



FCC PART 15.249 TEST REPORT

On Behalf of

Feit Electric company Inc.

4901 Gregg Road Pico Rivera, Ca 90660

FCC ID: SYW-SL2412CCRM

Model: SL2412RGBWWFIL/REM

October 22, 2024

This Report Concerns: <input checked="" type="checkbox"/> Original Report	Equipment Type: remote control
Test Engineer: <u>LBi Li / LBi Li</u>	
Report Number: <u>QCT24JR-2222E-01</u>	
Test Date: <u>October 14, 2024 ~ October 22, 2024</u>	
Reviewed By: <u>Vincent Yang / Vincent Yang</u>	
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Table of Contents

1. GENERAL INFORMATION	4
1.1 Product Description for Equipment under Test (EUT)	4
1.2 System Test Configuration	5
1.3 Test Facility	6
1.4 Measurement Uncertainty	6
2. SUMMARY OF TEST RESULTS	7
3. LIST OF TEST AND MEASUREMENT INSTRUMENTS	8
3.1 Radiated Emission Test	8
3.2 RF Conducted test	8
4. ANTENNA REQUIREMENT	9
5. RADIATED EMISSION METHOD	10
5.1 Applicable Standard	10
5.2 Limit	10
5.3 Receiver setup	10
5.4 Test setup	10
5.5 Test Procedure	11
5.6 Test Data	12
6. 20DB OCCUPY BANDWIDTH	17
6.1 Applicable Standard	17
6.2 Limit	17
6.3 Test setup	17
6.4 Test Procedure	17
6.5 Test Data	17



Revision History of This Test Report



1. GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

EUT Description	remote control
Model No.	SL2412RGBWWFIL/REM
Tested Model	SL2412RGBWWFIL/REM
Sample(s) Status	Engineer sample
Operation Frequency:	2402~2480MHz
Channel numbers:	3
Modulation type:	GFSK
Antenna Type:	PCB antenna
Antenna gain ^{*1} :	2.21dBi
Power supply:	DC 3V (Powered by 2*1.5V AAA battery)
Trade Mark:	N/A
Applicant	Feit Electric company Inc.
Address	4901 Gregg Road Pico Rivera, Ca 90660
Manufacturer	Feit Electric company Inc.
Address	4901 Gregg Road Pico Rivera, Ca 90660
Sample No.	Y24J2222E01WC

Note: *1This information provided by Manufacturer, SZ QC Lab is not responsible for the accuracy of this information.



1.2 System Test Configuration

1.2.1 Channel List

Operation Frequency each of channel					
Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2402MHz	2	2440MHz	3	2480MHz

Note: In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency	Channel	Frequency
The lowest channel	2402MHz	The middle channel	2440MHz
The Highest channel	2480MHz		

1.2.2 Support Equipment

N/A

1.2.3 Test mode and voltage

Transmitting mode: Keep the EUT in continuously transmitting.

Test voltage: DC 3V



1.3 Test Facility

Test Firm : Shenzhen QC Testing Laboratory Co., Ltd.

The testing quality ability of our laboratory meet with "Quality Law of People's Republic of China" Clause 19. The testing quality system of our laboratory meets with ISO/IEC-17025 requirements. This approval result is accepted by MRA of APLAC.

Our test facility is recognized, certified, or accredited by the following organizations:

CNAS – Registration No.: L8464

The EMC Laboratory has been accredited by CNAS, and in compliance with ISO/IEC 17025:2017 General Requirements for testing Laboratories.

A2LA Certificate Number: 6759.01

The EMC Laboratory has been accredited by A2LA, and in compliance with ISO/IEC 17025:2017 General Requirements for testing Laboratories.

FCC Registration Number: 561109

The EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications commission.

IC Registration Number: 29628

CAB identifier: CN0141

The EMC Laboratory has been registered and fully described in a report filed with the (IC) Industry Canada.

