TEST REPORT

Application No.:	KSCR2211002349HS (SHCR2211002483HS)
FCC ID:	N82-KOHLER052
IC:	4554A-KOHLER052
Applicant:	Kohler Co.
Address of Applicant:	444 Highland Drive, Mailstop 073, Kohler, WI 53044, USA
Manufacturer:	Zhongshan Kohler Shower Co.,Ltd
Address of Manufacturer:	13-1Xinye Road Houju Development Zone 528437 Zhongshan, Guangdong, China
Factory:	Zhongshan Kohler Shower Co.,Ltd
Address of Factory:	13-1Xinye Road Houju Development Zone 528437 Zhongshan, Guangdong, China
Equipment Under Test (EUT):	
EUT Name:	LIGHTED MIRROR CABINET
Model No.:	K-33690-L-NA, K-33690-R-NA ♣
♣	Please refer to section 2 of this report which indicates which model was actually tested and which were electrically identical.
Standard(s) :	47 CFR Part 15, Subpart C 15.249
	RSS-210 Issue10, December 2019
	RSS-Gen Issue 5 Amendment 2 (February 2021)
Date of Receipt:	2022-11-17
Date of Test:	2022-11-29 to 2022-12-26
Date of Issue:	2023-02-15
Test Result:	**Pass***

* In the configuration tested, the EUT complied with the standards specified above.

Eric Lin
Laboratory Manager

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Revision Record			
Version	**Description**	**Date**	**Remark**
00	Original	2023-02-15	/

Authorized for issue by:				
		Damon zhou		
		Damon Zhou / Project Engineer		
		Eric Lin		
		Eric Lin / Reviewer		

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2 Test Summary

Radio Spectrum Technical Requirement				
Item	**FCC Requirement**	**IC Requirement**	**Method**	**Result**
Antenna Requirement	47 CFR Part 15, Subpart C 15.203	RSS-Gen Clause 6.8	N/A	Pass

Radio Spectrum Matter Part				
Item	**FCC Requirement**	**IC Requirement**	**Method**	**Result**
Conducted Emissions at AC Power Line (150kHz-30MHz)	47 CFR Part 15, Subpart C 15.249	RSS-210 Issue10	ANSI C63.10 (2013) Section 6.2	Pass
20dB Bandwidth	47 CFR Part 15, Subpart C 15.249	RSS-Gen Section 6.7	ANSI C63.10 (2013) Section 6.9	Pass
Field Strength of the Fundamental Signal (15.249(a))	47 CFR Part 15, Subpart C 15.249	RSS-210 Issue10 Annex B.B10(a)	ANSI C63.10 (2013) Section 6.6	Pass
Restricted Band Around Fundamental Frequency	47 CFR Part 15, Subpart C 15.249	RSS-210 Issue10 Annex B.B10(b)& RSS-Gen Section 8.9	ANSI C63.10 (2013) Section 6.10	Pass
Radiated Emissions	47 CFR Part 15, Subpart C 15.249	RSS-210 Issue10 Annex B.B10(b)& RSS-Gen Section 8.9	ANSI C63.10 (2013) Section 6.6	Pass
99% Bandwidth	-	RSS-Gen Section 6.7	ANSI C63.10 Section 6.9.3	Pass

Declaration of EUT Family Grouping:

Note: There are series models mentioned in this report, and they are the similar in electrical and electronic characters. Only difference is the door open direction, the K-33690-L-NA open the door on the left, the K-33690-R-NA open the door on the right. Consider the difference only the model K-33690-R-NA was tested since their differences were the model number and appearance.

3 Contents

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4 General Information

4.1 Details of E.U.T.

Power supply: AC120V/60Hz
Test voltage: AC120V/60Hz
Number of Channels: 1
Frequency: 24.084GHz
Modulation Technique: FMCW
Antenna Type: Integrated Patch Antenna
Firmware Version: RKB1143L1_ST_V1.2_20221209
S/N: 20230320

4.2 Description of Support Units

The EUT has been tested as an independent unit.

4.3 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	8.4×10^{-8}
2	Timeout	2s
3	Duty Cycle	0.37%
4	Occupied Bandwidth	3%
5	RF Radiated Power	5.2dB (Below 1GHz)
		5.9dB (Above 1GHz)
6	Radiated Spurious Emission Test	4.2dB (Below 30MHz)
		4.5dB (30MHz-1GHz)
		5.1dB (1GHz-18GHz)
		5.4dB (Above 18GHz)
7	Temperature Test	1°C
8	Humidity Test	3%
9	Supply Voltages	1.5%
10	Time	3%

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

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4.4 Test Location

All tests were performed at:

Compliance Certification Services (Kunshan) Inc.

No.10 Weiye Rd, Innovation park, Eco&Tec, Development Zone, Kunshan City, Jiangsu, China.

Tel: +86 512 5735 5888 Fax: +86 512 5737 0818

Note:

1.SGS is not responsible for wrong test results due to incorrect information (e.g., max. internal working frequency, antenna gain, cable loss, etc) is provided by the applicant. (If applicable).

2.SGS is not responsible for the authenticity, integrity and the validity of the conclusion based on results of the data provided by applicant. (If applicable).

4.5 Test Facility

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

• A2LA

Compliance Certification Services (Kunshan) Inc. is accredited by the American Association for Laboratory Accreditation (A2LA). Certificate No. 2541.01.

• FCC

Compliance Certification Services (Kunshan) Inc. has been recognized as an accredited testing laboratory. Designation Number: CN1172.

• ISED

Compliance Certification Services (Kunshan) Inc. has been recognized by Innovation, Science and Economic Development Canada (ISED) as an accredited testing laboratory. Company Number: 2324E

• VCCI

The 3m and 10m Semi-anechoic chamber and Shielded Room of Compliance Certification Services (Kunshan) Inc. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-20134, R-11600, C-11707, T-11499, G-10216 respectively.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None

