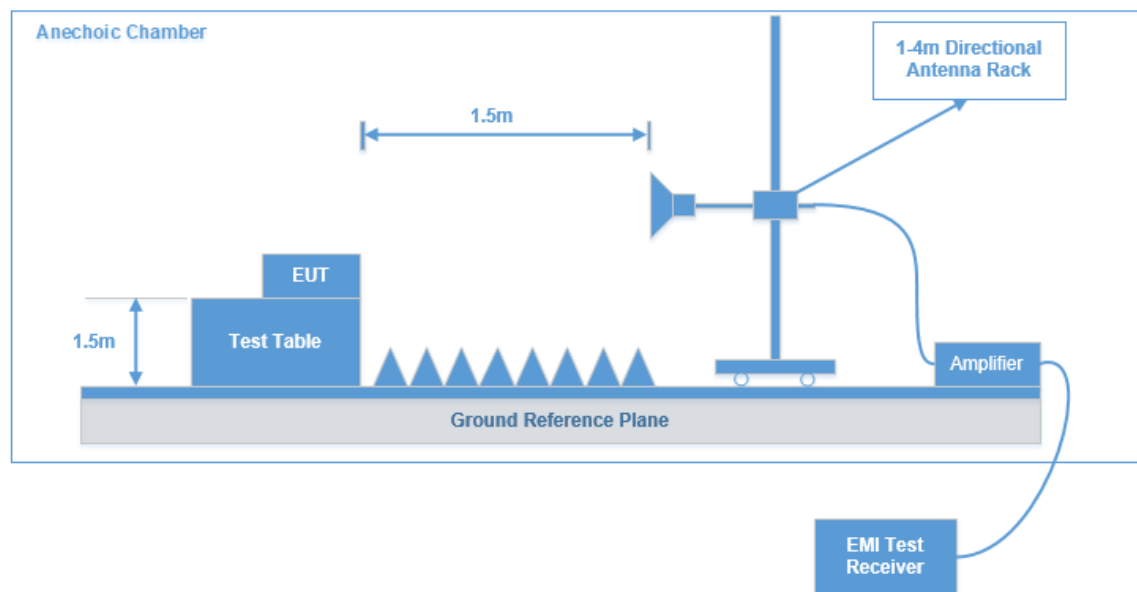
Applicable Standard

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

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 on the test table without connection to measurement instrument. Turn on the EUT. 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 System Setup



