

FCC - TEST REPORT

Report Number	:	68.940.23.0079.01	Date of Issue:	2023-10-27
Model	:	ERV-I, BCU1, BCU2, BCU3, BCU4, BCU5, BCU6, BCU7, BCU8, BCU9, BCU10, ERV-II, ERV-III, ERV-IV, ERV-V, ERV-VI, ERV-VII, ERV-VIII, ERV-IX, ERV-X, ERV1, ERV2, ERV3, ERV4, ERV5, ERV6, ERV7, ERV8, ERV9, ERV10		
Product Type	:	Bumper Car		
Applicant	:	MAXLEAD INTERNATIONAL LIMITED		
Address	:	Unit 503, 5/F., Silvercord Tower 2, 30 Canton Rd., Tsimshatsui, Kowloon, Hong Kong		
Manufacturer	:	SHENZHEN JINRUI IMPORT&EXPORT CO.,LTD		
Address	:	14-A1, Building 3, Zhongke R&D Park, No. 009, Gaoxin South Road, Gaoxin District, Yuehai Street, Nanshan District, Shenzhen, Guangdong, China		
Test Result	:	<input checked="" type="checkbox"/> Positive <input type="checkbox"/> Negative		
Total pages including Appendices	:	22		

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1 Table of Contents

1 Table of Contents.....	2
2 Details about the Test Laboratory	3
3 Description of the Equipment Under Test	4
4 Summary of Test Standards	5
5 Summary of Test Results	6
6 General Remarks	7
7 Test setups	8
8 Systems test configuration	9
9 Technical Requirement.....	10
9.1 Field strength of emissions and Restricted bands	10
9.2 Out of Band Emissions	14
9.3 20dB Bandwidth	17
10 Test equipment lists	21
11 System Measurement Uncertainty	22

2 Details about the Test Laboratory

Details about the Test Laboratory

Test Site 1

Company name: TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park, Guankou Erlu,
Nantou, Nanshan District, Shenzhen City, 518052, P. R. China

FCC Registration Number: 514049

FCC Designation Number: CN5009

Telephone: 86 755 8828 6998
Fax: 86 755 8828 5299

3 Description of the Equipment Under Test

Description of the Equipment Under Test

Product name:	Bumper Car
Model no.:	ERV-I
FCC ID:	2A3NW-ERV-I
Options and accessories:	NIL
Ratings:	Supplied by 12VDC Li-ion Rechargeable Battery 7Ah Charged by 12.0Vdc, 1.0A external adapter
Adapter information:	Adapter Model: HKP18-1201000dU Input: 100-240Vac, 50/60Hz; 0.45A Max Output: 12.0Vdc, 1.0A
RF Transmission Frequency:	2405MHz-2479MHz
Channel No.:	75
Modulation:	GFSK
Antenna Type:	PCB Antenna
Description of the EUT:	EUT is a Bumper Car with Bluetooth and 2.4G Hopping function which operated at 2.4GHz.

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	RATINGS	MODEL NO.
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4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2021 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators

All the test methods were according to ANSI C63.10-2020.

5 Summary of Test Results

Technical Requirements					
FCC Part 15 Subpart C 15.249					
Test Condition	Pages	Test Site	Test Result		
			Pass	Fail	N/A
§15.207 Conducted emission AC power port	See note 1		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
§15.205(a), §15.209(a), §15.249(a), §15.249(c) Field strength of emissions and Restricted bands	10	Site 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
§15.249(d) Out of band emissions	14	Site 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FCC §15.215(c) 20dB bandwidth 99% Occupied Bandwidth	17	Site 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
§15.203 Antenna requirement	See note 2		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Remark 1: N/A- Not Applicable;

Note 1: The EUT is not intended to operate from the AC power lines;

Note 2: The EUT used a PCB Antenna, According to §15.203, it is considered sufficiently to comply with the provisions of this section.

6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: 2A3NW-ERV-I complies with Section 15.205, 15.209, 15.249 of the FCC Part 15, Subpart C Rules.

SUMMARY:

All tests according to the regulations cited on page 6 were

■ - Performed

□ - **Not** Performed

The Equipment Under Test

■ - **Fulfills** the general approval requirements.

□ - **Does not** fulfill the general approval requirements.

