

FCC Part 15.249

TEST REPORT

For

Keeson Technology Corporation Limited

No. 195, Yuanfeng East Road, Wangjiangjing, Xiuzhou District, Jiaxing City, China
314000

FCC ID: 2AK23-RF405A

Report Type:
Original Report

Product Type:
REMOTE CONTROL

Report Producer : Jojo Lu *Jojo Lu*

Report Number : RXZ211109005RF01

Report Date : 2021-12-14

Reviewed By: Andy Shih *Andy Shih*

Prepared By: Bay Area Compliance Laboratories Corp.

70, Lane 169, Sec. 2, Datong Road, Xizhi Dist.,

New Taipei City 22183, Taiwan, R.O.C.

Tel: +886 (2) 2647 6898

Fax: +886 (2) 2647 6895

www.bacl.com.tw

Revision History

Revision	No.	Report Number	Issue Date	Description	Author/ Revised by
1.0	RXZ211109005	RXZ211109005RF01	2021-12-14	Original Report	Jojo Lu

TABLE OF CONTENTS

1	General Information	4
1.1	Product Description for Equipment under Test (EUT)	4
1.2	Objective	5
1.3	Related Submittal(s)/Grant(s).....	5
1.4	Test Methodology.....	5
1.5	Statement of Compliance	5
1.6	Measurement Uncertainty	5
1.7	Environmental Conditions.....	6
1.8	Test Facility.....	6
2	System Test Configuration	7
2.1	Description of Test Configuration.....	7
2.2	Equipment Modifications	7
2.3	EUT Exercise Software	7
2.4	Support Equipment List and Details.....	7
2.5	External Cable List and Details.....	7
2.6	Block Diagram of Test Setup	8
3	Summary of Test Results.....	9
4	Test Equipment List and Details.....	10
5	FCC §15.203 – Antenna Requirements	11
5.1	Applicable Standard	11
5.2	Antenna Information	11
6	FCC §15.205, §15.209 , §15.249 - Radiated Emissions.....	12
6.1	Applicable Standard.....	12
6.2	EUT Setup.....	12
6.3	EMI Test Receiver & Spectrum Analyzer Setup.....	13
6.4	Test Procedure.....	13
6.5	Corrected Factor & Margin Calculation	13
6.6	Test Results Summary	13
6.7	Test Results	14
7	FCC §15.215(c) – 20 dB Bandwidth Testing.....	19
7.1	Applicable Standard.....	19
7.2	Test Procedure.....	19
7.3	Test Results	19

1 General Information

1.1 Product Description for Equipment under Test (EUT)

Applicant	Keeson Technology Corporation Limited
	No. 195, Yuanfeng East Road, Wangjiangjing, Xiuzhou District, Jiaxing City, China 314000
Manufacturer	Keeson Technology Corporation Limited
	No. 195, Yuanfeng East Road, Wangjiangjing, Xiuzhou District, Jiaxing City, China 314000
Brand(Trade) Name	N/A
Product (Equipment)	REMOTE CONTROL
Main Model Name	RF405A
Series Model Name	N/A
Frequency Range	2403 ~ 2480 MHz
Antenna Specification	PCB Antenna / 1 dBi
Power Operation (Voltage Range)	<input type="checkbox"/> AC 120V/60Hz <input type="checkbox"/> Adapter <input type="checkbox"/> By AC Power Cord <input type="checkbox"/> PoE
	<input checked="" type="checkbox"/> DC Type <input checked="" type="checkbox"/> Battery 3V (AAA 1.5V*2) <input type="checkbox"/> DC Power Supply <input type="checkbox"/> External from USB Cable <input type="checkbox"/> External DC Adapter
	<input type="checkbox"/> Host System
Received Date	Nov 09, 2021
Date of Test	Nov 24, 2021 ~ Nov 29, 2021

**All measurement and test data in this report was gathered from production sample serial number: RXZ211109005(Assigned by BACL).*

1.2 Objective

This report is prepared on behalf of *Keeson Technology Corporation Limited* in accordance with Part 2, Subpart J, Part 15, Subparts A and C of the Federal Communication Commission's rules.

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

1.3 Related Submittal(s)/Grant(s)

N/A.

1.4 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.

1.5 Statement of Compliance

Decision Rule: No, (The test results do not include MU judgment)

It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp.

Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

The determination of the test results does not require consideration of the uncertainty of the measurement, unless the assessment is required by customer agreement, regulation or standard document specification.

Bay Area Compliance Laboratories Corp.is not responsible for the authenticity of the information provided by the applicant that affects the test results.

1.6 Measurement Uncertainty

Parameter	Uncertainty	
Emission Bandwidth	+/- 0.35 MHz	
	30 MHz~1GHz	+/- 5.22 dB
	1 GHz~18 GHz	+/- 6.12 dB
	18 GHz~40 GHz	+/- 4.99 dB
Temperature	+/- 1.27 °C	
Humidity	+/- 3 %	

1.7 Environmental Conditions

Test Site	Test Data	Temperature (°C)	Relative Humidity (%)	ATM Pressure (hPa)	Test Engineer
Radiation Spurious Emissions	2021/11/24~2021/11/25	23.2~24.7	56~58	1010	Howard Ho
20 dB Emission Bandwidth	2021/11/29	24.5	52	1010	Ken Yu

1.8 Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. to collect test data is located on

☒70, Lane 169, Sec. 2, Datong Road, Xizhi Dist., New Taipei City 22183, Taiwan, R.O.C.