5 Equipment List

Item	Equipment	Manufacturer	Model	Inventory No	Cal Date	Cal. Due Date
Conducted Emission at Mains Terminals (150kHz-30MHz)						
1	EMI Test Receive	R&S	ESCI	KS301101	01/21/2023	01/20/2024
2	LISN	R&S	ENV216	KS301197	01/21/2023	01/20/2024
3	LISN	Schwarzbeck	NNLK 8129	KS301091	01/21/2023	01/20/2024
4	Pulse Limiter	R&S	ESH3-Z2	KUS1902E001	01/21/2023	01/20/2024
5	CE test Cable	Thermax	/	CZ301102	11/12/2022	11/11/2023
6	Test Software	Farad	EZ-EMC	/	N.C.R	N.C.R
RF Radiated Test						
1	Spectrum Analyzer	R&S	FSV40	KUS1806E003	08/22/2022	08/21/2023
2	PXA Spectrum Analyzer	KEYSIGHT	N9030B	KSEM021-1	01/22/2023	01/21/2024
3	Signal Generator	Agilent	E8257C	KS301066	08/22/2022	08/21/2023
4	Loop Antenna	COM-POWER	AL-130R	KUS1806E001	04/13/2021	04/12/2023
5	Bilog Antenna	TESEQ	CBL 6112D	KUS1806E005	06/29/2021	06/28/2023
6	Bilog Antenna	SCHWARZBECK	VULB9160	CZ301016	04/13/2021	04/12/2024
7	Amplifier(30MHz~18GHz)	PANSHAN TECHNOLOGY	LNA:1~18G	KSEM010-1	01/22/2023	01/21/2024
8	Horn-antenna(1-18GHz)	ETS-LINDGREN	3117	KS301186	02/22/2021	02/21/2023
9	Amplifier(18~40GHz)	COM-POWER	PAM-840A	KUS1710E001	01/22/2023	01/21/2024
10	Horn Antenna(18-40GHz)	Schwarzbeck	BBHA9170	CZ301058	03/22/2022	03/21/2023
11	Horn-antenna(40-60GHz)	REBES	SAZ-2410-19-S1	KSEM003-1	N/A	N/A
12	Horn-antenna(50-75GHz)	REBES	SAZ-2410-15-S1	KSEM003-2	N/A	N/A
13	Horn-antenna(75-110GHz)	REBES	SAZ-2410-10-S1	KSEM003-3	N/A	N/A
14	Horn-antenna(110-170GHz)	REBES	SAZ-2410-06-S1	KSEM003-4	N/A	N/A
15	Horn-antenna(140-220GHz)	REBES	SAZ-2410-05-S1	KSEM003-5	N/A	N/A
16	Horn-antenna(220-325GHz)	REBES	SAR-2309-03-S2	KSEM003-6	N/A	N/A
17	Extended waveguide(40-60GHz)	REBES	SWG-19025-FB	KSEM004-1	N/A	N/A
18	Extended waveguide(50-75GHz)	REBES	SWG-15025-FB	KSEM004-2	N/A	N/A
19	Extended waveguide(75-110GHz)	REBES	SWG-10025-FB	KSEM004-3	N/A	N/A
20	Extended waveguide(110-170GHz)	REBES	SWG-06025-FB	KSEM004-4	N/A	N/A
21	Extended waveguide(140-220GHz)	REBES	SWG-05025-FB	KSEM004-5	N/A	N/A
22	Extended waveguide(220-325GHz)	REBES	SWG-03025-FB	KSEM004-6	N/A	N/A
23	Harmonic mixer(40-60GHz)	REBES	STH-19SF-S1	KSEM005-2	N/A	N/A
24	Harmonic Mixer(50-75GHz)	KEYSIGHT	M1970V	KSEM006-1	N/A	N/A
25	Harmonic Mixer(75-110GHz)	KEYSIGHT	M1970W	KSEM006-4	N/A	N/A

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26	Harmonic mixer(110-170GHz)	REBES	STH-06SF-S1	KSEM005-1	N/A	N/A
27	Harmonic mixer(140-220GHz)	REBES	HM 140-220	KSEM005-3	N/A	N/A
28	Harmonic mixer(220-325GHz)	REBES	HM 220-325	KSEM005-4	N/A	N/A
29	Harmonic Mixer(50-75GHz) cable	Silverline	SLU18-SMSM-01.00M	KSEM006-2	N/A	N/A
30	Waveguide Harmonic Mixer(75-110GHz) cable	Silverline	SLU18-SMSM-01.00M	KSEM006-3	N/A	N/A
31	RE test cable	REBES MICROWAVE	/	CZ301097	11/12/2022	11/11/2023
32	Temperature & Humidity Recorder	Renke Control	RS-WS-N01-6J	KSEM024-4	01/04/2022	03/31/2023
33	Software	Faratronic	EZ_EMC-v 3A1	/	N/A	N/A

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6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

FCC 47 CFR Part 15C Section 15.203

6.1.2 Conclusion

Standard 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 an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit permanently attached antenna or of an 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 integrated patch antenna and no consideration of replacement.

Antenna location: Refer to EUT Photos.

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7 Radio Spectrum Matter Test Results

7.1 Conducted Emissions at AC Power Line (150kHz-30MHz)

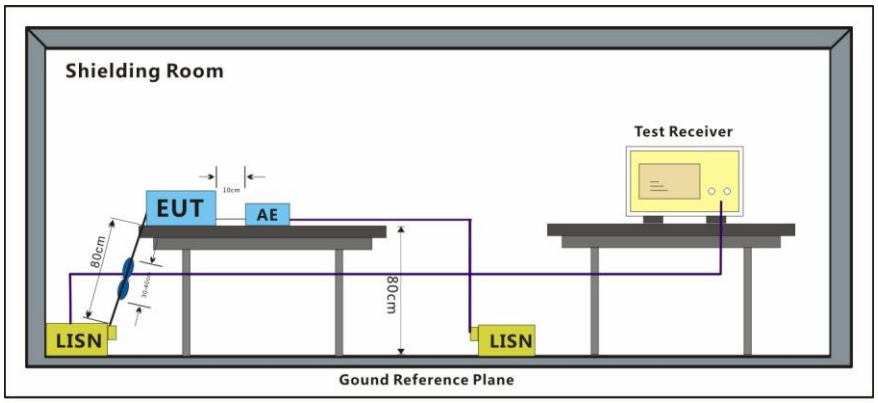
Test Requirement 47 CFR Part 15, Subpart C 15.249
Test Method: ANSI C63.10 (2013) Section 6.2
Limit:

Frequency of Emission (MHz)	Conducted Limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50
*Decreases with the logarithm of the frequency.		

7.1.1 E.U.T. Operation

Operating Environment:
Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1002 mbar
Test Mode: a: TX mode _ Keep the EUT in continuously transmitting mode.

7.1.2 Test Setup Diagram



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7.1.3 Measurement Procedure and Data

1) The mains terminal disturbance voltage test was conducted in a shielded room.

2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50ohm/50μH + 5ohm linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.

3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane

4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.

5) In order to find the maximum emission, the relative positions of equipment and all the interface cables must be changed according to ANSI C63.10 on conducted measurement.

Remark:

LISN = Read Level + Cable Loss + LISN Factor

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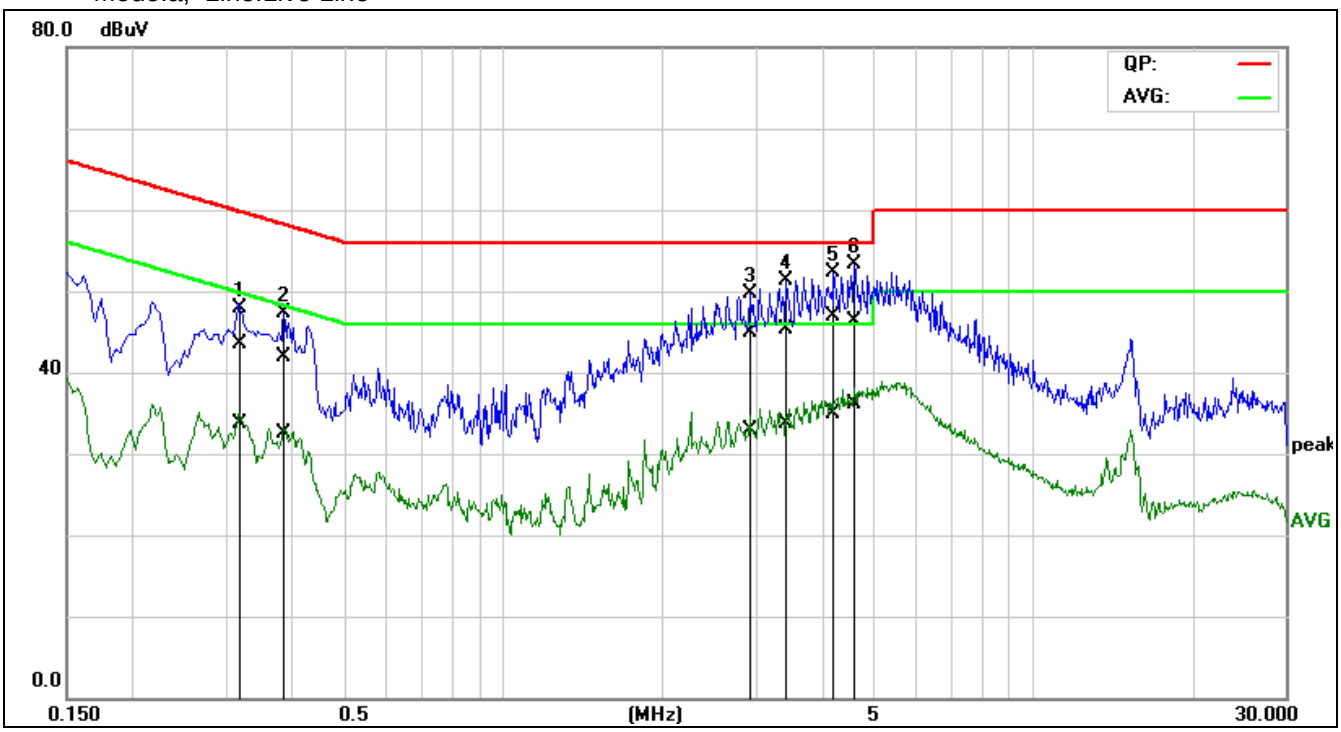
Mode:a; Line:Live Line



No.	Frequency	QuasiPeak reading	Average reading	Correction factor	QuasiPeak result	Average result	QuasiPeak limit	Average limit	QuasiPeak margin	Average margin	Remark
	(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)	
1	0.3214	24.10	14.19	19.46	43.56	33.65	59.67	49.67	-16.11	-16.02	Pass
2	0.3847	22.47	13.05	19.46	41.93	32.51	58.18	48.18	-16.25	-15.67	Pass
3	2.9060	25.31	13.37	19.50	44.81	32.87	56.00	46.00	-11.19	-13.13	Pass
4	3.4301	25.77	14.19	19.52	45.29	33.71	56.00	46.00	-10.71	-12.29	Pass
5*	4.2225	27.28	15.41	19.55	46.83	34.96	56.00	46.00	-9.17	-11.04	Pass
6	4.6217	26.71	16.46	19.56	46.27	36.02	56.00	46.00	-9.73	-9.98	Pass

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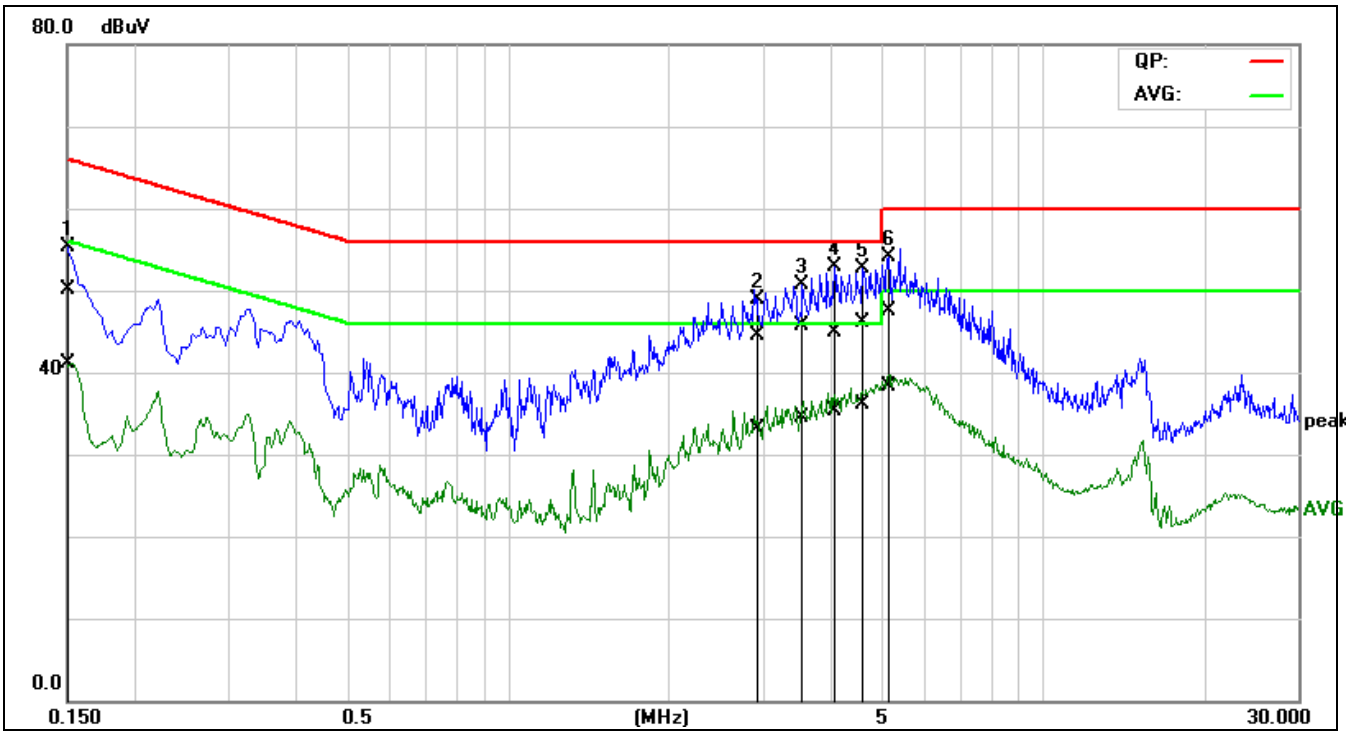
Mode:a; Line:Neutral Line



No.	Frequency	QuasiPeak reading	Average reading	Correction factor	QuasiPeak result	Average result	QuasiPeak limit	Average limit	QuasiPeak margin	Average margin	Remark
	(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)	
1	0.1504	30.69	21.76	19.44	50.13	41.20	65.97	55.98	-15.84	-14.78	Pass
2	2.9219	24.99	13.63	19.50	44.49	33.13	56.00	46.00	-11.51	-12.87	Pass
3	3.5580	26.12	15.07	19.53	45.65	34.60	56.00	46.00	-10.35	-11.40	Pass
4	4.0801	25.41	15.83	19.54	44.95	35.37	56.00	46.00	-11.05	-10.63	Pass
5*	4.6011	26.57	16.62	19.56	46.13	36.18	56.00	46.00	-9.87	-9.82	Pass
6	5.1364	27.97	18.77	19.57	47.54	38.34	60.00	50.00	-12.46	-11.66	Pass

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7.2 20dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.249