Sample Received Date: 2023-10-10

Testing Start Date: 2023-10-10


Testing End Date: 2023-10-20

- TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch -

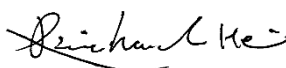
Reviewed by:

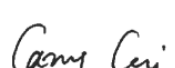
Prepared by:

Tested by:


Jessie He
Project Manager



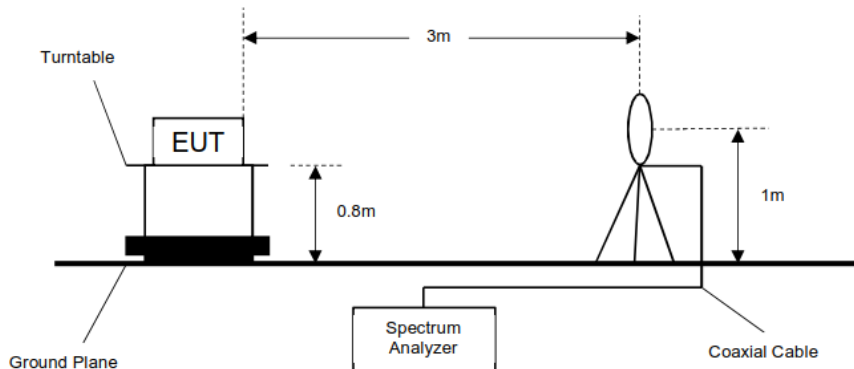

Richard He
Project Engineer


Garry Cai
Test Engineer

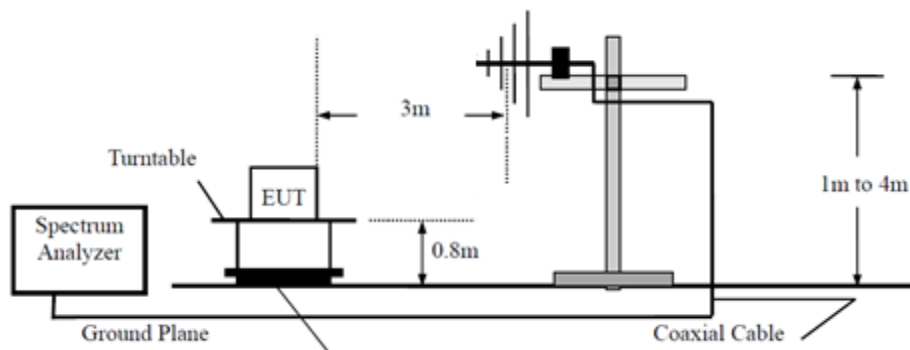
7 Test setups

7.1 Radiated test setups

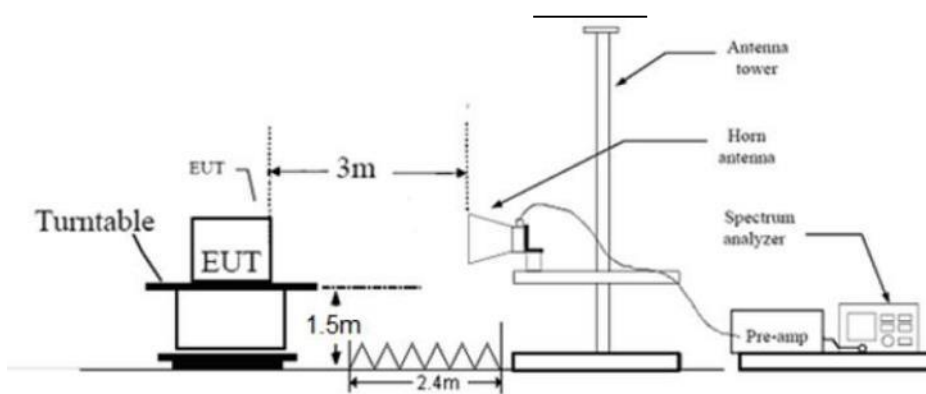
9KHz - 30MHz



30MHz - 1GHz



Above 1GHz



8 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.	S/N
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9 Technical Requirement

9.1 Field strength of emissions and Restricted bands

Test Method

- 1: The EUT was placed on a turn table which is 1.5m above ground plane for above 1GHz and 0.8m above ground for below 1GHz at 3-meter chamber room for test. 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 height of antenna 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 rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- 5: Use the following spectrum analyzer settings According to C63.10:

For Above 1GHz

Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 1MHz, VBW ≥ RBW for peak and average measurement,
Sweep = auto, Detector function = peak, Trace = max hold.

For Below 1GHz

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 100 KHz, VBW ≥ RBW for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.