Bay Area Compliance Laboratories Corp.is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code: 3732) and the FCC designation No.TW3732 under the Mutual Recognition Agreement (MRA) in FCC Test.

2 System Test Configuration

2.1 Description of Test Configuration

The system was configured for testing in an engineering mode, which was provided by manufacturer. The engineering mode was configured the system transmitting with maximum power.

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2403	40	2442
2	2404
...
38	2440	77	2479
39	2441	78	2480

Tested with channel 1, 40 and 78.

2.2 Equipment Modifications

No modification was made to the EUT.

2.3 EUT Exercise Software

Use the buttons on the remote control to switch the test channel.

Test Frequency	Low	Mid	High
Power Level Setting	Default	Default	Default

2.4 Support Equipment List and Details

N/A

2.5 External Cable List and Details

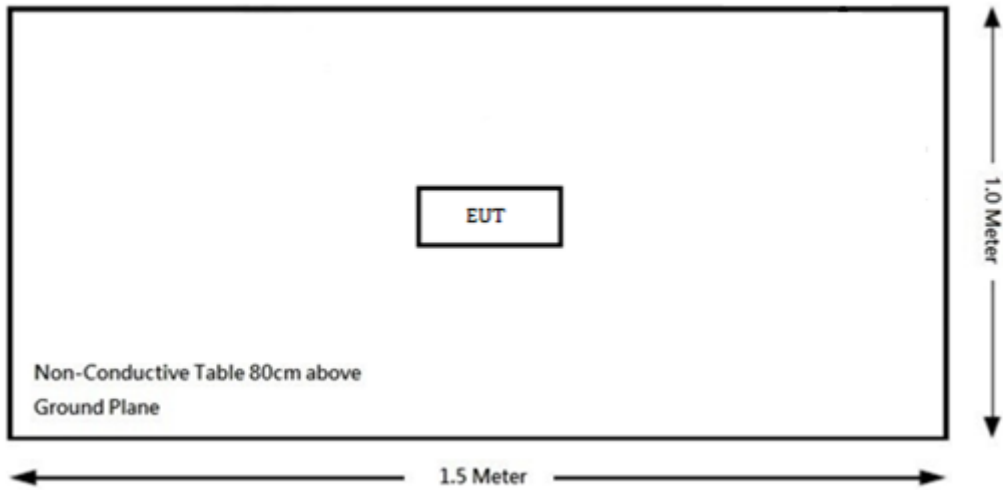
N/A

2.6 Block Diagram of Test Setup

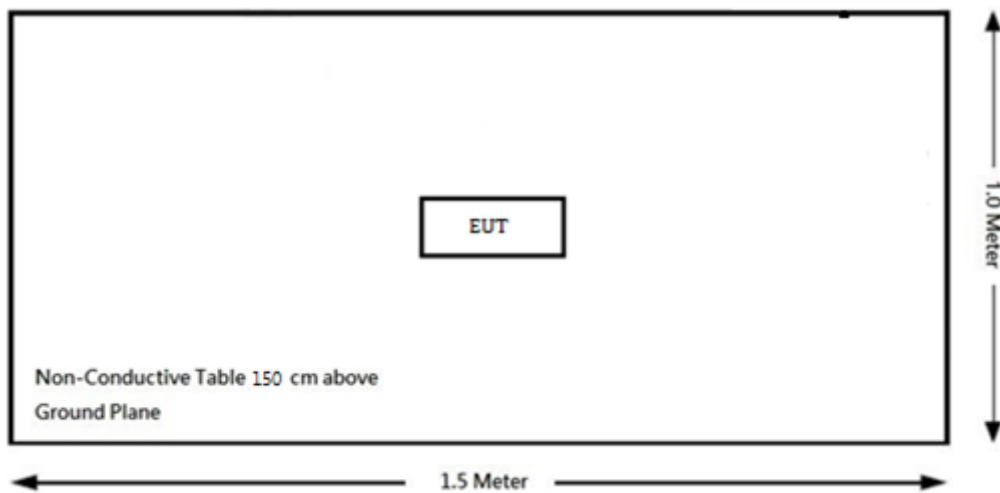
See test photographs attached in setup photos for the actual connections between EUT and support equipment.

Radiation:

Below 1GHz:



Above 1GHz:



3 Summary of Test Results

FCC Rules	Description of Test	Results
§15.203	Antenna Requirement	Compliance
§15.207 (a)	AC Line Conducted Emissions	Not applicable
§15.205, §15.209, §15.249	Radiated Emissions	Compliance
§15.215 (c)	20 dB Emission Bandwidth	Compliance

Not applicable: The EUT is powered by batteries.