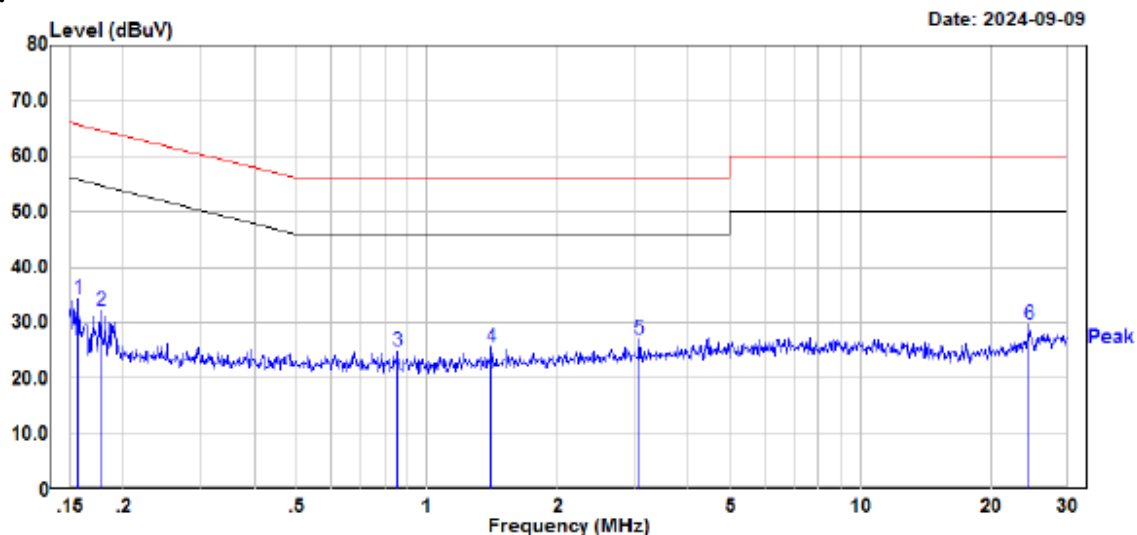
Test Data: See Appendix

APPENDIX - TEST DATA

Environmental Conditions & Test Information

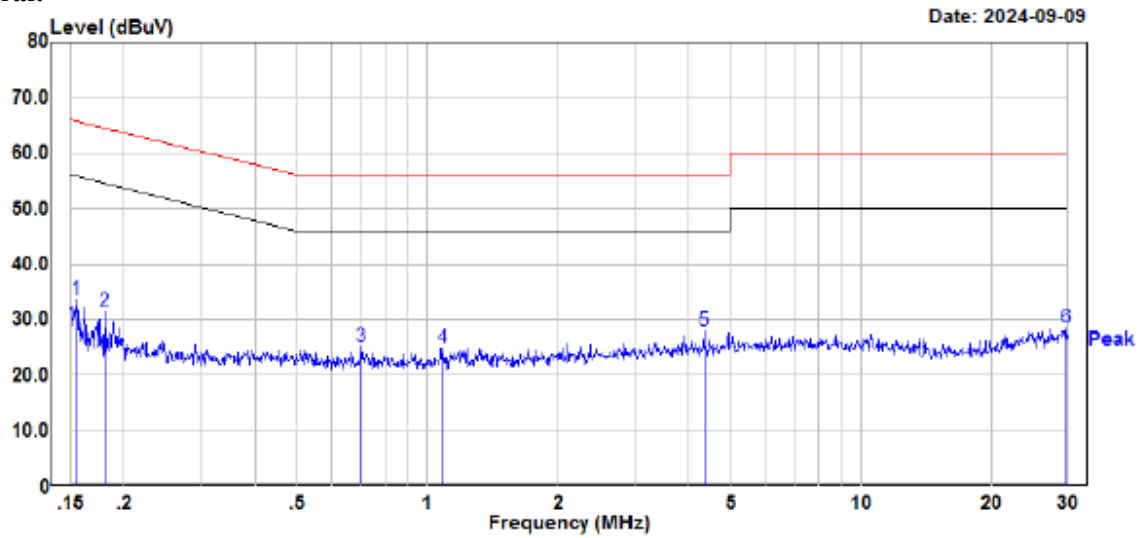
Test Item:	CONDUCTED EMISSIONS	RADIATED EMISSIONS		
		9kHz~30MHz	30MHz – 1 GHz	1 GHz – 18 GHz
Test Date:	2024-09-09	2024-09-15	2024-11-25	2024-11-16
Temperature:	28.5℃	25.3 ℃	18.9 ℃	24.9 ℃
Relative Humidity:	59 %	56 %	56 %	54 %
ATM Pressure:	101.2 kPa	100.9 kPa	101.8 kPa	100.5 kPa
Test Result:	Pass	Pass	Pass	Pass
Test Engineer:	Leah Li	Grace Luo	Jerry Yan	Destine Hu

Test Item:	RADIATED EMISSIONS		BAND EDGE	20 DB BANDWIDTH TESTING
	18 GHz – 40 GHz	40 GHz – 100 GHz		
Test Date:	2024-11-27	2024-09-24 to 2024-09-25	2024-10-28	2024-11-26
Temperature:	20.8 ℃	24.5-25.3 ℃	23.8 ℃	18.9 ℃
Relative Humidity:	50 %	55-59 %	55 %	56 %
ATM Pressure:	102.2 kPa	101.1-101.3 kPa	101.8 kPa	102.5 kPa
Test Result:	Pass	Pass	Pass	Pass
Test Engineer:	Hugh Wu	Hugh Wu	Hugh Wu	Hugh Wu

CONDUCTED EMISSIONS*EUT operation mode: Transmitting in maximum output power channel (Low channel)***Line:**

Site : CE
Condition : FCC PART 15.207
: DET:Peak
Project No. : RKS240903001
Model : AT24MP1T2RS32A
Phase : L
Voltage : DC 5V
Mode : TX
Test Equipment : ENV216,ESR
Temperature : 28.5°C
Humidity : 59%
Atmospheric pressure: 101.2kPa
Test Engineer : Leah Li

		Read			Limit	Over	
	Freq	Level	Factor	Level	Line	Limit	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	
1	0.157	14.25	20.11	34.36	65.63	-31.27	Peak
2	0.178	12.13	20.12	32.25	64.59	-32.34	Peak
3	0.854	4.98	19.87	24.85	56.00	-31.15	Peak
4	1.406	5.73	19.94	25.67	56.00	-30.33	Peak
5	3.091	6.81	20.23	27.04	56.00	-28.96	Peak
6	24.455	9.95	19.80	29.75	60.00	-30.25	Peak

Neutral:

Site : CE
 Condition : FCC PART 15.207
 : DET:Peak
 Project No. : RKSB240903001
 Model : AT24MP1T2RS32A
 Phase : N
 Voltage : DC 5V
 Mode : TX
 Test Equipment : ENV216,ESR
 Temperature : 28.5°C
 Humidity : 59%
 Atmospheric pressure: 101.2kPa
 Test Engineer : Leah Li

	Read		Limit	Over	
Freq	Level	Factor	Level	Line	Limit Remark
MHz	dBuV	dB	dBuV	dBuV	dB
1	0.155	13.38	20.11	33.49	65.71 -32.22 Peak
2	0.180	11.20	20.12	31.32	64.47 -33.15 Peak
3	0.703	5.19	20.07	25.26	56.00 -30.74 Peak
4	1.080	5.23	19.76	24.99	56.00 -31.01 Peak
5	4.337	7.68	20.25	27.93	56.00 -28.07 Peak
6	29.555	8.63	19.87	28.50	60.00 -31.50 Peak