Note:

- 1: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 KHz for Quasi-peak detection (QP) at frequency below 1GHz.
- 2: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for peak detection (PK) at frequency above 1GHz.
- 3: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average (duty cycle ≥ 98%) for peak detection at frequency above 1GHz
- 4: If the emission is pulsed (duty cycle < 98%), modify the unit for continuous operation: use the settings shown above, then correct the reading by subtracting the peak to average duty cycle correction factor $20\log(\text{duty cycle})$, derived from the appropriate duty cycle calculation.

Field strength of emissions and Restricted bands

Limits

According to §15.249 (a), 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
24.0–24.25 GHz	250	2500

According to §15.249 (c), Field strength limits are specified at a distance of 3 meters.

According to §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.

According to §15.205 Unwanted emissions falling into restricted bands in §15.205 (a) shall comply with the limits specified in §15.209.

Frequency MHz	Field Strength uV/m	Field Strength dBμV/m	Detector
30-88	100	40	QP
88-216	150	43.5	QP
216-960	200	46	QP
960-1000	500	54	QP
Above 1000	500	54	AV
Above 1000	5000	74	PK

Field strength of emissions and Restricted bands

According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.

Test result as below:

Low channel 2405MHz Test Result

Radiated Emission							
Value	Emissions Frequency MHz	E-Field Polarity	Peak Emission dBμV/m	Correction Factor dB/m	Limit dBμV/m	Margin dBm	Emission Type
PK	753.727778	H	37.65	27.57	46.00	8.35	Spurious
PK	721.448333	V	36.83	26.82	46.00	9.17	Spurious
PK	2405.000000	H	51.64	-6.37	114.00	62.36	Fundamental
AV	2405.000000	H	50.64	-6.37	94.00	43.36	Fundamental
PK	2405.000000	V	51.08	-6.37	114.00	62.92	Fundamental
AV	2405.000000	V	50.08	-6.37	94.00	43.92	Fundamental
PK	5468.500000	H	49.90	5.08	74.00	24.10	Spurious
PK	5938.000000	V	51.33	5.44	74.00	22.67	Spurious

Middle channel 2440MHz Test Result

For Peak Value

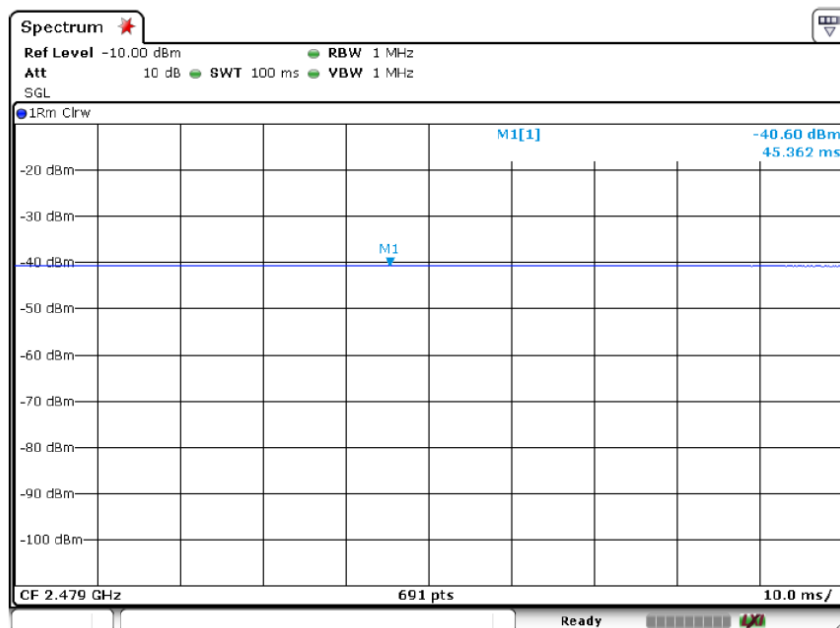
Radiated Emission							
Value	Emissions Frequency MHz	E-Field Polarity	Peak Emission dBμV/m	Correction Factor dB/m	Limit dBμV/m	Margin dBm	Emission Type
PK	2440.000000	H	53.13	-6.19	114.00	60.87	Fundamental
AV	2440.000000	H	52.13	-6.19	94.00	41.87	Fundamental
PK	2440.000000	V	51.78	-6.19	114.00	62.22	Fundamental
AV	2440.000000	V	50.78	-6.19	94.00	43.22	Fundamental
PK	5480.500000	H	49.65	5.19	74.00	24.35	Spurious
PK	4880.000000	V	49.63	3.44	74.00	24.37	Spurious