Test Method: ANSI C63.10 (2013) Section 6.9

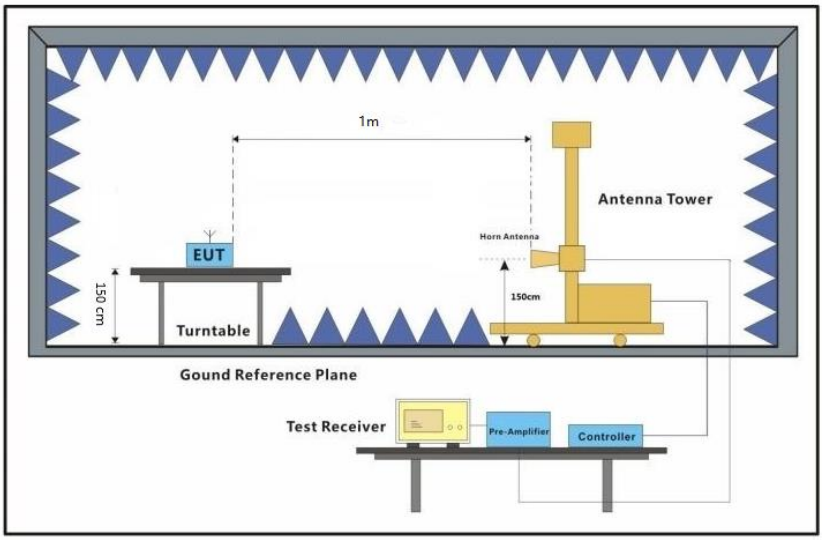
7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1002 mbar

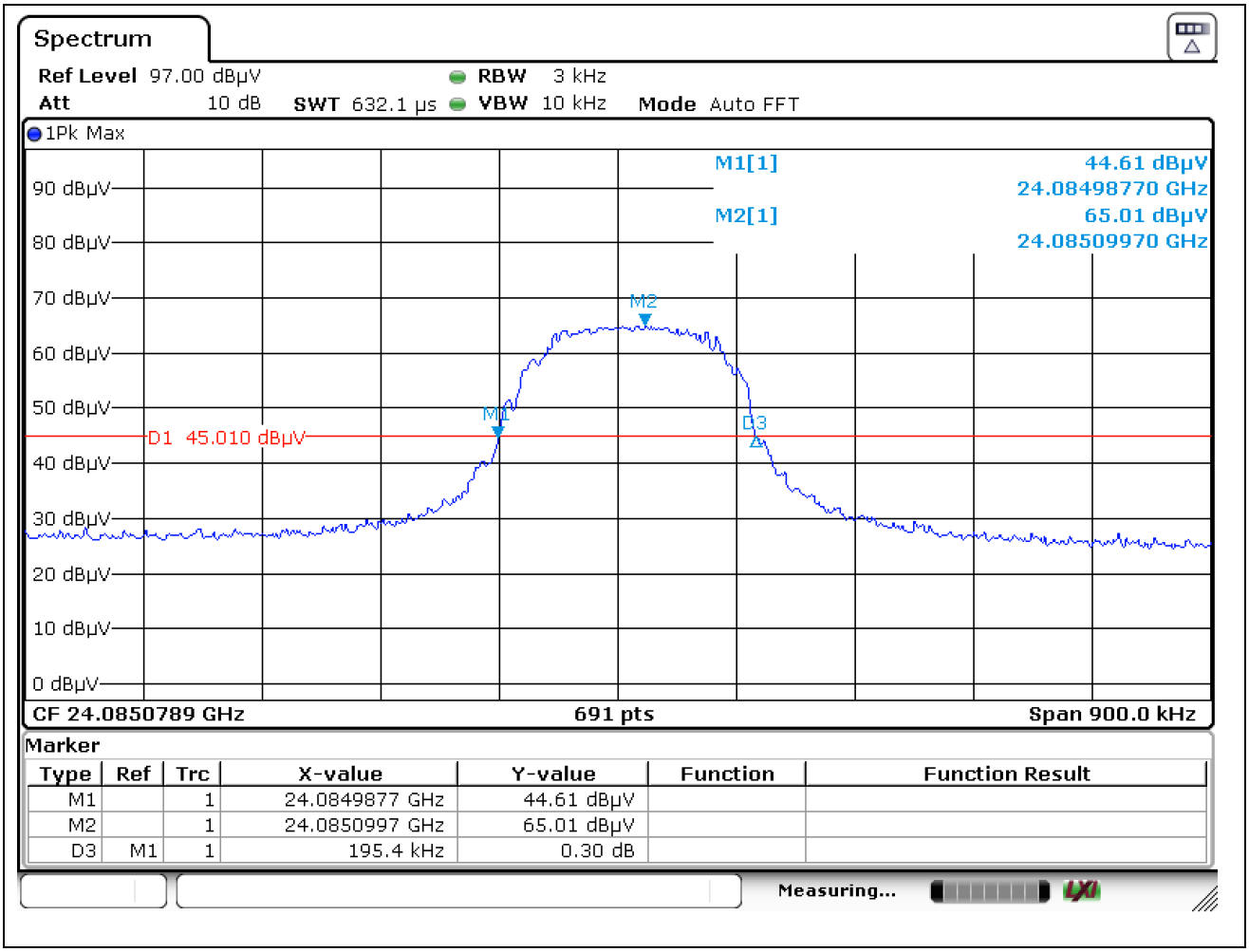
Test Mode: a: TX mode _ Keep the EUT in continuously transmitting mode.

7.2.2 Test Setup Diagram



7.2.3 Measurement Procedure and Data

1) Place the EUT on the table and set it in the transmitting mode
2) SA set RBW=1%~5% OBW, VBW=RBW and Detector=Peak
3) Measure and record the result of 20dB bandwidth



Low Frequency (GHz)	Limit (GHz)	High Frequency (GHz)	Limit (GHz)	20db Bandwidth(KHz)	Result
24.08498	24.00	24.08509	24.25	195.4	Pass

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7.3 Filed Strength of Fundamental and Radiation Spurious Emission

Test Requirement 47 CFR Part 15, Subpart C 15.249(a)
Test Method: ANSI C63.10 (2013) Section 6.6
Limit:

FCC according to §15.249(a).

(1) The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency (MHz)	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
2400-2483.5	50	500
5725-5875	50	500
24000-24250	250	2500

* Field strength limits are specified at a distance of 3 meters.

Fundamental Limit Conversion			
Average (mV/m) at 3M	Average (dBuV/m) at 3M	Average (dBuV/m) at 1M	Peak (dBuV/m) at 1M
250	107.9588	117.50	137.50

* (Limit = 107.9588 + 20LOG(3/1) = 117.50 dBuV/m)

Harmonic Limit Conversion			
Average (uV/m) at 3M	Average (dBuV/m) at 3M	Average (dBuV/m) at 1M	Peak (dBuV/m) at 1M
2500	67.9588	77.50	97.50

*(Limit=67.9588+20LOG(3/1)=77.50 dBuV/m)

(2) 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(follow the table), whichever is the lesser attenuation.