4 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Room (966-A)					
Bilog Antenna with 6 dB Attenuator	SUNOL SCIENCES & MINI-CIRCUITS	JB6/UNAT-6+	A050115/15542_01	2021/01/19	2022/01/18
Horn Antenna	EMCO	SAS-571	1020	2021/04/23	2022/04/22
Horn Antenna	ETS-Lindgren	3116	62638	2021/08/11	2022/08/10
Preamplifier	Sonoma	310N	130602	2021/06/08	2022/06/07
Microwave Preamplifier	EM Electronics Corporation	EM18G40G	060656	2020/12/30	2021/12/29
EMI Test Receiver	Rohde & Schwarz	ESR7	101419	2021/11/09	2022/11/08
Spectrum Analyzer	Rohde & Schwarz	FSV40	101435	2021/01/07	2022/01/06
Preamplifier	A.H. system Inc.	PAM-0118P	470	2021/3/15	2022/3/14
Micro flex Cable	UTIFLEX	UFB197C-1-2362-70U-70U	225757-001	2021/2/1	2022/1/31
Coaxial Cable	COMMATE	PEWC	8Dr	2020/12/25	2021/12/24
Coaxial Cable	UTIFLEX	UFB311A-Q-1440-300300	220490-006	2021/2/1	2022/1/31
Coaxial Cable	JUNFLON	J12J102248-00-B-5	AUG-07-15-044	2020/12/25	2021/12/24
Cable	EMC	EMC105-SM-SM-10000	201003	2021/2/3	2022/2/2
Software	Farad	EZ_EMG	BACL-03A1	N.C.R	N.C.R
Conducted Room					
Spectrum Analyzer	Rohde & Schwarz	FSV40	101140	2021/01/07	2022/01/06
Cable	UTIFLEX	UFA210A	9435	2021/10/5	2022/10/4

***Statement of Traceability:** BACL Corp. attests that all of the calibrations on the equipment items listed above were traceable to the SI System of Units via the R.O.C. Center for Measurement Standards of the Electronics Testing Center, Taiwan (ETC) or to another internationally recognized National Metrology Institute (NMI), and were compliant with the current Taiwan Accreditation Foundation (TAF) requirements

5 FCC §15.203 – Antenna Requirements

5.1 Applicable Standard

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.

5.2 Antenna Information

Type	Antenna Gain
PCB Antenna	1 dBi

The EUT has one integral antenna arrangement, which was permanently attached; fulfill the requirement of this section.

Result: Compliance.

6 FCC §15.205, §15.209 , §15.249 - Radiated Emissions

6.1 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:

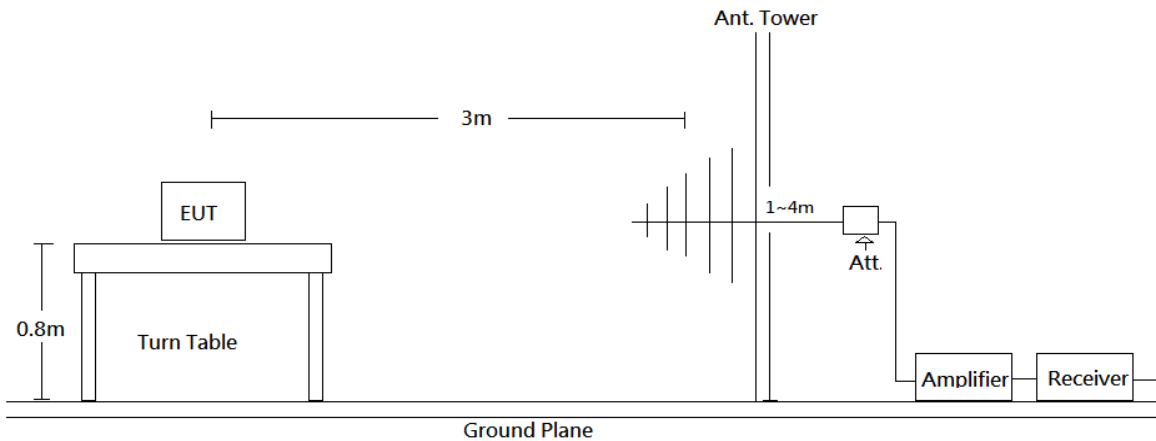
Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
920-928 MHz	50	500
2400-2483.5 MHz	50	500
5725-5875 MHz	50	500
24.0-24.25 GHz	250	2500

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

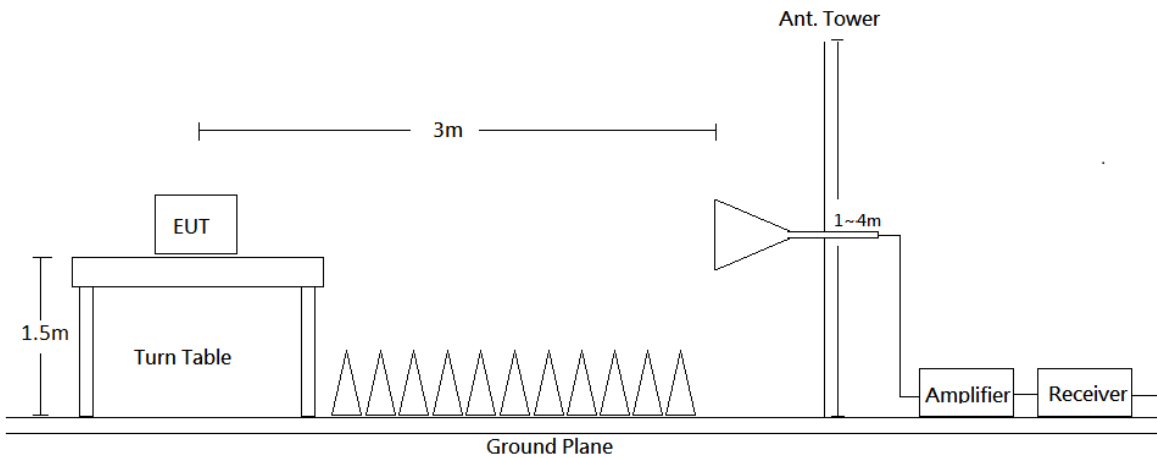
As per FCC§15.249 (d), Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

6.2 EUT Setup

Below 1 GHz:



Above 1 GHz:



Radiated 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, and FCC 15.249 limits.