High channel 2479MHz Test Result

Radiated Emission							
Value	Emissions Frequency MHz	E-Field Polarity	Peak Emission dBμV/m	Correction Factor dB/m	Limit dBμV/m	Margin dBm	Emission Type
PK	2479.000000	H	52.78	-5.96	114.00	61.22	Fundamental
AV	2479.000000	H	51.78	-5.96	94.00	42.22	Fundamental
PK	2479.000000	V	51.08	-5.96	114.00	62.92	Fundamental
AV	2479.000000	V	50.08	-5.96	94.00	43.92	Fundamental
PK	4309.500000	H	47.85	1.76	74.00	26.15	Spurious
PK	4812.000000	V	48.20	2.83	74.00	25.80	Spurious

- (1) Data of measurement within frequency range 9kHz-30MHz is the noise floor or attenuated more than 20dB below the permissible limits or the field strength is too small to be measured, so test data does not present in this report.
- (2) Data of measurement within this frequency range shown "--" in the table above means the reading of emissions are the noise floor or attenuated more than 10dB below the permissible limits or the field strength is too small to be measured.
- (3) Level=Reading Level + Correction Factor
 Above 1GHz: Corrector factor = Antenna Factor + Cable Loss- Amplifier Gain
 Below 1GHz: Corrector factor = Antenna Factor + Cable Loss
 (The Reading Level is recorded by software which is not shown in the sheet)

Duty cycle=100%
 Peak to average duty cycle correction factor = $20\log(\text{duty cycle})=0$



9.2 Out of Band Emissions

Test Method

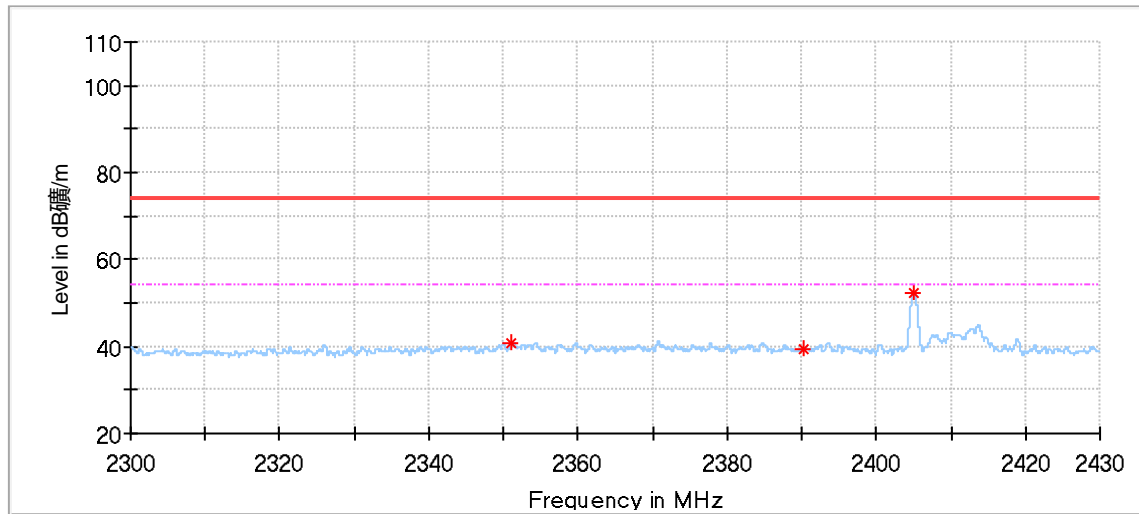
- 1 Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 100 kHz, VBW \geq RBW, Sweep = auto, Detector function = peak, Trace = max hold.
- 2 Allow the trace to stabilize, use the peak and delta measurement to record the result.
- 3 The level displayed must comply with the limit specified in this Section.

Limits

According to §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.