1.4 Measurement Uncertainty

Parameter	Uncertainty
Occupied Channel Bandwidth	$\pm 1.42 \times 10^{-1}$
RF output power, conducted	$\pm 1.06\text{dB}$
Power Spectral Density, conducted	$\pm 1.06\text{dB}$
Unwanted Emissions, conducted	$\pm 2.51\text{dB}$
AC Power Line Conducted Emission	$\pm 1.80\text{dB}$
Radiated Spurious Emission test (9kHz-30MHz)	$\pm 2.66\text{dB}$
Radiated Spurious Emission test (30MHz-1000MHz)	$\pm 4.04\text{dB}$
Radiated Spurious Emission test (1000MHz-18000MHz)	$\pm 4.70 \text{ dB}$
Radiated Spurious Emission test (18GHz-40GHz)	$\pm 4.80\text{dB}$
Temperature	$\pm 0.8^\circ\text{C}$
Humidity	$\pm 3.2\%$
DC and low frequency voltages	$\pm 0.1\%$
Time	$\pm 5\%$
Duty cycle	$\pm 5\%$

Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2



2. Summary of Test Results

Test Item	Section	Result
Antenna Requirement	15.203	Pass
Conduction Emission	15.207	Not Applicable
Radiated Emissions	15.205, 15.209, 15.249	Pass
20dB Bandwidth	15.215 (c)	Pass

Note: 1. Pass: The EUT complies with the essential requirements in the standard.
2. Test according to ANSI C63.10:2013
3.. All indications of Pass/Fail in this report are opinions expressed by Shenzhen QC Testing Laboratory Co., Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only.



3. List of Test and Measurement Instruments

3.1 Radiated Emission Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due
1.	EMI Test Receiver	R&S	ESIB 7	2277573376	2024.03.14	2025.03.13
2.	EMI Test Receiver	ESPI3	ESPI3	101131	2024.03.14	2025.03.13
3.	Spectrum Analyzer	Rohde&Schwarz	FSV 40	101458	2024.03.14	2025.03.13
4.	TRILOG Broadband Test-Antenna	SCHWARZBECK	VULB9168	VULB9168-588	2023.04.01	2025.03.31
5.	Loop Antenna	EMCO	6502	2133	2023.03.18	2025.03.17
6.	horn antenna	SCHWARZBECK	BBHA9120D	2069	2023.04.01	2025.03.31
7.	Horn Antenna	COM-MW	ZLB7-18-40G-950	12221225	2023.01.12	2025.01.09
8.	Pre-amplifier	MITEQ	TTA0001-18	2063645	2024.03.27	2025.03.26
9.	Pre-amplifier	COM-MW	DLAN-18000-40000-02	10229104	2024.03.14	2025.03.13
10.	966 Camber	ZhongYU	9*6*6	/	2023.05.08	2026.05.07

Radiated Emission Measurement Software: EZ_EMC Ver QCT03A2 RE+

3.2 RF Conducted test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due
1.	Wideband Radio Communication Tester	Rohde & Schwarz	CW500	151583	2024.03.14	2025.03.13
2.	Spectrum Analyzer	ROHDE & SCHWARZ	FSV 40	101458	2024.03.14	2025.03.13
3.	Signal Generator	Agilent	N5182A	MY50141563	2024.03.14	2025.03.13
4.	RF Automatic Test System	MW	MW100-RFCB/MW100-PSB	MW2007004	2024.03.14	2025.03.13

RF Conducted Measurement Software: MTS 8310 Ver 2.0.0.0



4. Antenna requirement

Standard requirement: FCC Part15 C Section 15.203

15.203 requirement:

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, 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.

EUT Antenna: The antenna is PCB Antenna, the best case gain of the antenna is 2.21dBi, reference to the Internal Photos for details.

5. Radiated Emission Method

5.1 Applicable Standard

FCC Part15 C Section 15.249

5.2 Limit

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
24.0-24.25 GHz	250	2500

As per FCC Section 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.