Below 30MHz

Frequency	Field Strength (μA/m)	Magnetic field strength (H-Field) (μA/m)	Measurement Distance (metres)
9-490 kHz	2,400/F (F in kHz)	2,400/F (F in kHz)	300
490-1,705 kHz	24,000/F (F in kHz)	24,000/F (F in kHz)	30
1.705-30 MHz	30	N/A	30

Above 30MHz

Frequency (MHz)	Field Strength microvolts/m at 3 metres (watts, e.i.r.p.)	
	Transmitters	Receivers

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30-88	100 (3 nW)	100 (3 nW)
88-216	150 (6.8 nW)	150 (6.8 nW)
216-960	200 (12 nW)	200 (12 nW)
Above 960	500 (75 nW)	500 (75 nW)

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Frequency	Field Strength microvolts/m at specific distance	
	Transmitters	Receivers
18-40GHz	63.5dBuV/m@1m	63.5dBuV/m@1m
Above 40GHz	80.00dBuV/m @0.15m	80.00dBuV/m @0.15m

7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1002 mbar

Test Mode: a: TX mode _ Keep the EUT in continuously transmitting mode.

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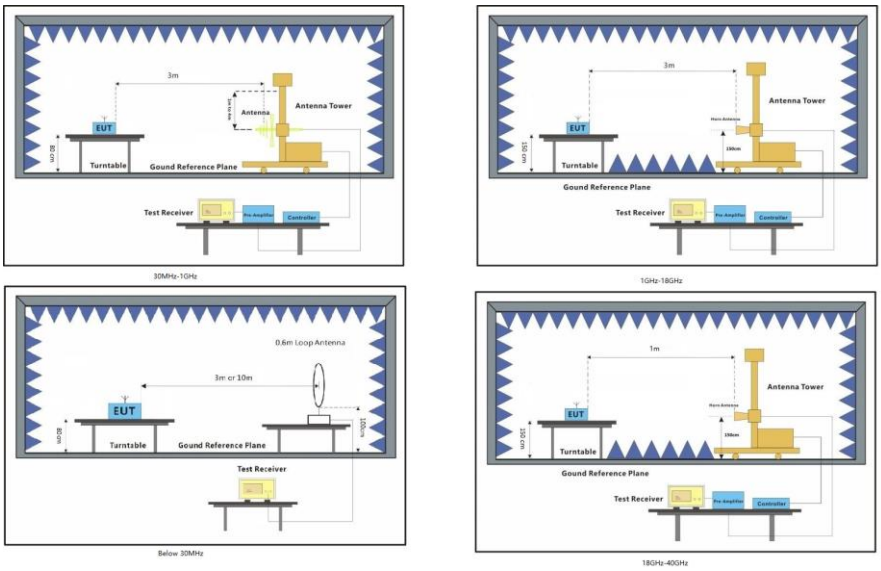
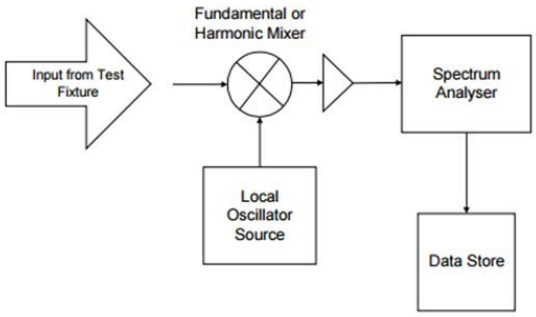
7.3.2 Test Setup Diagram





Above 40GHz

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7.3.3 Measurement Procedure and Data

a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. For 1-18GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. For 18-40GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 1 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. For above 40GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 0.15 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation

d. 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.

e. 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 (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

g. 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.

i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

j. Repeat above procedures until all frequencies measured was complete.

Remark 1: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

Remark 2: For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

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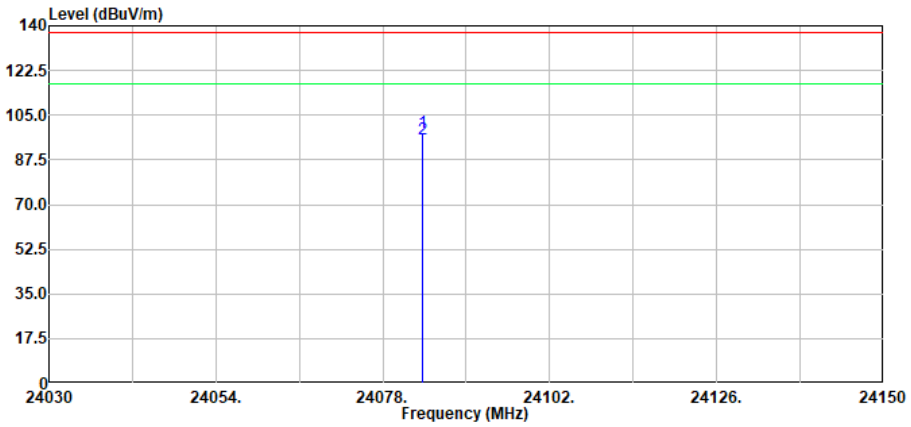
Filed Strength of Fundamental

Frequency (GHz)	Polarity	dBuV/m@(1m)	dBuV/m@(3m)	Limit	Result	Remark
24.083	Horizontal	98.16	88.62	127.96	Pass	peak
24.083	Horizontal	95.52	85.98	107.96	Pass	AVG

Horizontal



Notes: Emission Level = Read Level +Antenna Factor + Cable loss

	Freq	Read Level	Cable Loss	Ant Factor	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB/m	dB	dBuV/m	dBuV/m	dB	
1	24083.740	73.66	6.02	39.26	20.78	98.16	137.50	-39.34	Peak
2	24083.740	71.02	6.02	39.26	20.78	95.52	117.50	-21.98	Average

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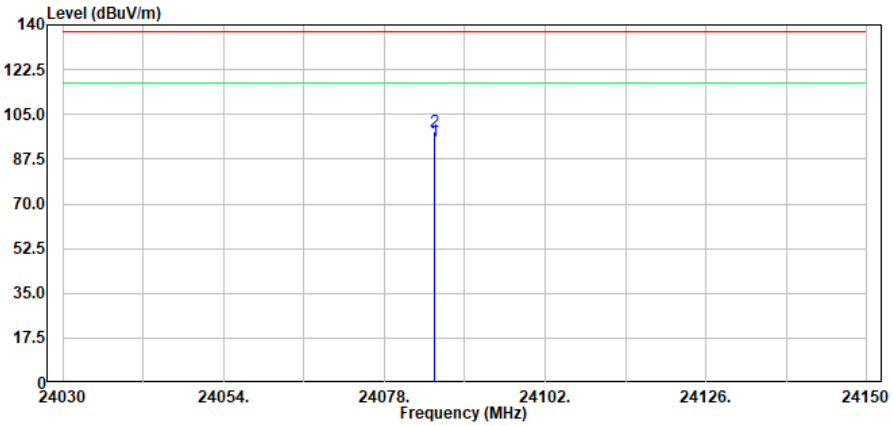
Frequency (GHz)	Polarity	dBuV/m@(1m)	dBuV/m@(3m)	Limit dBuV/m@(3m)	Result	Remark
24.083	Vertical	98.16	88.62	127.96	Pass	peak
24.083	Vertical	94.55	85.01	107.96	Pass	AVG

Vertical



Site : Shielding Room
Notes: Emission Level = Read Level +Antenna Factor + Cable loss