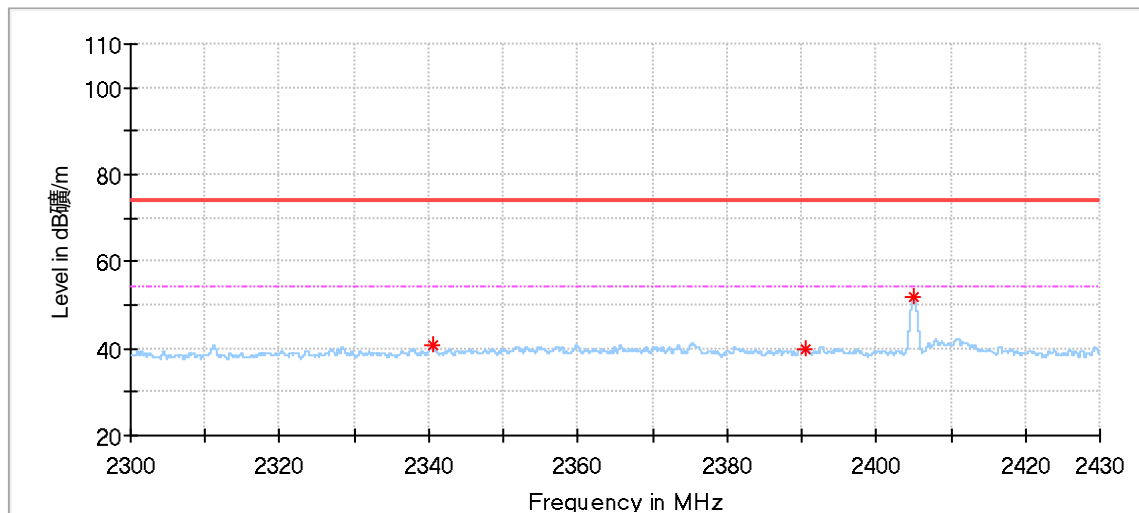
Out of Band Emissions

2405MHz



Critical_Freqs

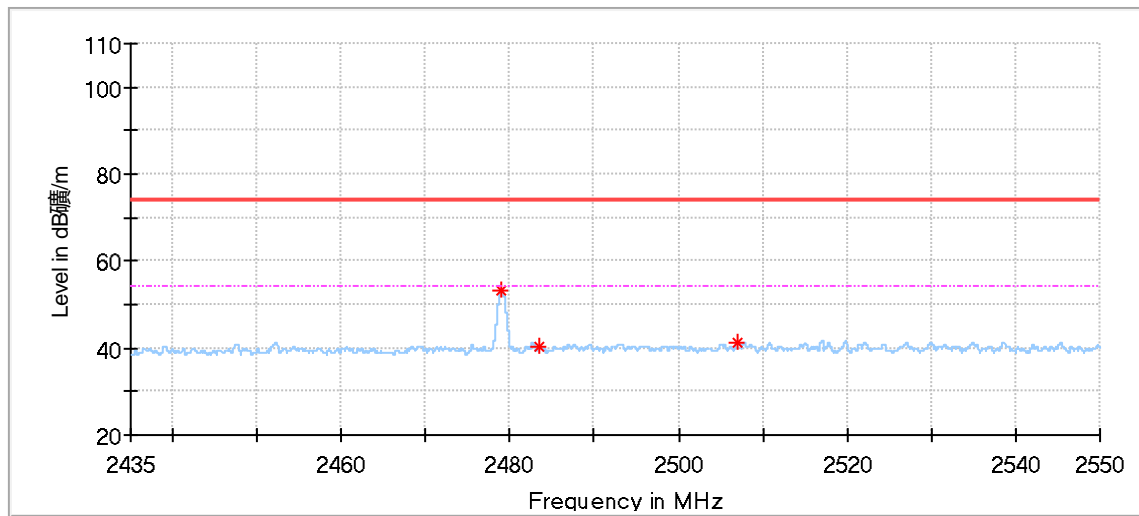
Frequency (MHz)	MaxPeak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2351.012000	40.91	74.00	33.09	150.0	H	356.0	-6.31
2390.376000	39.41	74.00	34.59	150.0	H	32.0	-6.40
2405.053000	52.28	74.00	21.72	150.0	H	32.0	-6.37