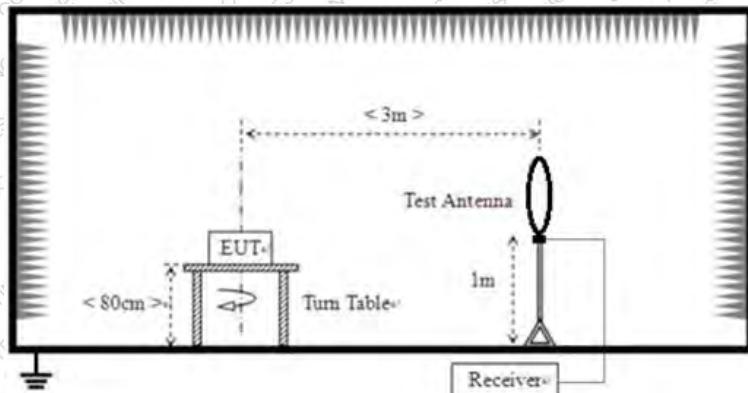
5.3 Receiver setup

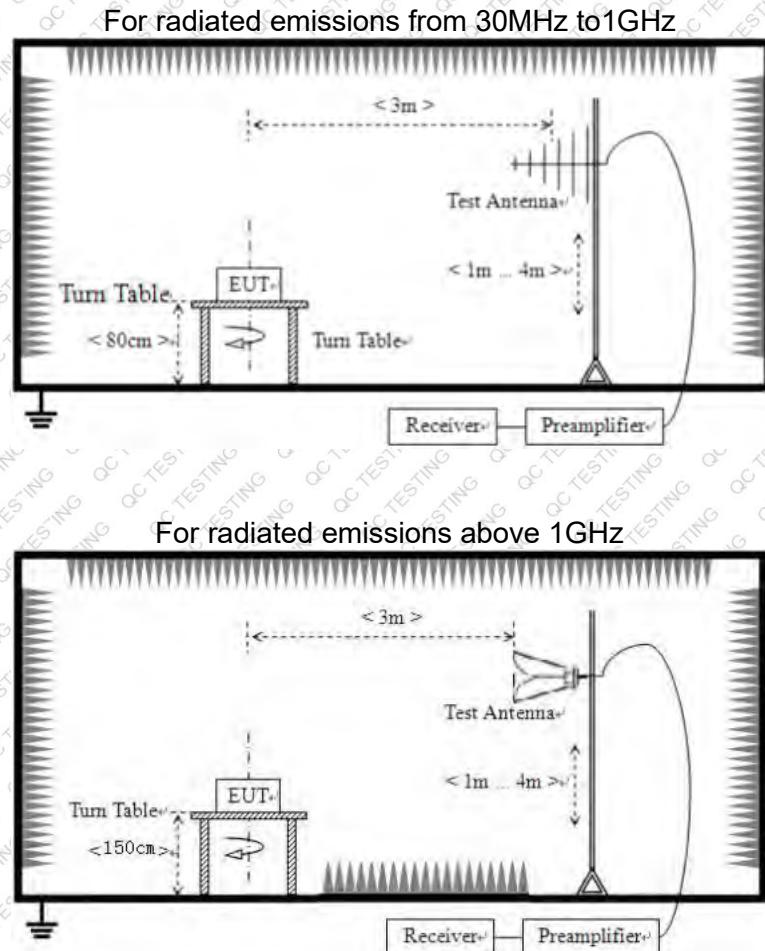
Frequency	Detector	RBW	VBW	Value
9KHz-150KHz	Quasi-peak	200Hz	600Hz	Quasi-peak
150KHz-30MHz	Quasi-peak	9KHz	30KHz	Quasi-peak
30MHz-1GHz	Quasi-peak	100KHz	300KHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

Remark: For the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission test in these three bands are based on measurements employing an average detector.

5.4 Test setup

For radiated emissions from 9kHz to 30MHz





5.5 Test Procedure

1. The EUT was placed on the top of a rotating table (0.8 meters for below 1GHz and 1.5 meters for above 1GHz) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.



5.6 Test Data

Temperature	26°C	Humidity	54%
ATM Pressure	101.1kPa	Antenna Gain	2.21dBi
Test by	LBi Li	Test result	PASS

Remarks:

Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis which is worse case.