	Freq	Read Level	Cable Loss	Ant Factor	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB/m	dB	dBuV/m	dBuV/m	dB	
1	24085.390	70.05	6.02	39.26	20.78	94.55	117.50	-22.95	Average
2	24085.390	73.66	6.02	39.26	20.78	98.16	137.50	-39.34	Peak

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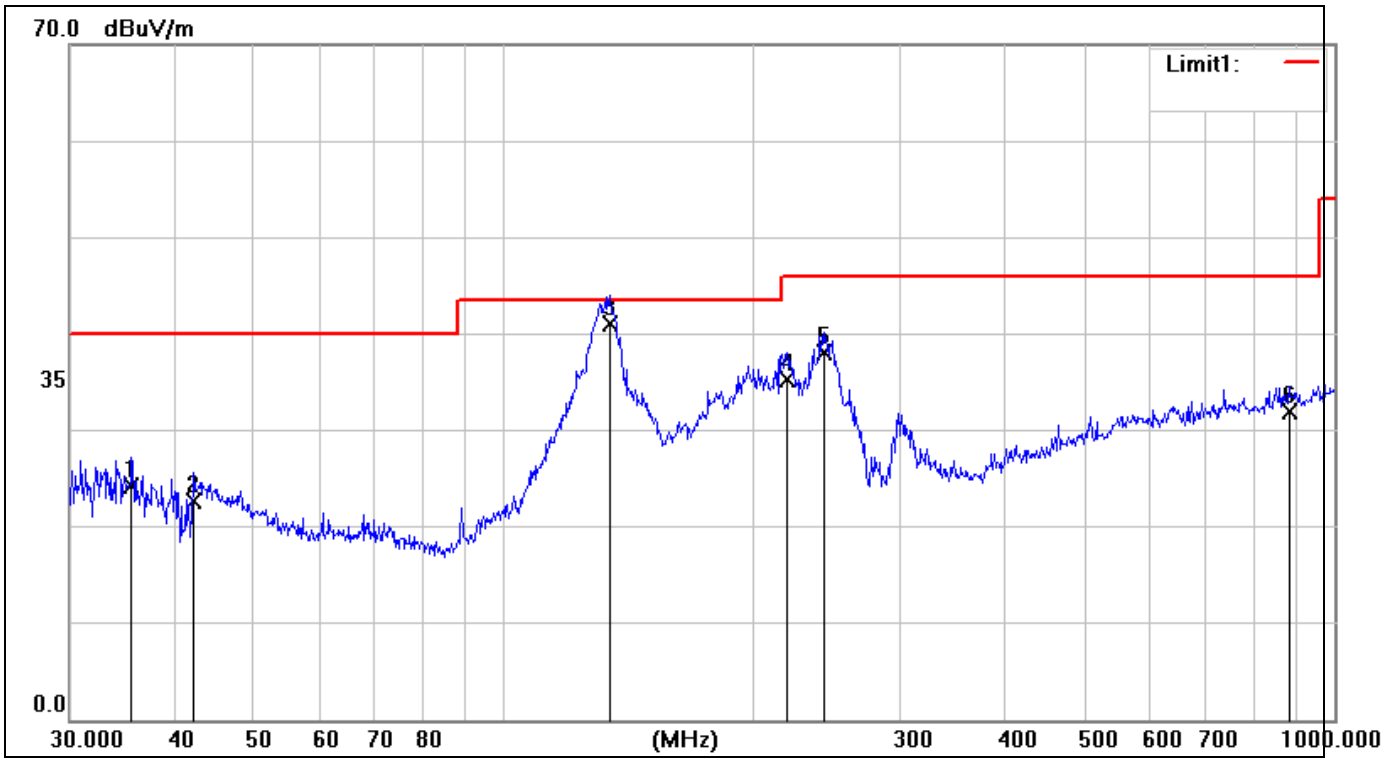
Radiation Spurious Emission
30MHz-1GHz Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	35.6240	-0.12	24.30	24.18	40.00	-15.82	QP
2	42.3021	1.57	21.13	22.70	40.00	-17.30	QP
3	134.0882	21.80	19.18	40.98	43.50	-2.52	QP
4	219.0752	18.68	16.62	35.30	46.00	-10.70	QP
5	242.5252	19.07	19.04	38.11	46.00	-7.89	QP
6	881.4067	29.68	2.33	32.01	46.00	-13.99	QP

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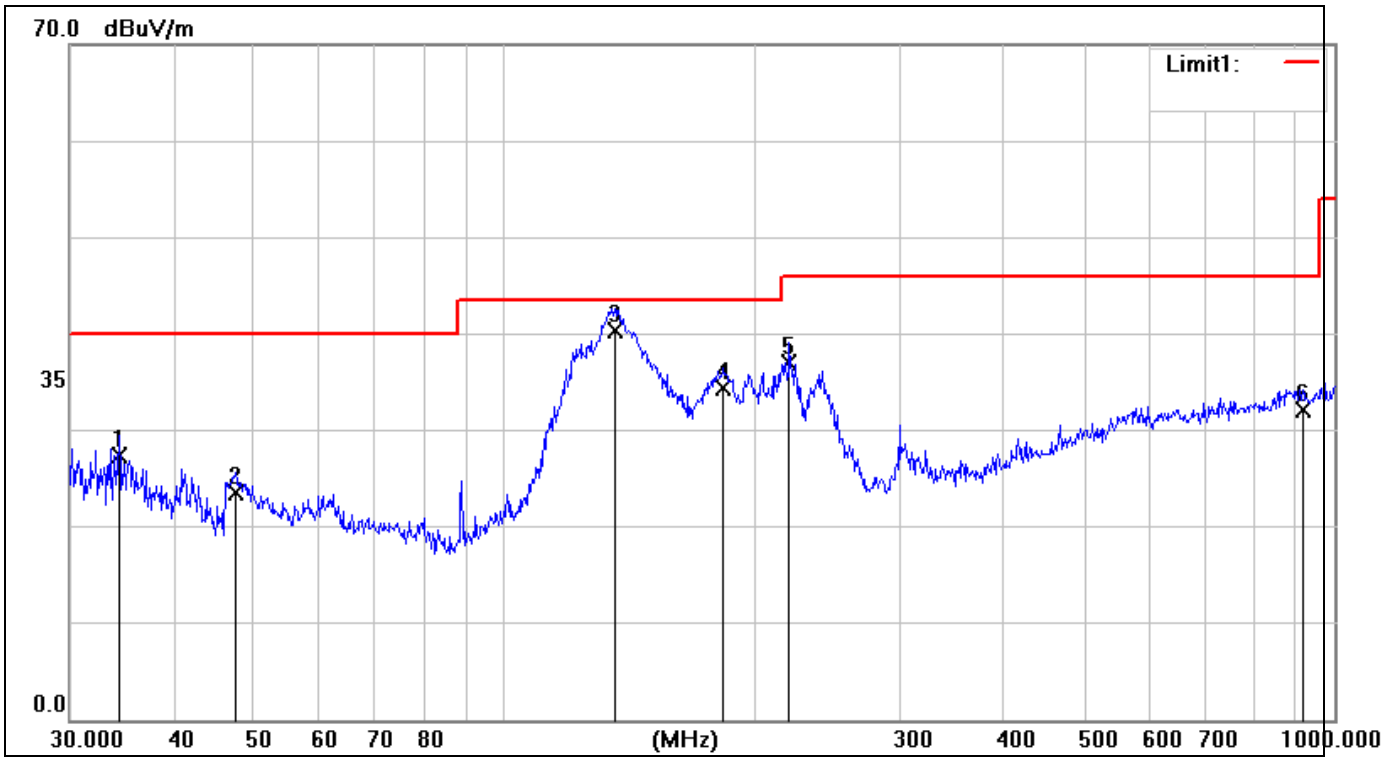
30MHz-1GHz Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	34.3964	2.54	24.80	27.34	40.00	-12.66	QP
2	47.4918	4.76	18.79	23.55	40.00	-16.45	QP
3	135.9822	21.36	18.99	40.35	43.50	-3.15	QP
4	183.8440	17.83	16.49	34.32	43.50	-9.18	QP
5	220.6171	20.36	16.70	37.06	46.00	-8.94	QP
6	916.0687	29.64	2.51	32.15	46.00	-13.85	QP