Critical_Freqs

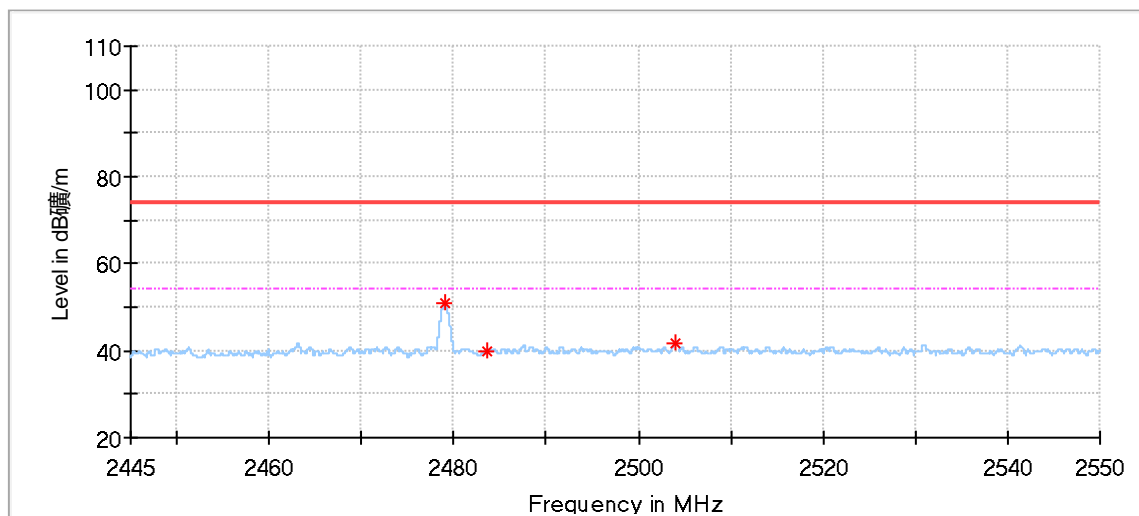
Frequency (MHz)	MaxPeak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2340.547000	40.71	74.00	33.29	150.0	V	317.0	-6.59
2390.610000	39.89	74.00	34.11	150.0	V	84.0	-6.40
2405.014000	52.02	74.00	21.98	150.0	V	232.0	-6.37

2479MHz



Critical Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2479.010500	53.40	74.00	20.60	150.0	H	118.0	-5.96
2483.507000	40.21	74.00	33.79	150.0	H	291.0	-5.92
2507.059000	41.44	74.00	32.56	150.0	H	218.0	-5.74



Critical Freqs

Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2479.020000	51.04	74.00	22.96	150.0	V	230.0	-5.96
2483.577000	39.63	74.00	34.37	150.0	V	14.0	-5.92
2503.905000	41.90	74.00	32.10	150.0	V	321.0	-5.77

9.3 20dB Bandwidth

Test Method

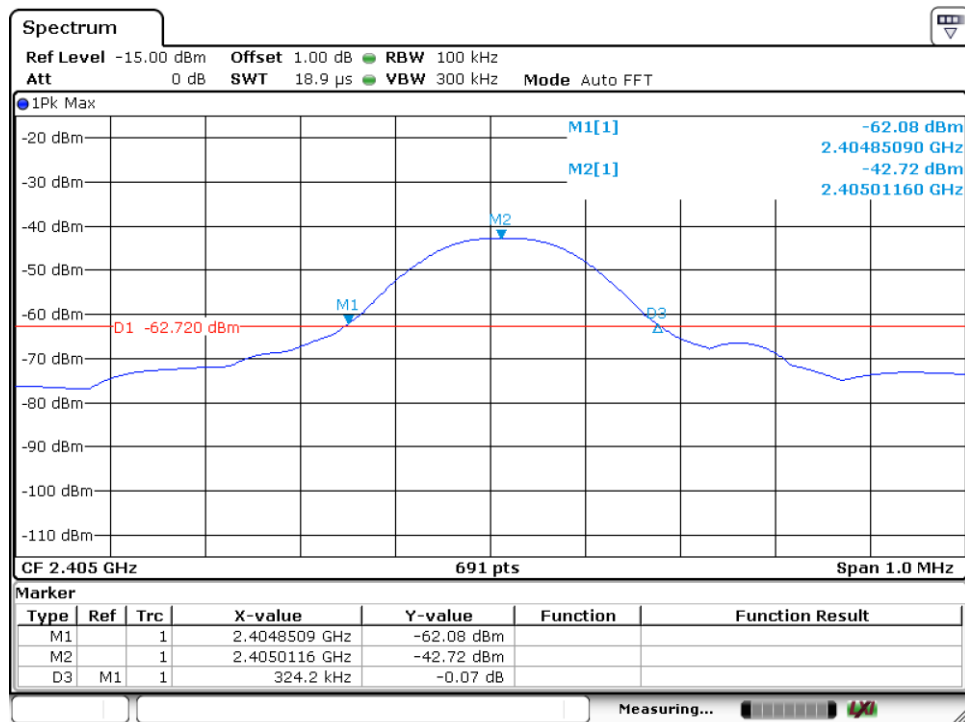
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to spectrum analyser. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within 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 20dB from the reference level. Record the frequency difference as the emission bandwidth.