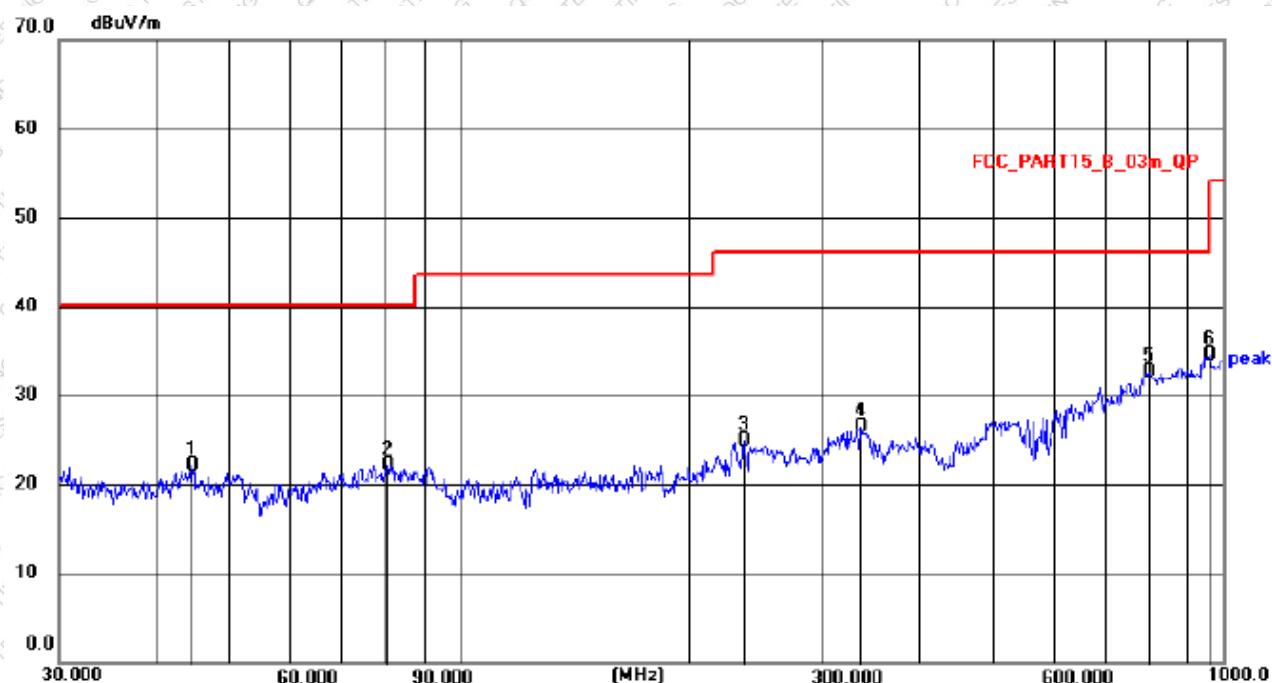
Measurement data:

9 kHz ~ 30 MHz

The low frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line per 15.31(o) was not reported.

Measurement data:

Pre-scan all test modes, found worst case at GFSK 2402MHz, and so only show the test result of GFSK 2402MHz.