RADIATED EMISSIONS

Test Result: Compliant

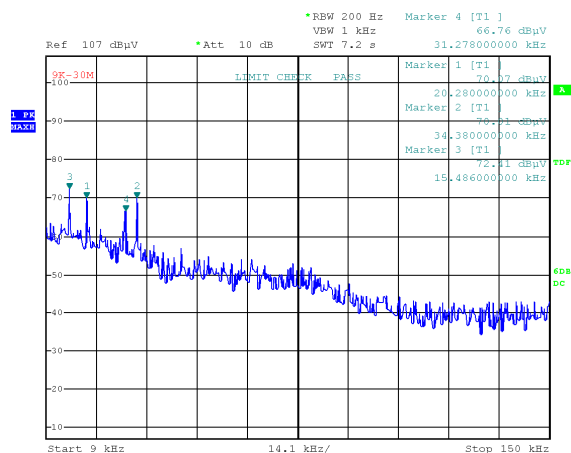
EUT operation mode: Transmitting

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

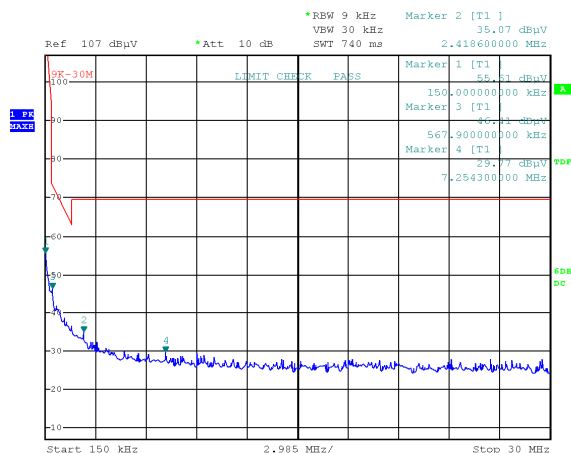
9 kHz-30MHz: Transmitting in maximum output power channel (Low channel)

Parallel (worst case):

9 kHz-150 kHz



150 kHz -30 MHz



Project No.RKSB240903001
Date: 15.SEP.2024 04:07:52

Tester:Grace Luo

Project No.RKSB240903001
Date: 15.SEP.2024 03:49:30

Tester:Grace Luo

9 kHz-150 kHz:

Frequency	Corrected Amplitude	Detector	Corrected Factor	Limit	Margin
(MHz)	(dBμV/m) @3m	PK/QP/Ave.	(dB/m)	(dBμV/m @ 3m)	(dB)
0.01549	72.41	PK	52.87	123.81	51.40
0.02028	70.07	PK	49.92	121.46	51.39
0.03128	66.76	PK	46.94	117.70	50.94
0.03438	70.01	PK	46.06	116.88	46.87

150 kHz -30 MHz:

Frequency	Corrected Amplitude	Detector	Corrected Factor	Limit	Margin
(MHz)	(dBμV/m) @3m	PK/QP/Ave.	(dB/m)	(dBμV/m @ 3m)	(dB)
0.15000	55.61	PK	30.90	104.08	48.47
0.56790	46.41	PK	21.35	72.52	26.11
2.41860	35.07	PK	12.67	69.54	34.47
7.25430	29.77	PK	6.46	69.54	39.77

30 MHz - 1 GHz:

Frequency: 24.005 GHz

Common Information

Project No:

EUT Model:

Test Mode:

Standard:

Test Equipment:

Receiver Setting:

Temperature:

Humidity:

Barometric Pressure:

Test Engineer:

Test Date:

RKS240903001

AT24MP1T2RS32A

TX

FCC Part 15.205 & FCC Part 15.209 & FCC Part 15.249

ESCI, JB3, 310N

RBW:120 kHz, VBW: 300 kHz, Sweep Time: Auto

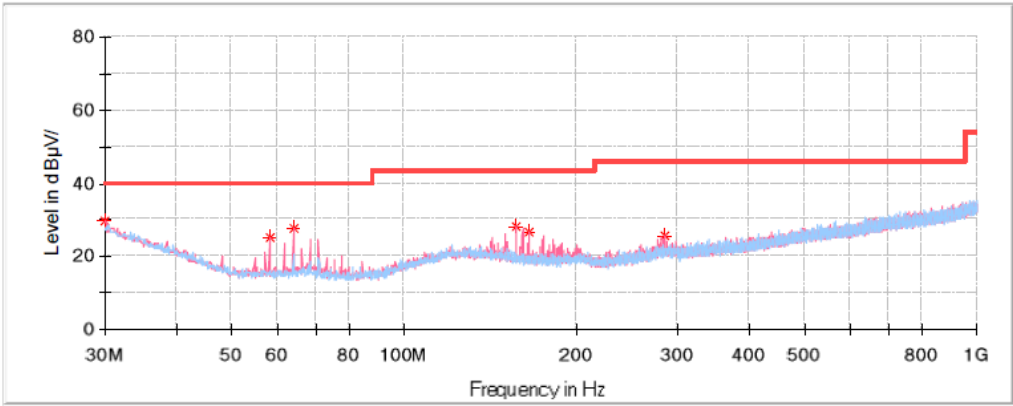
18.9°C

56%

101.8kPa

Jerry Yan

2024/11/25



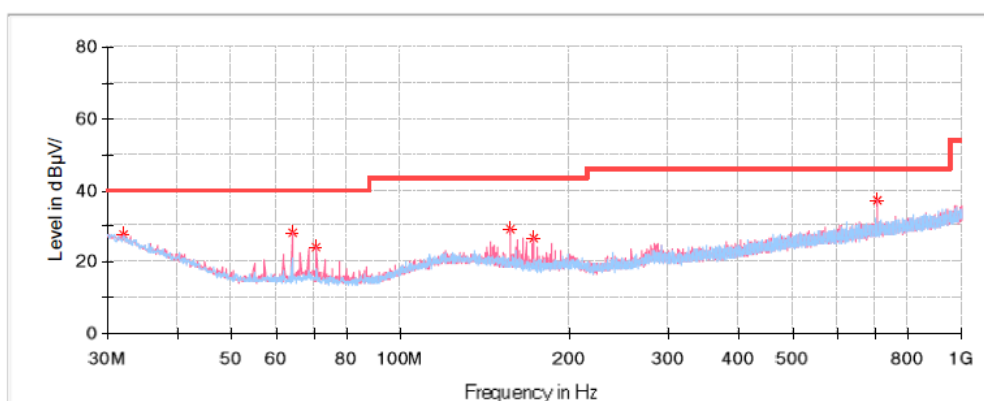
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµ V/m)	Limit (dBµ V/m)	Margin (dB)	Pol	Corr. (dB/m)
30.000000	29.46	40.00	10.54	V	-4.8
58.130000	25.20	40.00	14.80	V	-17.0
63.950000	27.74	40.00	12.26	V	-16.9
156.948750	28.20	43.50	15.30	V	-12.0
165.193750	26.89	43.50	16.61	V	-12.3
284.503750	25.86	46.00	20.14	V	-10.4