Limits:

According to 15.215 (c) 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. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

20dB Bandwidth

Frequency	20dB Bandwidth	Limit
MHz	MHz	MHz
2405	0.3242	--

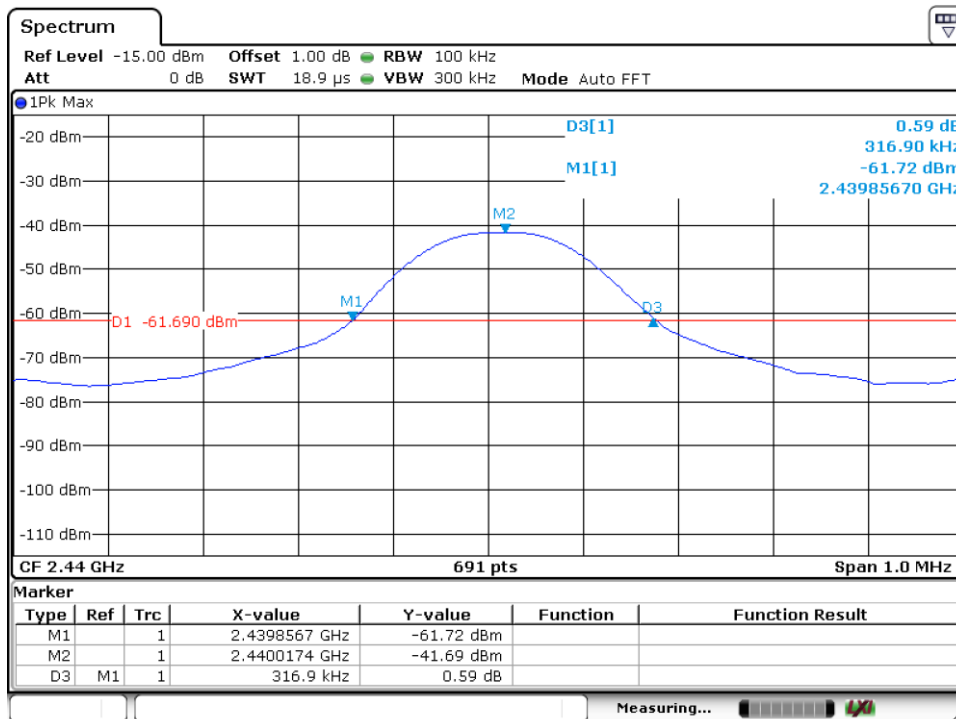


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2405MHz

20dB Bandwidth

Frequency	20dB Bandwidth	Limit
MHz	MHz	MHz
2440	0.3169	--

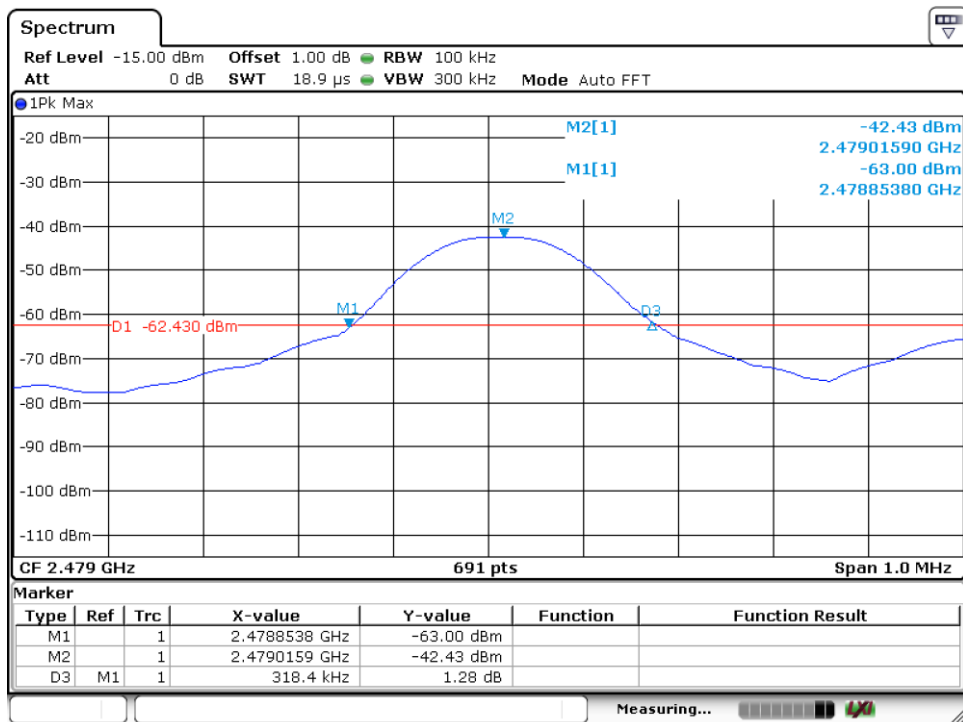


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2440MHz

20dB Bandwidth & 99% Occupied Bandwidth

Frequency	20dB Bandwidth	Limit
MHz	MHz	MHz
2479	0.3184	--



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2479MHz

10 Test equipment lists

List of Test Instruments

Radiated Emission Test 1# Test

DESCRIPTION	MANUFACTURER	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL INTERVAL (YEAR)	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 7	68-4-74-19-001	102176	1	2024-5-20
Loop Antenna	Rohde & Schwarz	HFH2-Z2	68-4-80-14-006	100398	1	2024-8-7
Pre-amplifier	Rohde & Schwarz	SCU 18	68-4-29-14-001	102230	1	2024-5-19
Attenuator	Mini-circuits	UNAT-6+	68-4-81-21-001	15542	1	2024-5-19
3m Semi-anechoic chamber	TDK	SAC-3 #1	68-4-90-14-001	----	3	2024-5-28
Test software	Rohde & Schwarz	EMC32	68-4-90-14-001-A10	Version10.35.02	N/A	N/A

Radiated Emission 2# Test

DESCRIPTION	MANUFACTURER	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL INTERVAL (YEAR)	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 26	68-4-74-14-002	101269	1	2024-5-20
Wave Guide Antenna	ETS	3117	68-4-80-19-001	00218954	1	2024-4-26
Pre-amplifier	Rohde & Schwarz	SCU 18F	68-4-29-19-001	100745	1	2024-5-19
Pre-amplifier	Rohde & Schwarz	SCU 18F	68-4-29-19-002	100746	1	2024-5-19