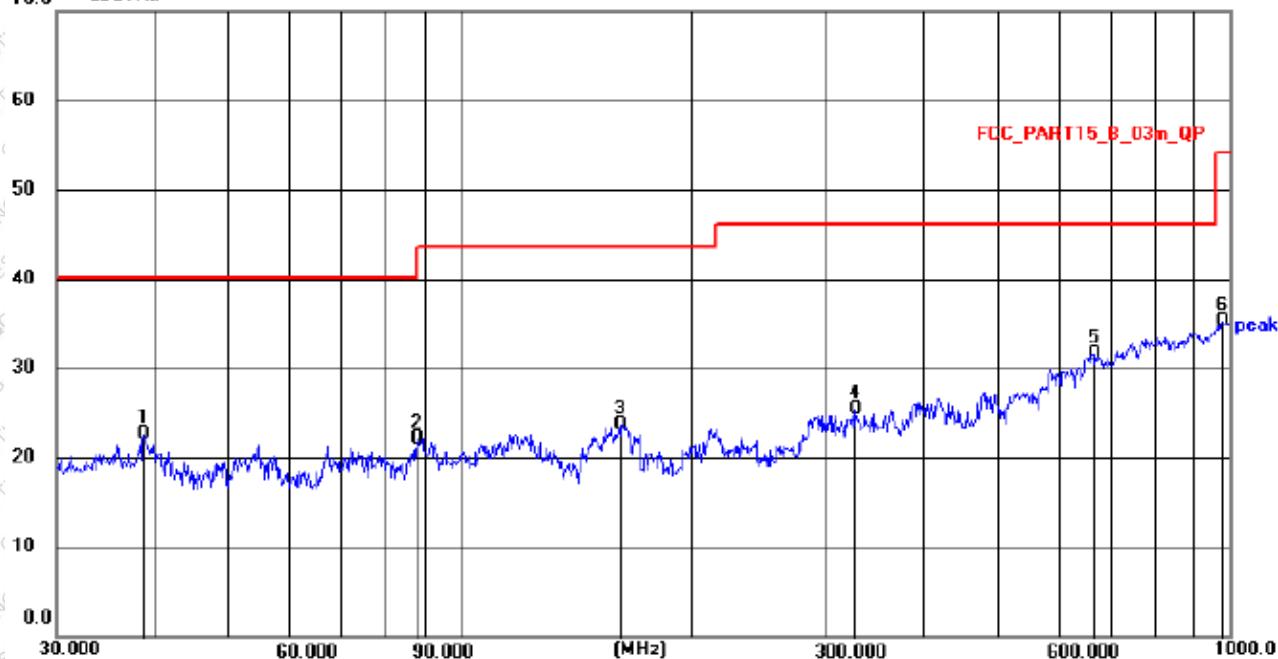
Below 1GHz:**Horizontal**

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	44.7433	7.48	14.72	22.20	40.00	17.80	QP
2	80.6440	11.81	10.38	22.19	40.00	17.81	QP
3	235.8163	11.95	13.05	25.00	46.00	21.00	QP
4	336.0350	10.75	15.73	26.48	46.00	19.52	QP
5 *	798.9796	8.26	24.45	32.71	46.00	13.29	QP
6	962.1621	7.66	26.83	34.49	54.00	19.51	QP



Vertical

70.0 dBuV/m



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	38.8877	8.28	14.32	22.60	40.00	17.40	QP
2	88.0327	12.18	10.02	22.20	43.50	21.30	QP
3	162.0413	9.54	14.19	23.73	43.50	19.77	QP
4	325.5957	10.32	15.11	25.43	46.00	20.57	QP
5 *	665.8034	9.37	22.29	31.66	46.00	14.34	QP
6	979.1802	8.39	26.81	35.20	54.00	18.80	QP



Above 1G:

Test channel: Lowest channel

Frequency (MHz)	Read Level (dB μ V)	polarization	Factor (dB/m)	Level (dB μ V/m)	Limit Line (dB μ V/m)	Margin (dB)	Detector
2310	52.77	H	-11.46	41.31	74	32.69	peak
2310	52.41	V	-11.46	40.95	74	33.05	peak
2390	54.59	H	-11.16	43.43	74	30.57	peak
2390	50.34	H	-11.16	39.18	54	14.82	AVG
2390	58.18	V	-11.16	47.02	74	26.98	peak
2390	53.82	V	-11.16	42.66	54	11.34	AVG
2400	60.53	H	-11.12	49.41	74	24.59	peak
2400	54.84	H	-11.12	43.72	54	10.28	AVG
2400	59.04	V	-11.12	47.92	74	26.08	peak
2400	54.28	V	-11.12	43.16	54	10.84	AVG
4804	61.52	H	-5.98	55.54	74	18.46	peak
4804	56.93	H	-5.98	50.95	54	3.05	AVG
4804	60.91	V	-5.98	54.93	74	19.07	peak
4804	56.45	V	-5.98	50.47	54	3.53	AVG
17386.383	40.50	H	10.94	51.44	74	22.56	peak
17386.383	32.14	H	10.94	43.08	54	10.92	AVG
17186.528	40.84	V	9.85	50.69	74	23.31	peak
17186.528	32.37	V	9.85	42.22	54	11.78	AVG

Test channel: Middle channel

Frequency (MHz)	Read Level (dB μ V)	polarization	Factor (dB/m)	Level (dB μ V/m)	Limit Line (dB μ V/m)	Margin (dB)	Detector
4880	61.21	H	-5.71	55.50	74	18.50	peak
4880	56.43	H	-5.71	50.72	54	3.28	AVG
4880	61.00	V	-5.71	55.29	74	18.71	peak
4880	55.74	V	-5.71	50.03	54	3.97	AVG
17588.562	39.43	H	12.04	51.47	74	22.53	peak
17588.562	30.35	H	12.04	42.39	54	11.61	AVG
17236.275	41.26	V	10.12	51.38	74	22.62	peak
17236.275	32.57	V	10.12	42.69	54	11.31	AVG