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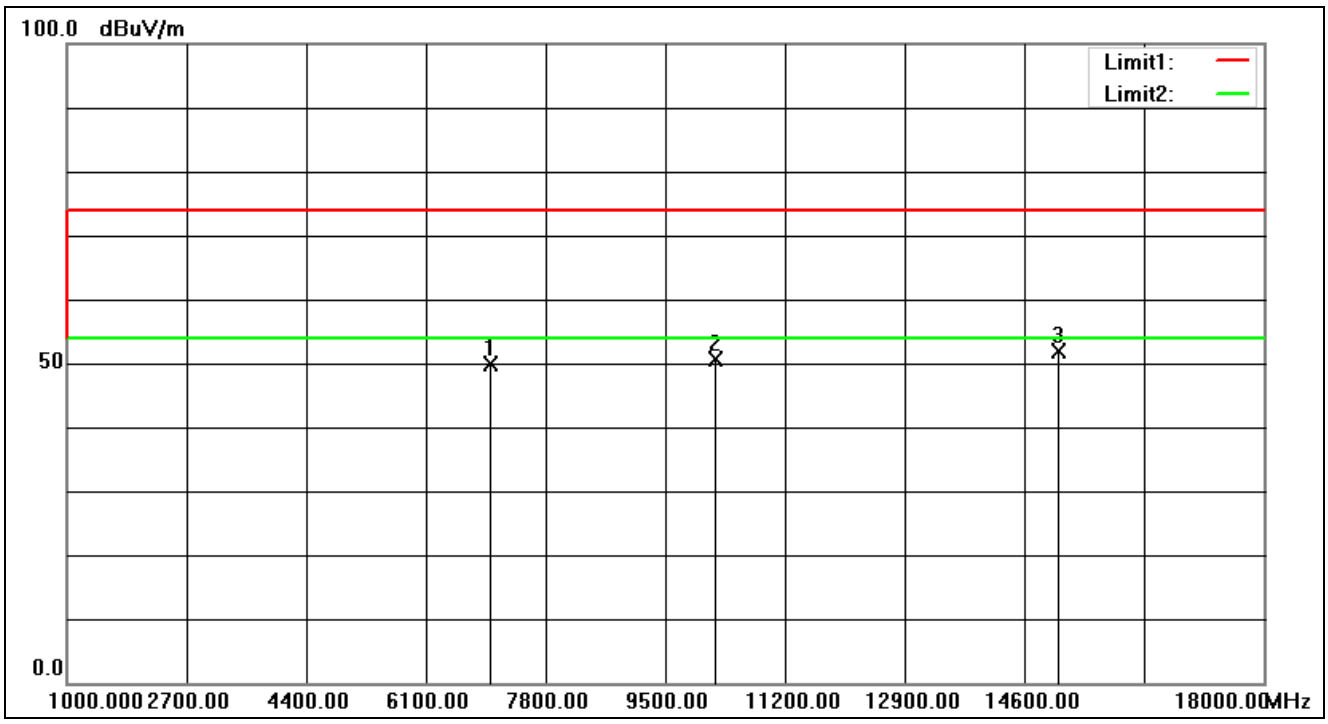
1-18GHz Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	7018.000	55.05	-5.18	49.87	74.00	-24.13	peak
2	10214.000	49.60	0.91	50.51	74.00	-23.49	peak
3	15076.000	46.15	5.74	51.89	74.00	-22.11	peak

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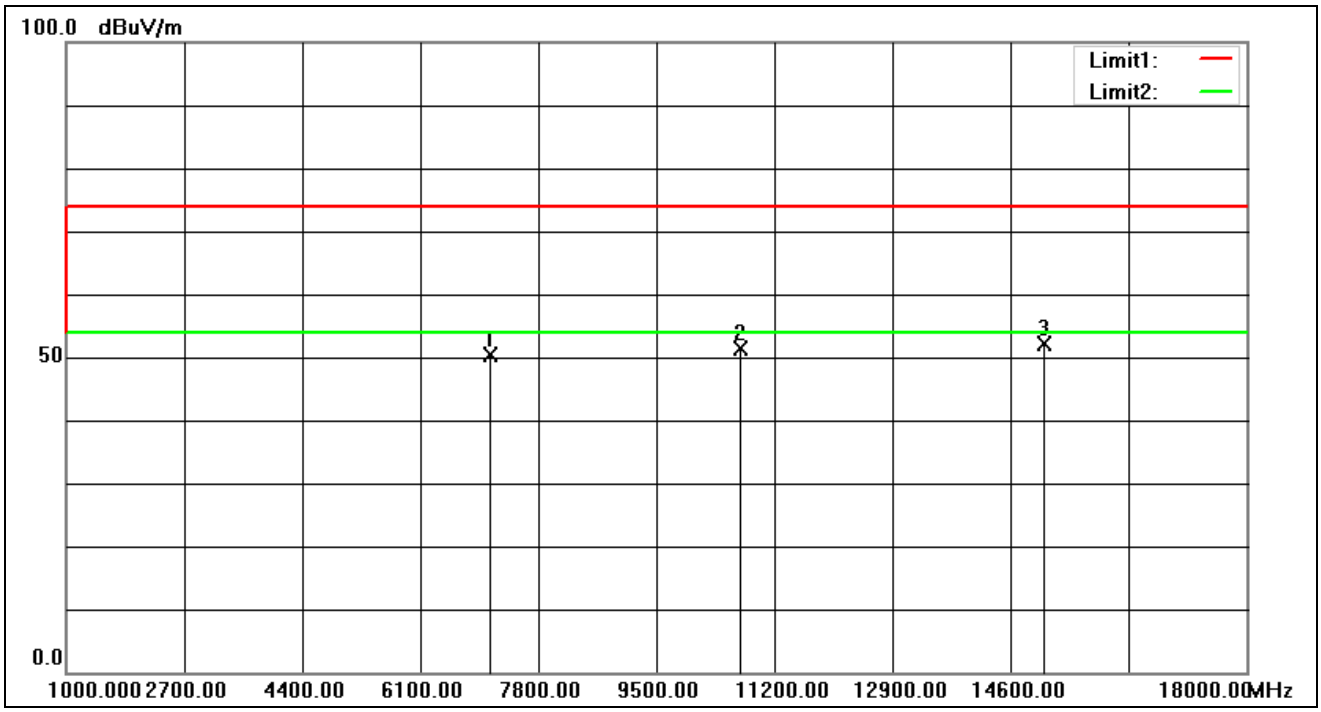
1-18GHz Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	7103.000	55.47	-5.11	50.36	74.00	-23.64	peak
2	10707.000	49.65	1.72	51.37	74.00	-22.63	peak
3	15076.000	46.45	5.74	52.19	74.00	-21.81	peak