Sideband Horn Antenna	Q-PAR	QWH-SL-18-40-K-SG	68-4-80-14-008	12827	1	2024-7-11
Pre-amplifier	Rohde & Schwarz	SCU 40A	68-4-29-14-002	100432	1	2024-8-1
Attenuator	Mini-circuits	UNAT-6+	68-4-81-21-002	15542	1	2024-5-19
3m Semi-anechoic chamber	TDK	SAC-3 #2	68-4-90-19-006	----	2	2024-5-28
Test software	Rohde & Schwarz	EMC32	68-4-90-19-006-A01	Version10.35.02	N/A	N/A

RF conducted test

DESCRIPTION	MANUFACTURER	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL INTERVAL (YEAR)	CAL. DUE DATE
Signal Analyzer	Rohde & Schwarz	FSV40	68-4-74-14-004	101030	1	2024-5-19
RF Switch Module	Rohde & Schwarz	OSP120/OSP-B157W	68-4-93-14-003	101226/100929	1	2024-5-20
Test software	Rohde & Schwarz	EMC32	68-4-48-14-003-A10	Version 10.60.10	N/A	N/A
Test software	Tonscend	System for BT/WIFI	68-4-74-14-006-A13	Version 2.6.77.0518	N/A	N/A
Shielding Room	TDK	TS8997	68-4-90-19-003	----	3	2025-10-15

11 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

System Measurement Uncertainty	
Test Items	Extended Uncertainty
Uncertainty for Radiated Emission in 3m chamber (68-4-90-14-001) 9kHz-30MHz	4.70dB
Uncertainty for Radiated Emission in new 3m chamber (68-4-90-19-006) 30MHz-1000MHz	Horizontal: 4.63dB; Vertical: 4.78dB;
Uncertainty for Radiated Emission in new 3m chamber (68-4-90-19-006) 1000MHz-18000MHz	Horizontal: 5.38dB; Vertical: 5.38dB;
Uncertainty for Radiated Emission in new 3m chamber (68-4-90-19-006) 18GHz-40GHz	Horizontal: 3.14dB; Vertical: 3.12dB;
Uncertainty for Conducted RF test with TS 8997	RF Power Conducted: 1.31dB Frequency test involved: 0.6×10 ⁻⁸ or 1%

Measurement Uncertainty Decision Rule

Determination of conformity with the specification limits is based on the decision rule according to IEC Guide 115: 2021, clause 4.4.3 and 4.5.1.

---The End---