Test channel: Highest channel

Frequency (MHz)	Read Level (dB μ V)	polarization	Factor (dB/m)	Level (dB μ V/m)	Limit Line (dB μ V/m)	Margin (dB)	Detector
2483.5	59.49	H	-10.81	48.68	74	25.32	peak
2483.5	54.47	V	-10.81	43.66	74	30.34	peak
2500	51.19	H	-10.75	40.44	74	33.56	peak
2500	51.74	V	-10.75	40.99	74	33.01	peak
4960	60.53	H	-5.45	55.08	74	18.92	peak
4960	56.34	H	-5.45	50.89	54	3.11	AVG
4960	59.89	V	-5.45	54.44	74	19.56	peak
4960	54.82	V	-5.45	49.37	54	4.63	AVG
17087.464	42.03	H	9.32	51.35	74	22.65	peak
17087.464	33.47	H	9.32	42.79	54	11.21	AVG
17136.924	41.48	V	9.59	51.07	74	22.93	peak
17136.924	32.82	V	9.59	42.41	54	11.59	AVG

Frequency (MHz)	Read Level (dB μ V)	polarization	Factor (dB/m)	Peak value (dB μ V/m)	Average Limit (dB μ V/m)	Margin (dB)
2402	95.32	H	-11.12	84.20	93.98	9.78
2402	95.11	V	-11.12	83.99	93.98	9.99
2440	95.53	H	-10.97	84.56	93.98	9.42
2440	94.63	V	-10.97	83.66	93.98	10.32
2480	95.61	H	-10.82	84.79	93.98	9.19
2480	94.70	V	-10.82	83.88	93.98	10.10

Remarks:

1. Level =Reading + Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

6. 20dB Occupy Bandwidth

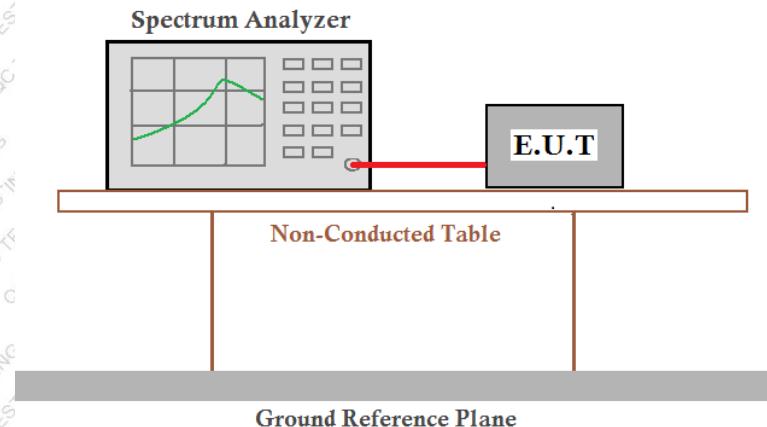
6.1 Applicable Standard

FCC Part15 C Section 15.215

6.2 Limit

N/A

6.3 Test setup



6.4 Test Procedure

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) Spectrum Setting:Bandwidth:
$$\text{RBW}=1\%-5\% \text{ OBW}, \text{ VBW}>3\text{RBW}$$
- (3) The bandwidth is measured at an amplitude level reduced 20dB from the reference level. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst -case (i.e the widest) bandwidth.