6.3 EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 26.5 GHz. During the radiated emission test, the EMI test receiver was set with the following configurations measurement method 6.3 in ANSI C63.10.

Frequency Range	RBW	VBW	Measurement method
30-1000 MHz	120 kHz	/	QP
Above 1 GHz	1 MHz	3 MHz	PK
	1 MHz	10 Hz	Ave

6.4 Test Procedure

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

All data was recorded in the Quasi-peak detector mode from 30 MHz to 1 GHz and PK and average detector modes for frequencies above 1 GHz.

6.5 Corrected Factor & Margin Calculation

The Correct Factor 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:

$$\text{Correct Factor} = \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

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

$$\text{Margin} = \text{Result} - \text{Limit}$$

6.6 Test Results Summary

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

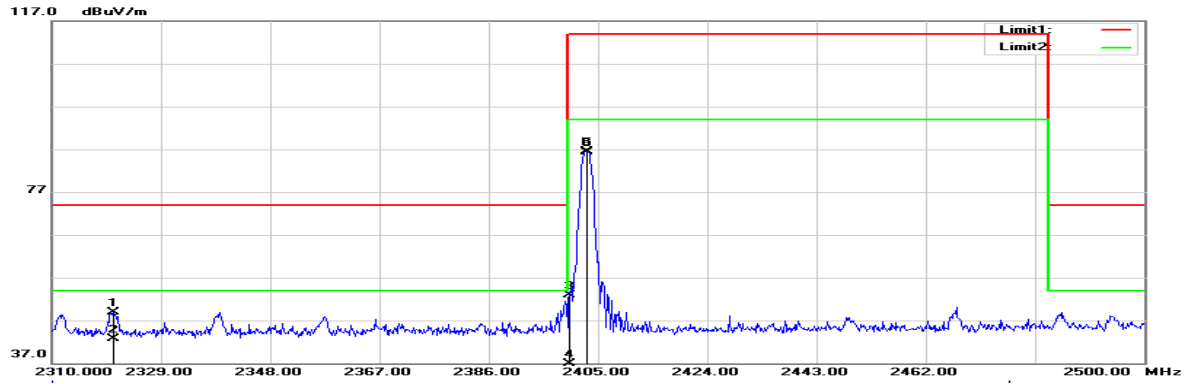
6.7 Test Results

Test Mode: Transmitting

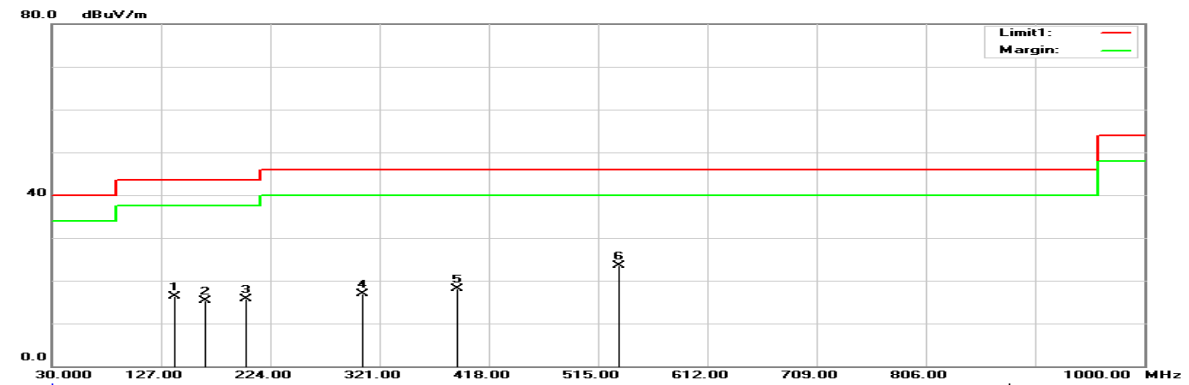
(Pre-scan with three orthogonal axis, and worse case as X axis.)

Horizontal (worst case is low channel)

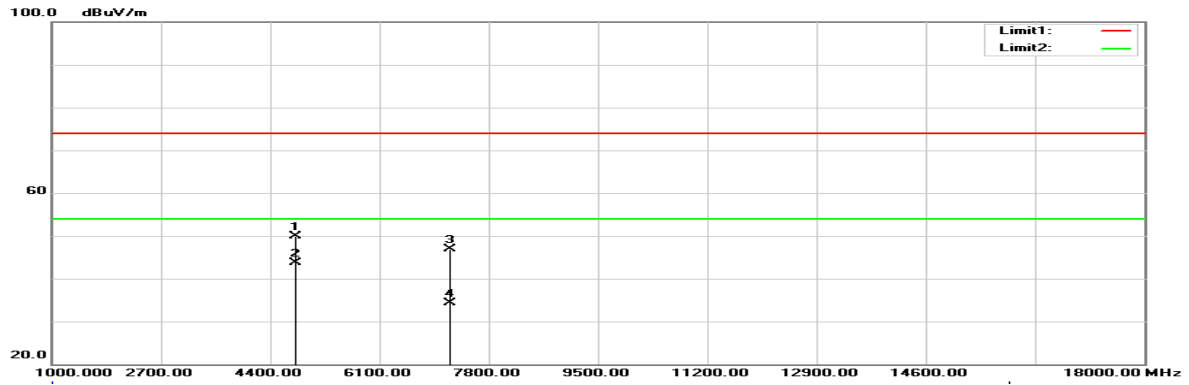
Fundamental:



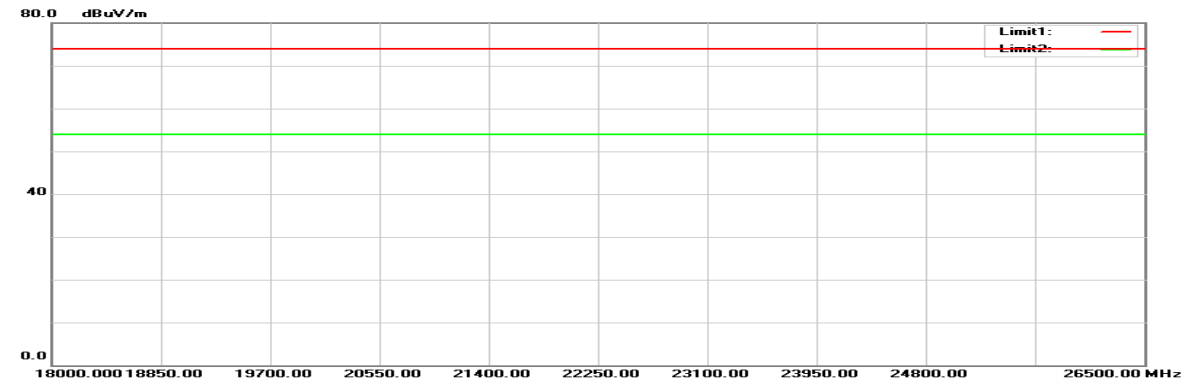
30MHz-1GHz:



1GHz-18GHz:

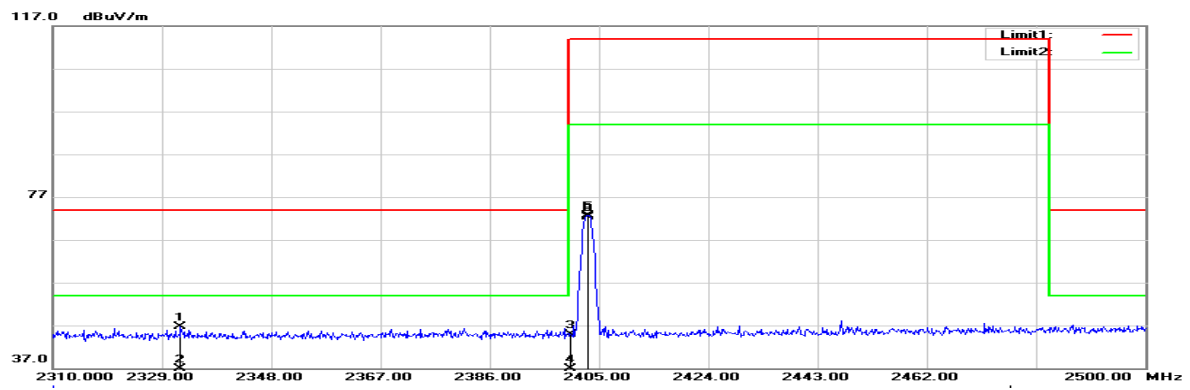


18GHz-26.5GHz:

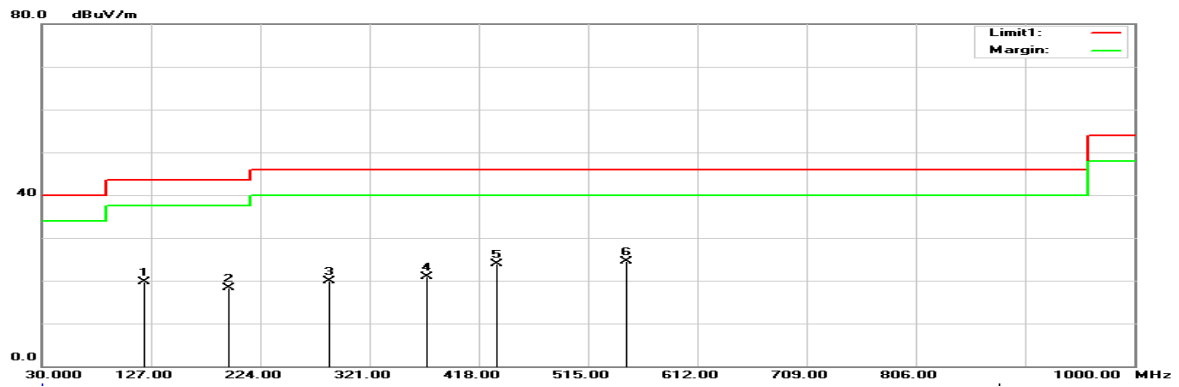


Vertical (worst case is low channel)