Frequency: 24.125 GHz

Common Information

Project No: RKSB240903001
EUT Model: AT24MP1T2RS32A
Test Mode: TX
Standard: FCC Part 15.205 & FCC Part 15.209 & FCC Part 15.249
Test Equipment: ESCI, JB3, 310N
Receiver Setting: RBW:120 kHz, VBW: 300 kHz, Sweep Time: Auto
Temperature: 18.9°C
Humidity: 56%
Barometric Pressure: 101.8kPa
Test Engineer: Jerry Yan
Test Date: 2024/11/25

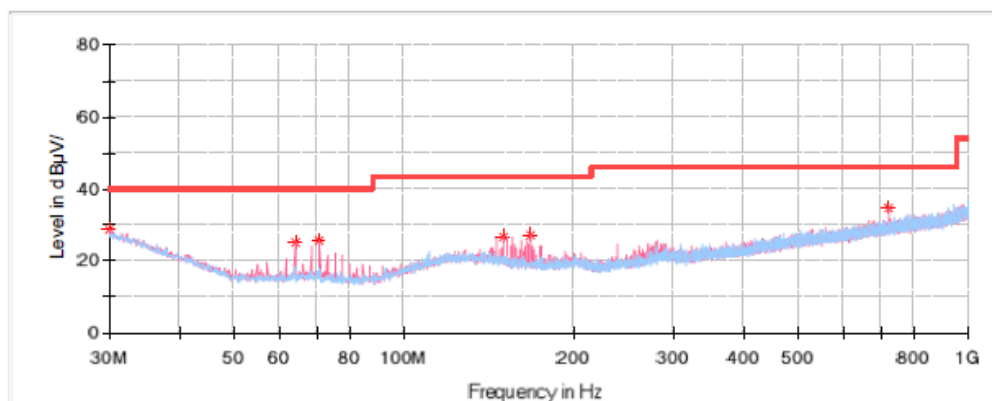
**Critical_Freqs**

Frequency (MHz)	MaxPeak (dBμ V/m)	Limit (dBμ V/m)	Margin (dB)	Pol	Corr. (dB/m)
32.061250	27.72	40.00	12.28	V	-6.1
63.950000	27.95	40.00	12.05	V	-16.9
70.861250	24.37	40.00	15.63	V	-16.6
156.585000	29.41	43.50	14.09	V	-11.9
172.468750	26.62	43.50	16.88	V	-12.6
705.483750	37.35	46.00	8.65	V	-2.0

Frequency: 24.245 GHz

Common Information

Project No: RKSB240903001
EUT Model: AT24MP1T2RS32A
Test Mode: TX
Standard: FCC Part 15.205 & FCC Part 15.209 & FCC Part 15.249
Test Equipment: ESCI, JB3, 310N
Receiver Setting: RBW: 120 kHz, VBW: 300 kHz, Sweep Time: Auto
Temperature: 18.9°C
Humidity: 56%
Barometric Pressure: 101.8kPa
Test Engineer: Jerry Yan
Test Date: 2024/11/25

**Critical_Freqs**

Frequency (MHz)	MaxPeak (dBμ V/m)	Limit (dBμ V/m)	Margin (dB)	Pol	Corr. (dB/m)
30.000000	28.57	40.00	11.43	V	-4.8
63.950000	25.08	40.00	14.92	V	-16.9
70.861250	25.75	40.00	14.25	V	-16.6
149.673750	26.91	43.50	16.59	V	-11.6
167.740000	26.98	43.50	16.52	V	-12.4
723.307500	34.78	46.00	11.22	V	-1.8

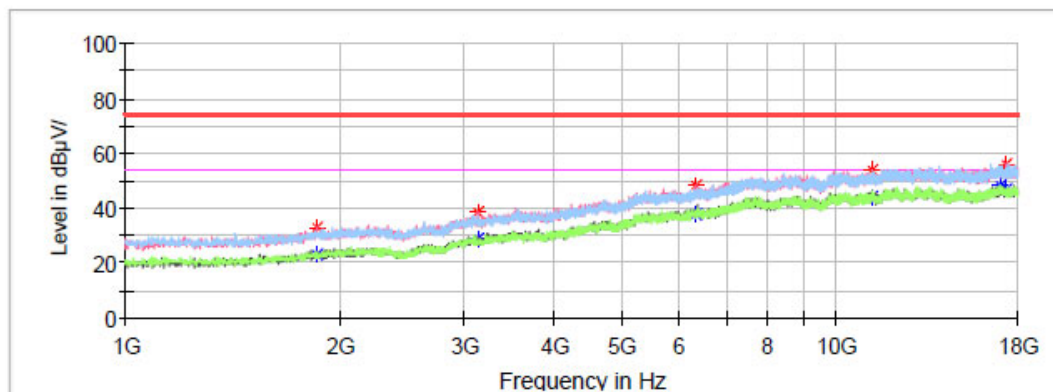
1 GHz – 18 GHz

Frequency: 24.005 GHz

Common Information

Project No.:	RKSB240903001
Test Mode:	TX
Standard:	FCC Part 15.205& FCC Part 15.209& FCC Part 15.249
Receiver Setting:	RBW: 1MHz, VBW: 3MHz, Sweep Time: Auto
Test Engineer:	Destine Hu