6.5 Test Data

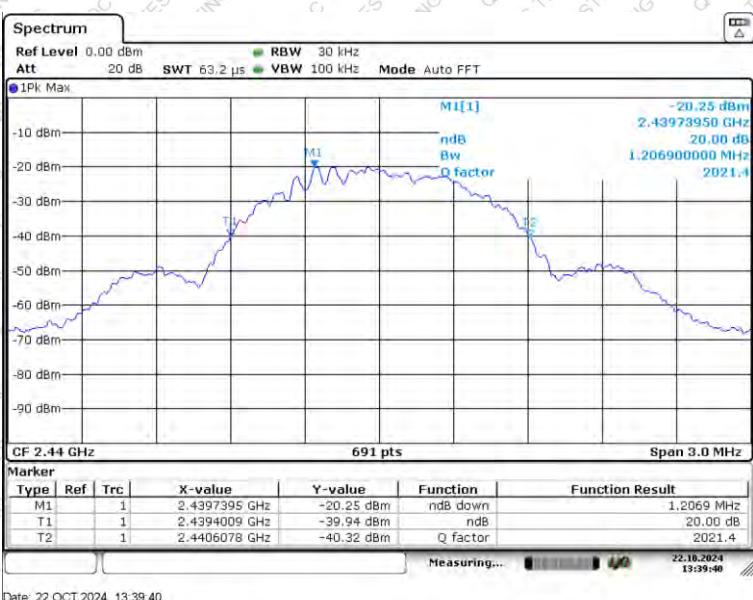
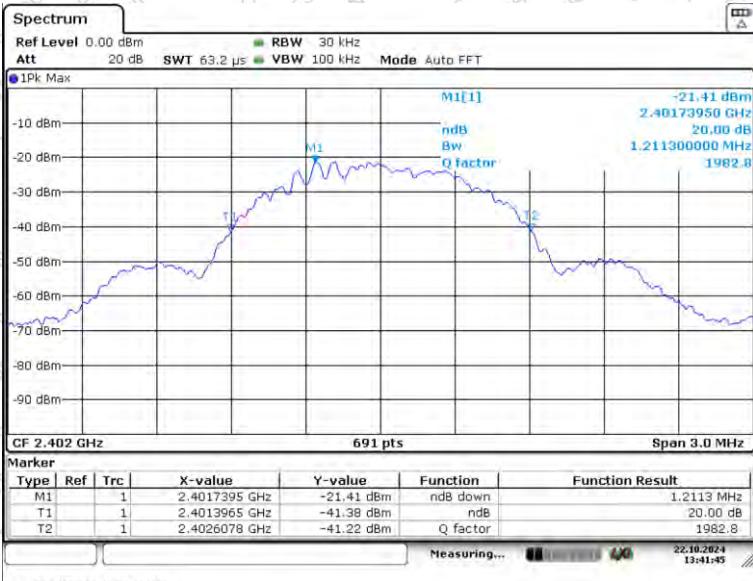
Temperature	24 °C	Humidity	52%
ATM Pressure	101.1kPa	Antenna Gain	2.21dBi
Test by	LBi Li	Test result	PASS

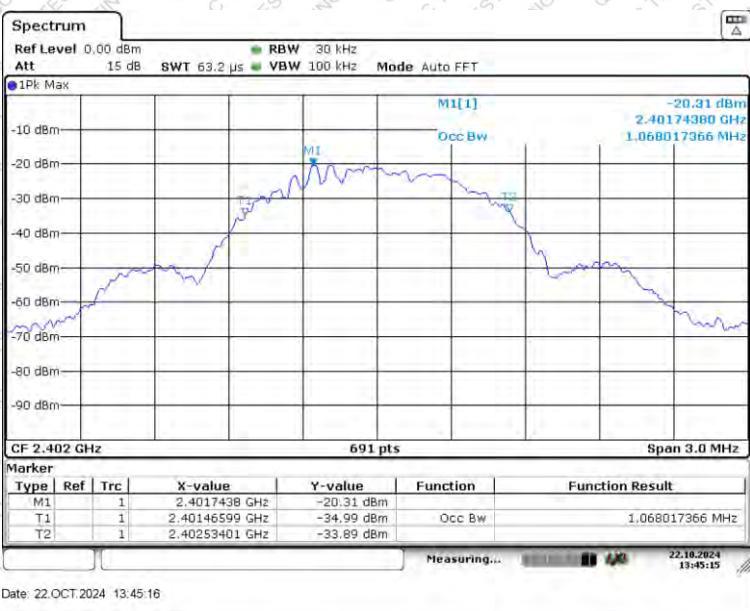
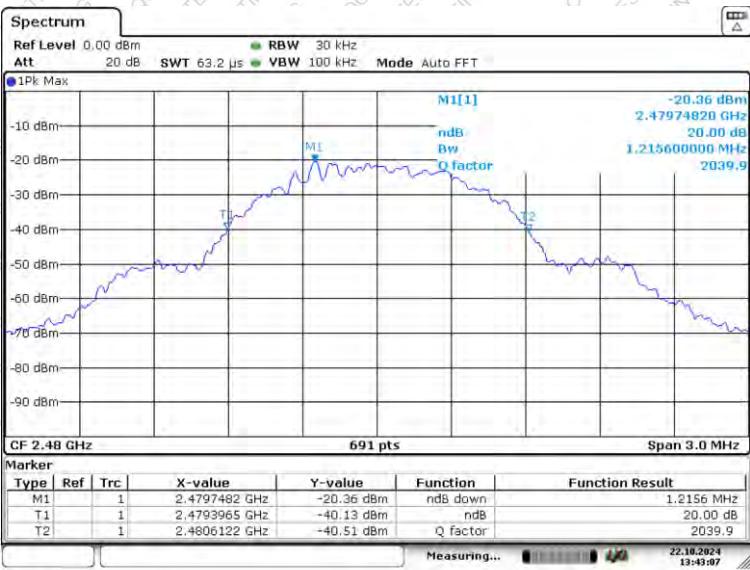
Please refer to following table and plots.