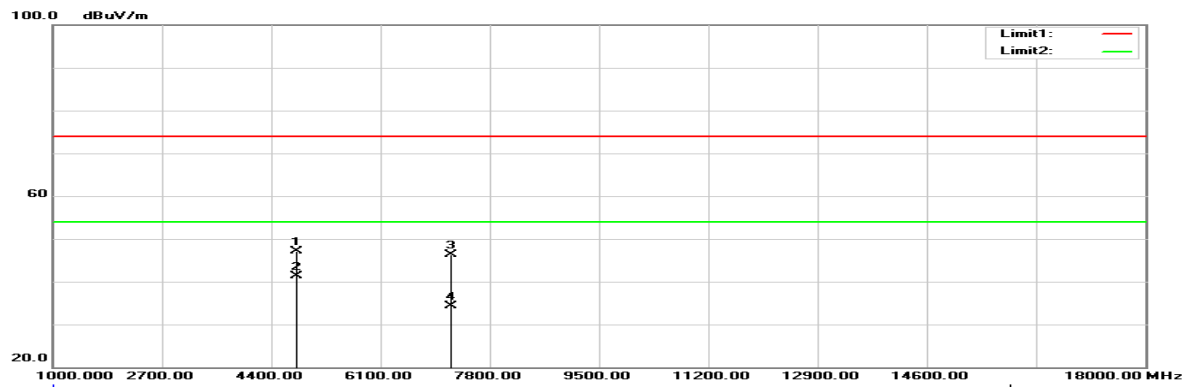
Fundamental:



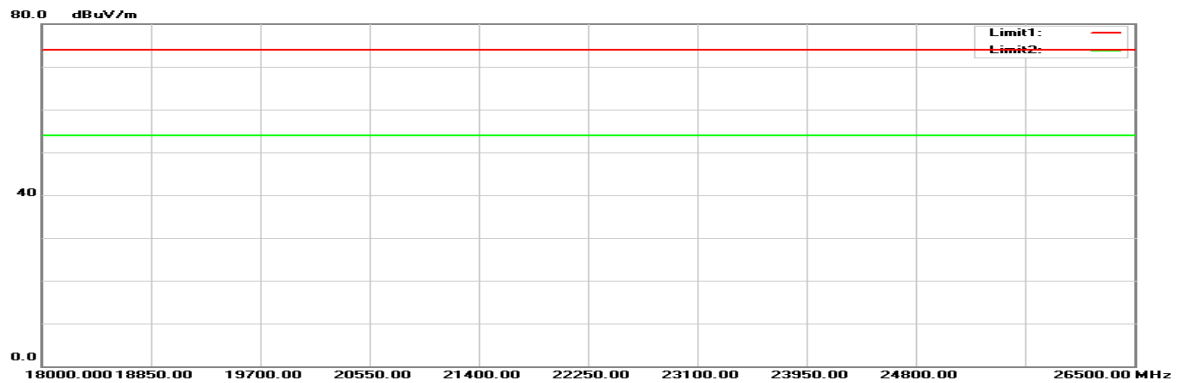
30MHz-1GHz:



1GHz-18GHz:



18GHz-26.5GHz:



Below 1GHz**Horizontal**

Frequency (MHz)	Reading (dB μ V)	Correct Factor(dB/m)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Height (cm)	Degree ($^{\circ}$)	Remark
138.6400	27.01	-10.69	16.32	43.50	-27.18	100	124	peak
165.8000	27.04	-11.71	15.33	43.50	-28.17	100	245	peak
202.6600	27.68	-11.91	15.77	43.50	-27.73	100	322	peak
305.4800	26.81	-9.98	16.83	46.00	-29.17	100	14	peak
389.8700	26.15	-8.04	18.11	46.00	-27.89	100	222	peak
533.4300	29.23	-5.64	23.59	46.00	-22.41	100	155	peak

Vertical

Frequency (MHz)	Reading (dB μ V)	Correct Factor(dB/m)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Height (cm)	Degree ($^{\circ}$)	Remark
121.1800	29.94	-10.21	19.73	43.50	-23.77	100	124	peak
195.8700	30.06	-11.70	18.36	43.50	-25.14	100	136	peak
285.1100	30.18	-10.20	19.98	46.00	-26.02	100	156	peak
371.4400	29.61	-8.61	21.00	46.00	-25.00	100	311	peak
434.4900	30.57	-6.75	23.82	46.00	-22.18	100	245	peak
548.9500	30.07	-5.59	24.48	46.00	-21.52	100	56	peak

Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported.