Full Spectrum

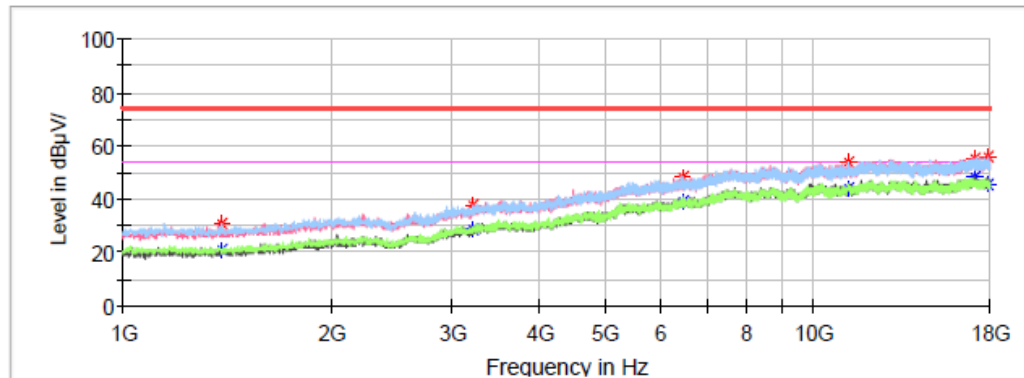
**Critical Freqs**

Frequency (MHz)	MaxPeak (dB µ V/m)	Average (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Pol	Corr. (dB/m)
1858.500000	32.87	---	74.00	41.13	V	-12.6
1858.500000	---	22.90	54.00	31.10	V	-12.6
3138.600000	38.27	---	74.00	35.73	V	-7.9
3138.600000	---	28.79	54.00	25.21	V	-7.9
6343.100000	48.04	---	74.00	25.96	H	0.4
6343.100000	---	37.67	54.00	16.33	H	0.4
11242.500000	---	44.07	54.00	9.93	V	8.1
11242.500000	53.99	---	74.00	20.01	V	8.1
17025.900000	53.30	---	74.00	20.70	H	12.2
17025.900000	---	47.87	54.00	6.13	H	12.2
17382.900000	56.01	---	74.00	17.99	H	11.7
17382.900000	---	47.13	54.00	6.87	H	11.7

Frequency: 24.125 GHz**Common Information**

Project No.:	RKSB240903001
Test Mode:	TX
Standard:	FCC Part 15.205& FCC Part 15.209& FCC Part 15.249
Receiver Setting:	RBW: 1MHz, VBW: 3MHz, Sweep Time: Auto
Test Engineer:	Destine Hu

Full Spectrum

**Critical Freqs**

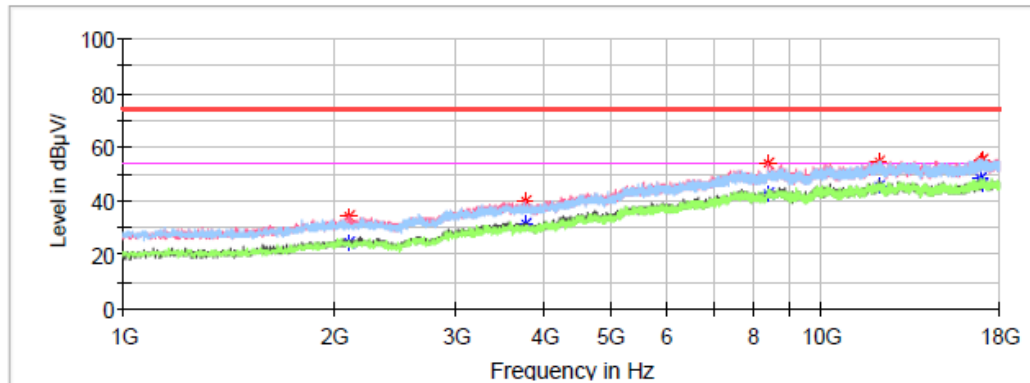
Frequency (MHz)	MaxPeak (dB μ V/m)	Average (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Pol	Corr. (dB/m)
1387.600000	---	21.23	54.00	32.77	H	-14.9
1387.600000	30.76	---	74.00	43.24	H	-14.9
3216.800000	---	28.32	54.00	25.68	V	-7.5
3216.800000	37.76	---	74.00	36.24	V	-7.5
6479.100000	---	39.44	54.00	14.56	H	0.5
6479.100000	48.41	---	74.00	25.59	H	0.5
11261.200000	---	44.04	54.00	9.96	H	8.1
11261.200000	53.62	---	74.00	20.38	H	8.1
17093.900000	55.35	---	74.00	18.65	V	12.1
17093.900000	---	47.73	54.00	6.27	V	12.1
17864.000000	---	45.80	54.00	8.20	V	11.8
17864.000000	56.02	---	74.00	17.98	V	11.8