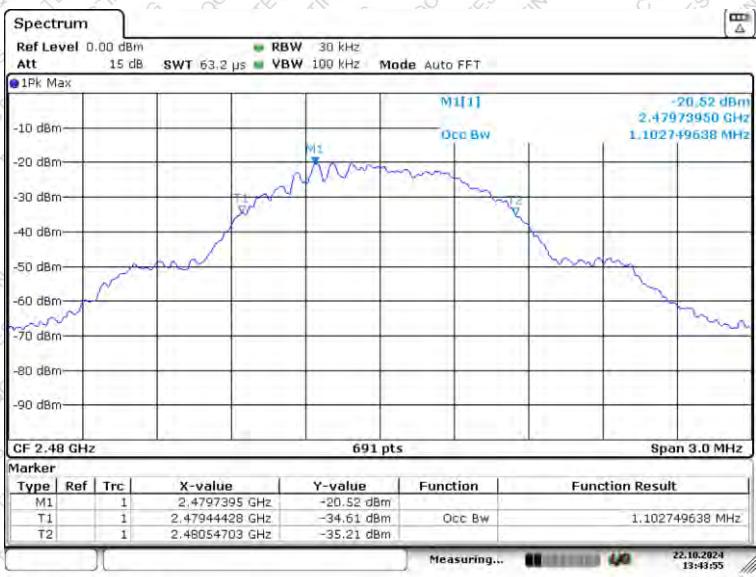
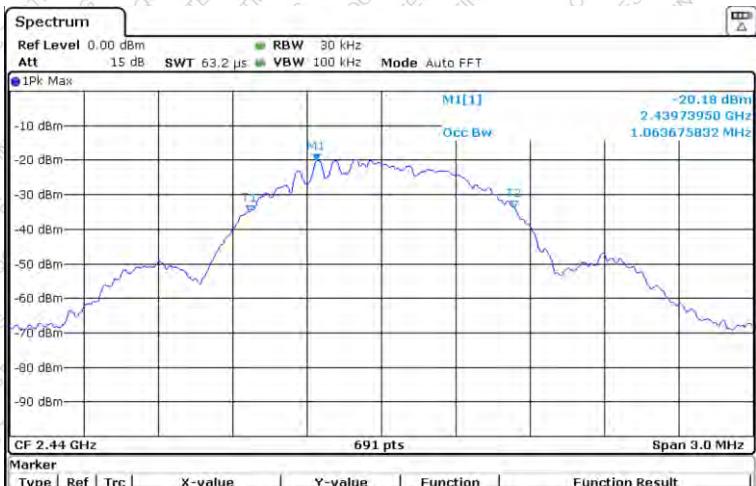


Test Frequency (MHz)	20dB bandwidth (MHz)	99% Occupied Bandwidth (MHz)
2402	1.2113	1.0680
2440	1.2069	1.0637
2480	1.2156	1.1027

Test plot as follows:







----- THE END OF TEST REPORT -----