Above 1GHz**Horizontal**

Frequency (MHz)	Reading (dB μ V)	Correct Factor(dB/m)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Height (cm)	Degree ($^{\circ}$)	Remark
Low channel								
2320.640	58.80	-9.80	49.00	74.00	-25.00	100	360	peak
2320.640	52.54	-9.80	42.74	54.00	-11.26	100	360	AVG
2400.000	62.32	-9.38	52.94	74.00	-21.06	100	360	peak
2400.000	42.79	-9.38	33.41	54.00	-20.59	100	360	AVG
2403.000	95.95	-9.35	86.60	114.00	-27.40	100	360	peak
2403.000	95.65	-9.35	86.30	94.00	-7.70	100	360	AVG
4806.000	52.08	-2.16	49.92	74.00	-24.08	138	360	peak
4806.000	45.83	-2.16	43.67	54.00	-10.33	138	360	AVG
7209.000	42.69	4.21	46.90	74.00	-27.10	145	257	peak
7209.000	30.18	4.21	34.39	54.00	-19.61	145	257	AVG
Middle channel								
2442.000	94.62	-9.02	85.60	114.00	-28.40	100	360	peak
2442.000	94.56	-9.02	85.54	94.00	-8.46	100	360	AVG
4884.000	55.18	-3.08	52.10	74.00	-21.90	120	360	peak
4884.000	47.98	-3.08	44.90	54.00	-9.10	120	360	AVG
7326.000	48.06	3.55	51.61	74.00	-22.39	100	110	peak
7326.000	41.89	3.55	45.44	54.00	-8.56	100	110	AVG
High channel								
2480.000	95.15	-8.50	86.65	114.00	-27.35	139	0	peak
2480.000	94.10	-8.50	85.60	94.00	-8.40	139	0	AVG
2485.750	56.40	-8.42	47.98	74.00	-26.02	139	0	peak
2485.750	43.06	-8.42	34.64	54.00	-19.36	139	0	AVG
4960.000	44.26	-1.49	42.77	74.00	-31.23	153	246	peak
4960.000	32.60	-1.49	31.11	54.00	-22.89	153	246	AVG
7440.000	42.56	5.23	47.79	74.00	-26.21	149	278	peak
7440.000	30.56	5.23	35.79	54.00	-18.21	149	278	AVG

Result = Reading + Correct Factor

Margin = Result - Limit

Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported.

Vertical

Frequency (MHz)	Reading (dB μ V)	Correct Factor(dB/m)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Height (cm)	Degree ($^{\circ}$)	Remark
Low channel								
2332.230	56.47	-9.80	46.67	74.00	-27.33	123	293	peak
2332.230	42.83	-9.80	33.03	54.00	-20.97	123	293	AVG
2400.000	54.27	-9.38	44.89	74.00	-29.11	123	293	peak
2400.000	42.19	-9.38	32.81	54.00	-21.19	123	293	AVG
2403.000	82.06	-9.35	72.71	114.00	-41.29	123	293	peak
2403.000	81.56	-9.35	72.21	94.00	-21.79	123	293	AVG
4806.000	49.31	-2.16	47.15	74.00	-26.85	130	149	peak
4806.000	43.50	-2.16	41.34	54.00	-12.66	130	149	AVG
7209.000	42.19	4.21	46.40	74.00	-27.60	146	285	peak
7209.000	30.17	4.21	34.38	54.00	-19.62	146	285	AVG
Middle channel								
2442.000	81.41	-9.02	72.39	114.00	-41.61	100	308	peak
2442.000	81.10	-9.02	72.08	94.00	-21.92	100	308	AVG
4884.000	51.06	-3.08	47.98	74.00	-26.02	118	179	peak
4884.000	46.08	-3.08	43.00	54.00	-11.00	118	179	AVG
7326.000	45.79	3.55	49.34	74.00	-24.66	108	203	peak
7326.000	36.26	3.55	39.81	54.00	-14.19	108	203	AVG
High channel								
2480.000	79.68	-8.50	71.18	114.00	-42.82	100	328	peak
2480.000	79.06	-8.50	70.56	94.00	-23.44	100	328	AVG
2491.450	55.34	-8.33	47.01	74.00	-26.99	100	328	peak
2491.450	42.32	-8.33	33.99	54.00	-20.01	100	328	AVG
4960.000	43.31	-1.49	41.82	74.00	-32.18	154	218	peak
4960.000	32.60	-1.49	31.11	54.00	-22.89	154	218	AVG
7440.000	42.02	5.23	47.25	74.00	-26.75	146	325	peak
7440.000	30.01	5.23	35.24	54.00	-18.76	146	325	AVG

Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported.

7 FCC §15.215(c) – 20 dB Bandwidth Testing

7.1 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.

7.2 Test Procedure

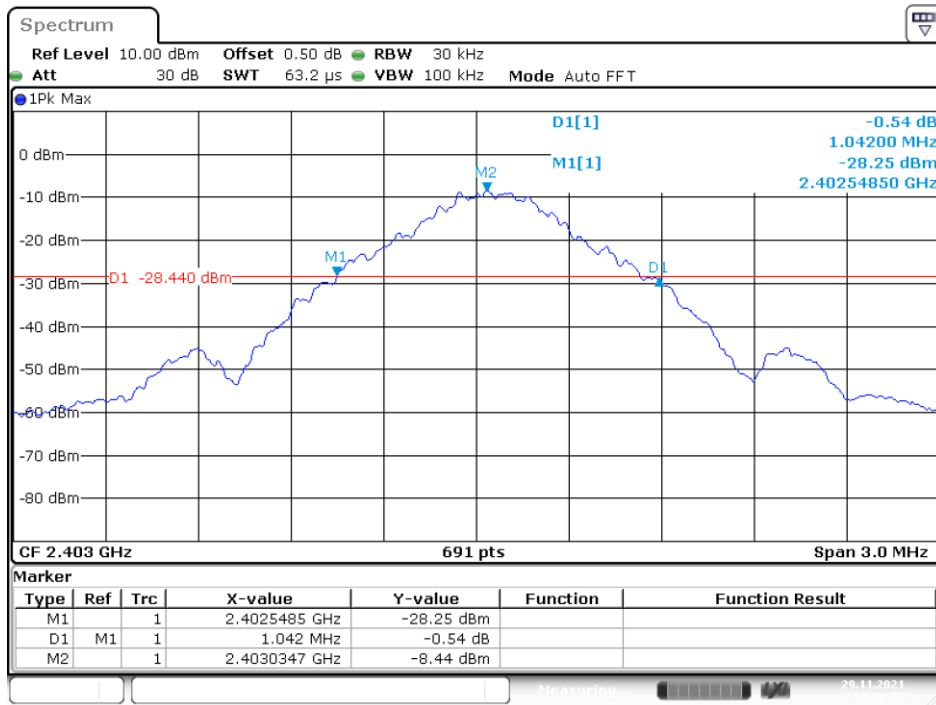
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency 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.