Frequency: 24.245 GHz

Common Information

Project No.:	RKS240903001
Test Mode:	TX
Standard:	FCC Part 15.205& FCC Part 15.209& FCC Part 15.249
Receiver Setting:	RBW: 1MHz, VBW: 3MHz, Sweep Time: Auto
Test Engineer:	Destine Hu

Full Spectrum

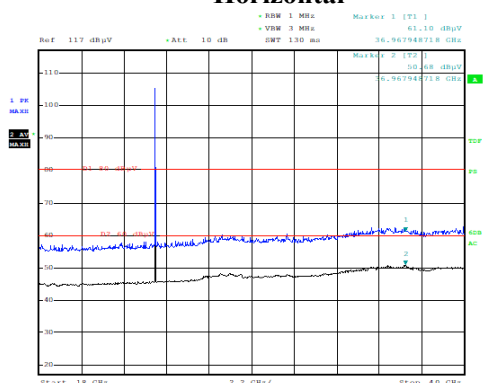
**Critical Freqs**

Frequency (MHz)	MaxPeak (dB μ V/m)	Average (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Pol	Corr. (dB/m)
2099.900000	---	24.71	54.00	29.29	V	-11.4
2099.900000	34.24	---	74.00	39.76	V	-11.4
3774.400000	---	31.72	54.00	22.28	V	-6.1
3774.400000	40.19	---	74.00	33.81	V	-6.1
8413.700000	---	42.37	54.00	11.63	V	5.2
8413.700000	53.95	---	74.00	20.05	V	5.2
12078.900000	---	45.72	54.00	8.28	H	9.1
12078.900000	54.81	---	74.00	19.19	H	9.1
16956.200000	---	47.61	54.00	6.39	H	12.1
16956.200000	54.31	---	74.00	19.69	H	12.1
17065.000000	---	46.32	54.00	7.68	H	12.2
17065.000000	55.58	---	74.00	18.42	H	12.2

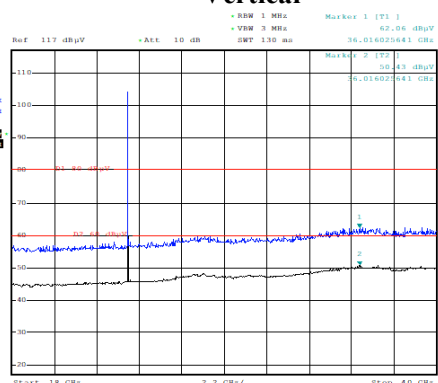
18 GHz - 40 GHz:

Frequency: 24.005 GHz

Horizontal



Vertical

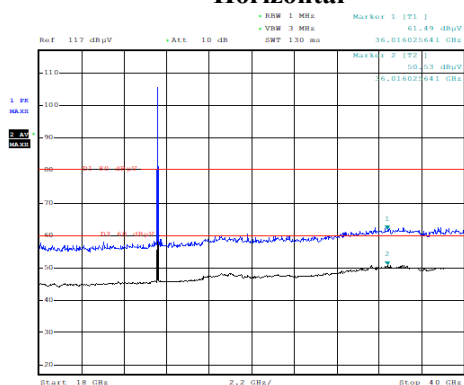


Project No : RKSB240903001
Date: 27.NOV.2024 11:16:20
Tester : Hugh Wu

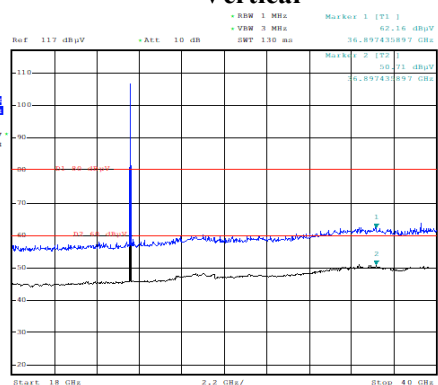
Project No : RKSB240903001
Date: 27.NOV.2024 11:41:18
Tester : Hugh Wu

Frequency: 24.125 GHz

Horizontal



Vertical

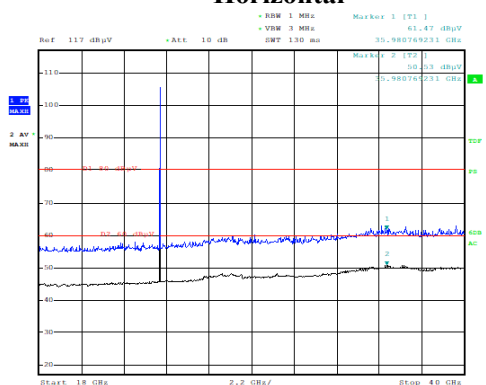


Project No : RKSB240903001
Date: 27.NOV.2024 12:16:25
Tester : Hugh Wu

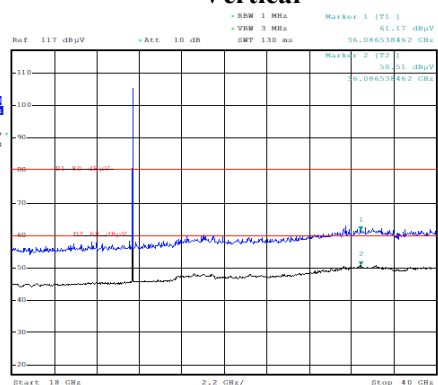
Project No : RKSB240903001
Date: 27.NOV.2024 12:22:22
Tester : Hugh Wu

Frequency: 24.245 GHz

Horizontal



Vertical



Project No : RKSB240903001
Date: 27.NOV.2024 14:11:19
Tester : Hugh Wu

Project No : RKSB240903001
Date: 27.NOV.2024 14:56:45
Tester : Hugh Wu

Note: The test distance is 1.5m. The unit of limit and test level are dBμV/m.