7.3 Test Results

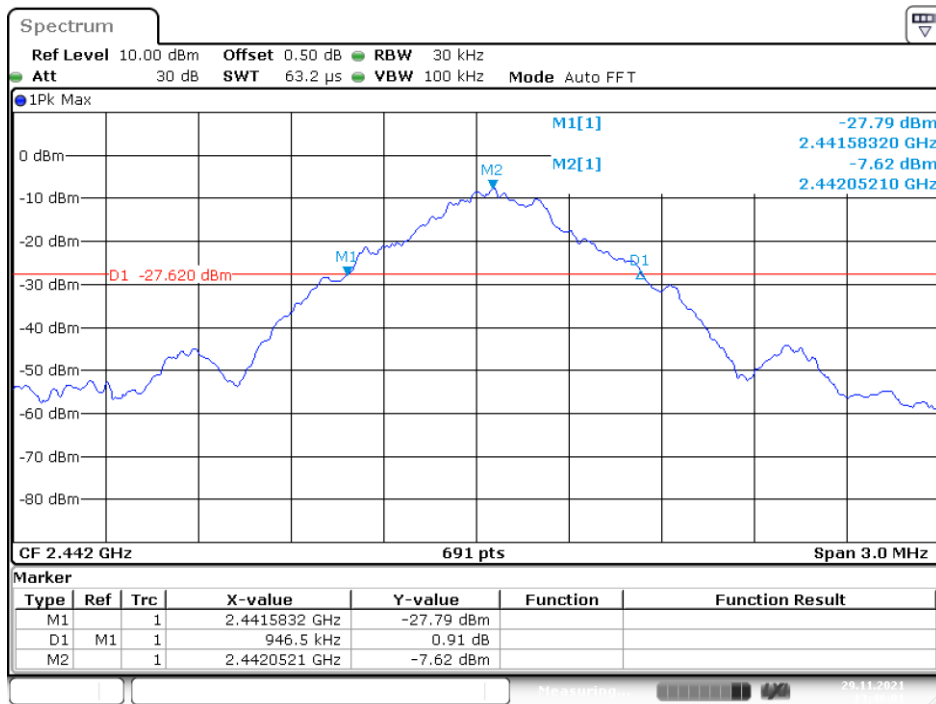
Channel	Frequency (MHz)	20 dB Emission Bandwidth (kHz)
Low	2403	1042.0
Middle	2442	946.5
High	2480	968.2

Please refer to the following plots

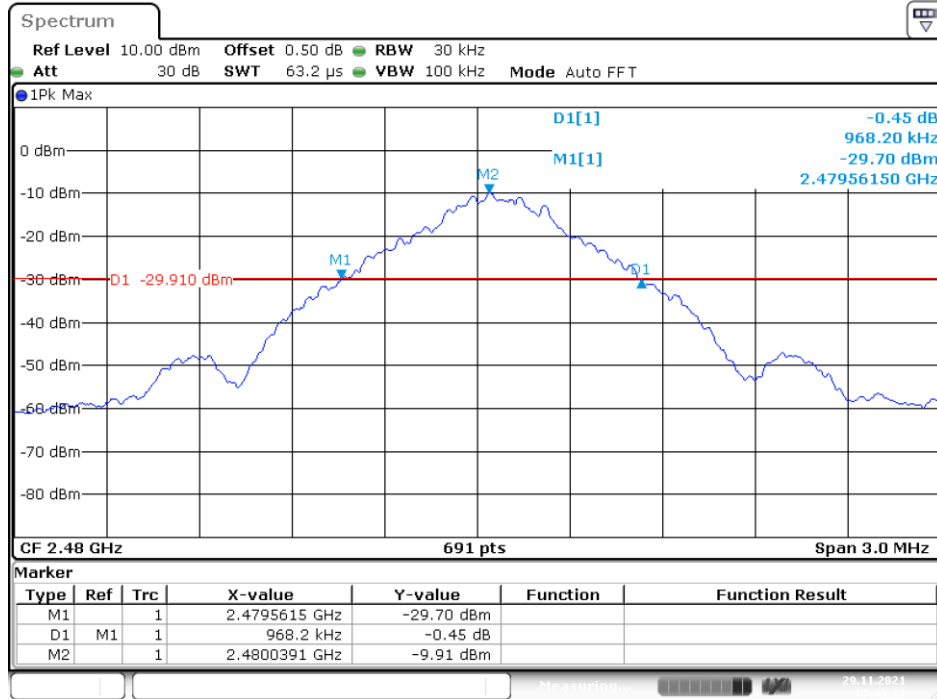
Low Channel



Middle Channel



High Channel



Date: 29.NOV.2021 13:43:11

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