40 GHz - 50 GHz:

Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
Low Channel: 24.005 GHz							
41158	48.96	83.54	34.58	150	H	125	38.6
41158	48.68	83.54	34.86	200	V	160	38.6
Middle Channel: 24.125 GHz							
41256	48.71	83.54	34.83	150	H	123	38.6
41256	48.97	83.54	34.57	150	V	19	38.6
High Channel: 24.245 GHz							
41534	48.79	83.54	34.75	150	H	32	38.6
41534	48.78	83.54	34.76	150	V	261	38.6

50 GHz - 75 GHz:

Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
Low Channel: 24.005 GHz							
53156	48.21	83.54	35.33	200	H	46	40.7
53156	47.94	83.54	35.6	150	V	125	40.7
Middle Channel: 24.125 GHz							
53345	48.22	83.54	35.32	150	H	85	40.7
53345	48.27	83.54	35.27	200	V	38	40.7
High Channel: 24.245 GHz							
53467	48.22	83.54	35.32	150	H	26	40.7
53467	48.02	83.54	35.52	150	V	168	40.7

Note: The limit on the peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. Therefore, when the measured peak level of the emissions is at least 20 dB below the peak emission limit, there's no need to record the measured AV level of the emissions.

Extrapolation factor of 20dB/decade from 3m to 1.0m

Distance extrapolation factor = $20 \log(\text{specific distance [3m]}/\text{test distance [1m]})$ dB

Limit = Specific limits(dBμV/m) + distance extrapolation factor (9.54dB)

75 GHz - 100 GHz:

Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
Low Channel: 24.005 GHz							
85531	57.89	83.54	25.65	150	H	125	44.5
85531	57.89	83.54	25.65	200	V	160	44.5
Middle Channel: 24.125 GHz							
85461	58.11	83.54	25.43	150	H	123	44.5
85461	57.74	83.54	25.8	150	V	19	44.5
High Channel: 24.245 GHz							
85462	58.19	83.54	25.35	150	H	32	44.5
85462	57.91	83.54	25.63	150	V	261	44.5

Note: The limit on the peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. Therefore, when the measured peak level of the emissions is at least 20 dB below the peak emission limit, there's no need to record the measured AV level of the emissions.

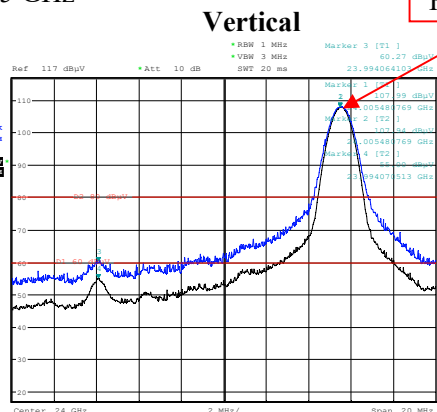
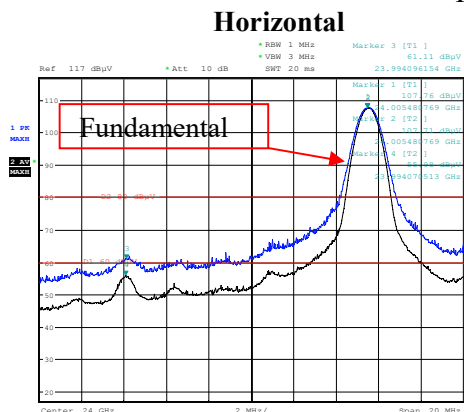
Extrapolation factor of 20dB/decade from 3m to 1.0m

Distance extrapolation factor = $20 \log (\text{specific distance [3m]}/\text{test distance [1.0m]})$ dB

Limit = Specific limits(dBμV/m) + distance extrapolation factor (9.54dB)

Fundamental and band edge Test

Frequency: 24.005 GHz



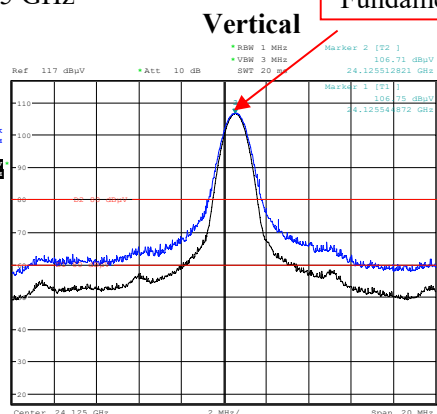
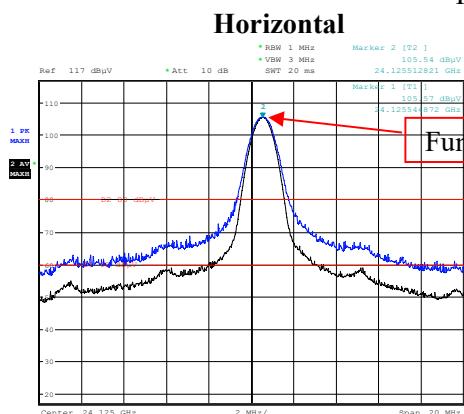
Project No : RKSB240903001
Date: 28.OCT.2024 12:37:27

Tester : Hugh Wu

Project No : RKSB240903001
Date: 28.OCT.2024 12:54:02

Tester : Hugh Wu

Frequency: 24.125 GHz



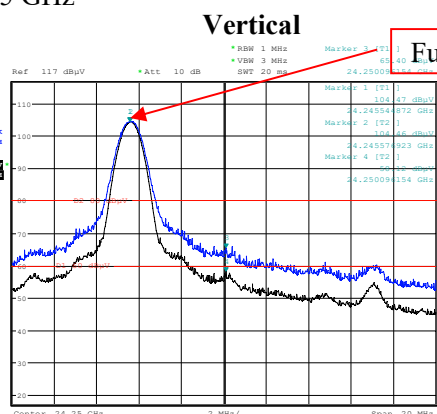
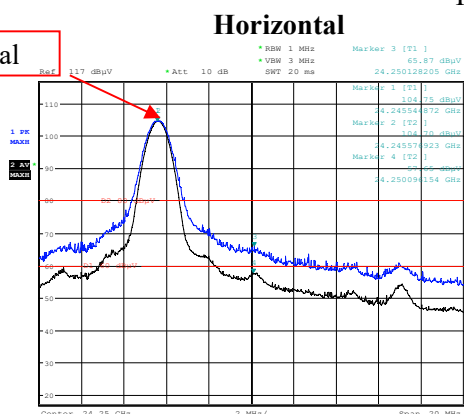
Project No : RKSB240903001
Date: 28.OCT.2024 13:20:26

Tester : Hugh Wu

Project No : RKSB240903001
Date: 28.OCT.2024 13:34:13

Tester : Hugh Wu

Frequency: 24.245 GHz



Project No : RKSB240903001
Date: 28.OCT.2024 14:00:38

Tester : Hugh Wu

Project No : RKSB240903001
Date: 28.OCT.2024 13:45:08

Tester : Hugh Wu

Note: The unit of limit and test level are dBμV/m.

Fundamental:

Frequency (GHz)	Pol	Average Field strength of fundamental@1.5m (dBuV/m)	Peak Field strength of fundamental @1.5m (dBuV/m)	Limit@1.5m (dBuV/m)	Margin
24.005	H	/	107.76	133.96	26.20
	H	107.71	/	113.96	6.25
	V	/	107.99	133.96	25.97
	V	107.94	/	113.96	6.02
24.125	H	/	105.57	133.96	28.39
	H	105.54	/	113.96	8.42
	V	/	106.75	133.96	27.21
	V	106.71	/	113.96	7.25
24.245	H	/	104.75	133.96	29.21
	H	104.70	/	133.96	29.26
	V	/	104.47	113.96	9.49
	V	104.46	/	113.96	9.50

Band Edge:

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
Low channel								
24000	61.11	---	80	18.89	150	H	158	9.4
24000	---	55.98	60	4.02	150	H	158	9.4
24000	60.27	---	80	19.73	100	V	42	9.5
24000	---	55	60	5	100	V	42	9.5
High Channel								
24250	65.87	---	80	14.13	150	H	244	9.4
24250	---	57.65	60	2.35	150	H	244	9.4
24250	65.4	---	80	14.6	100	V	139	9.5
24250	---	58.12	60	1.88	100	V	139	9.5

Note: Extrapolation factor of 20dB/decade from 3m to 1.5m

Distance extrapolation factor = $20 \log (\text{specific distance [3m]}/\text{test distance [1.5m]})$ dB

Limit = Specific limits(dBμV/m) + distance extrapolation factor (6 dB)

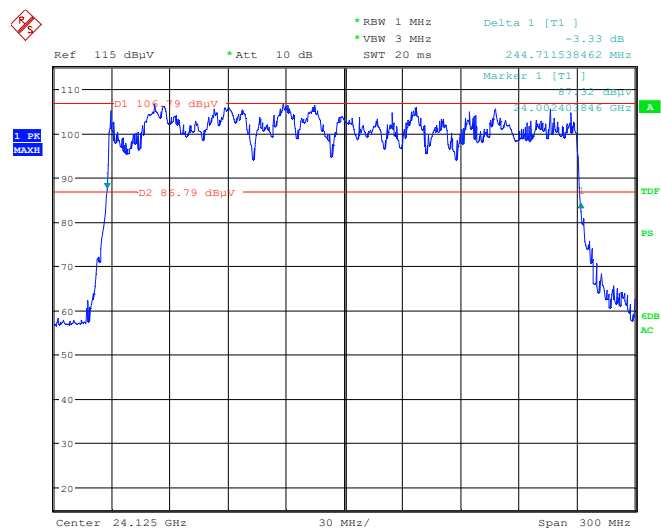
So Maximum Field Strength of Fundamental is 101.99 dBμV/m at 3m

20 dB BANDWIDTH TESTING

Test Result: Compliant.

Test Mode: Transmitting

Mode	20 dB BANDWIDTH (MHz)	F _L (GHz)	Limit (GHz)	F _H (GHz)	Limit (GHz)
Sweep	244.71	24.002	24.00	24.247	24.25



Project No :RKSB240903001
Date: 26.NOV.2024 10:35:47

Tester :Hugh Wu

EUT PHOTOGRAPHS

Please refer to the attachment EXHIBIT A - EUT EXTERNAL PHOTOGRAPHS, 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*******