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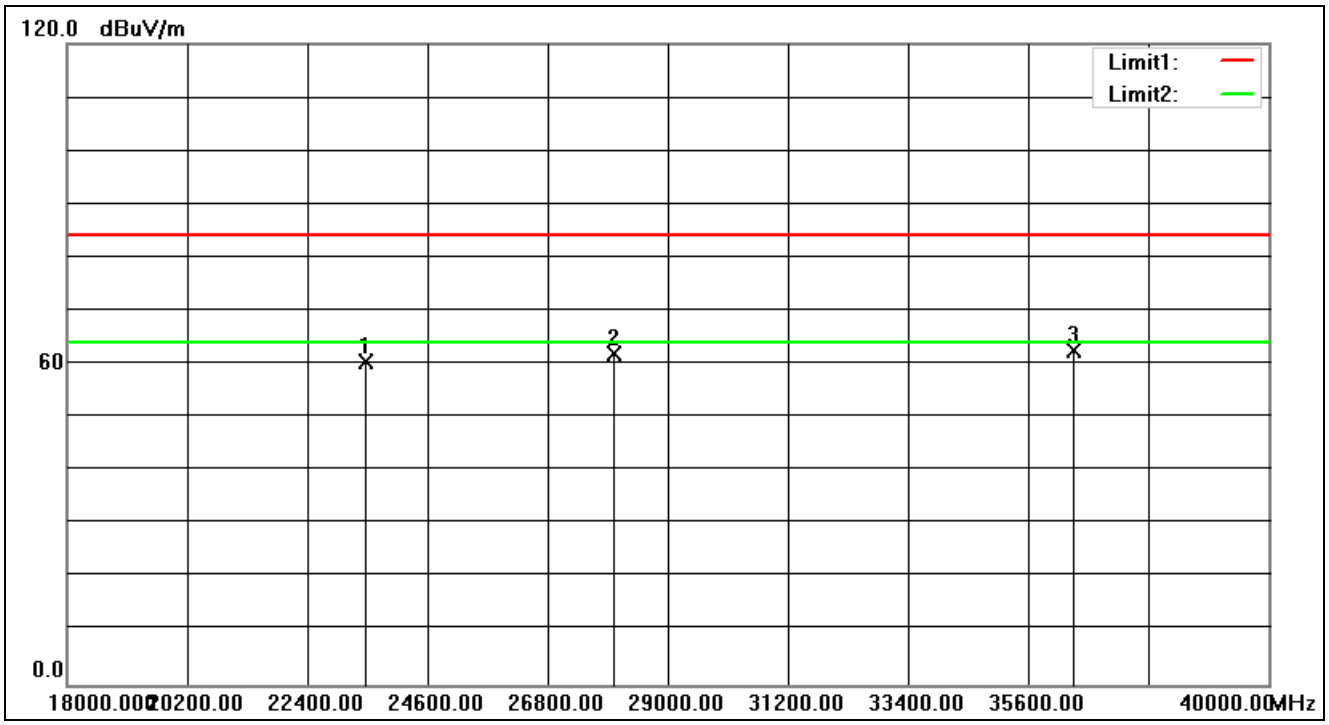
18-40GHz Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	23462.000	47.83	12.55	60.38	84.00	-23.62	peak
2	28016.000	48.83	13.11	61.94	84.00	-22.06	peak
3	36438.000	41.12	21.45	62.57	84.00	-21.43	peak

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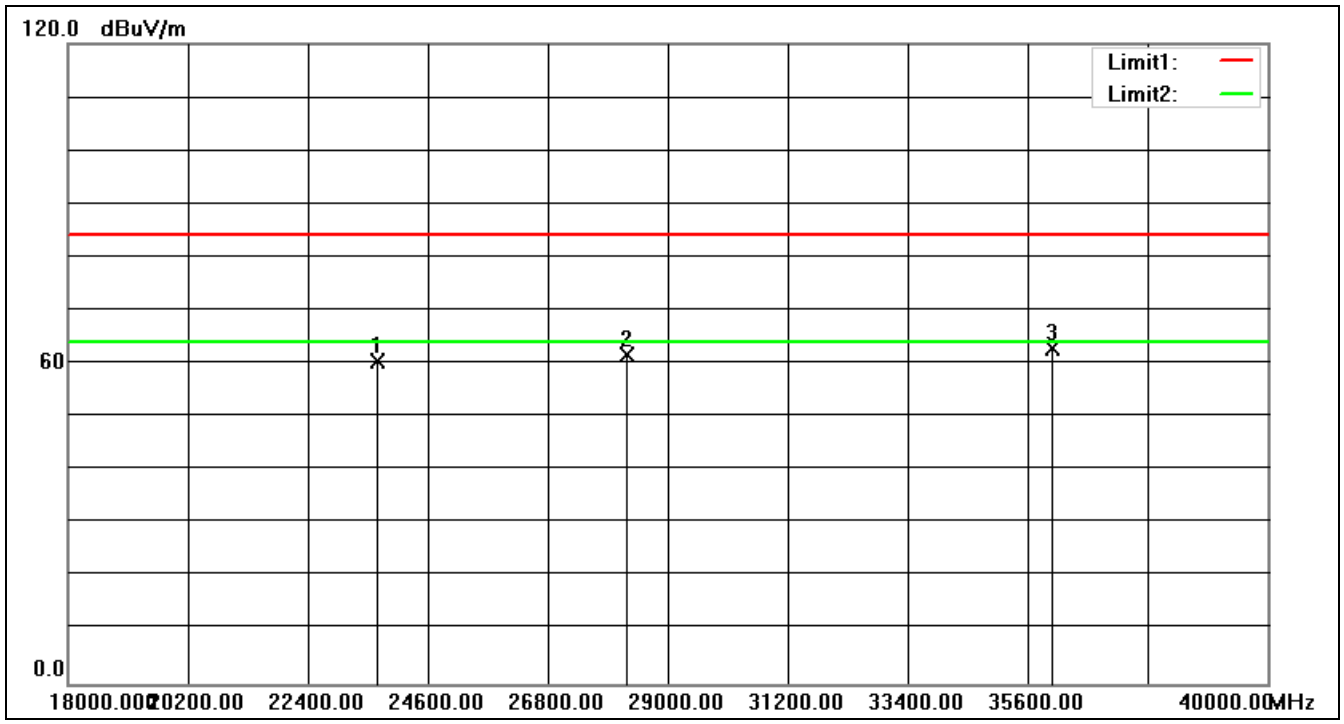
18-40GHz Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	23682.000	47.73	12.60	60.33	84.00	-23.67	peak
2	28246.000	48.60	12.99	61.59	84.00	-22.41	peak
3	36060.000	43.33	19.50	62.83	84.00	-21.17	peak

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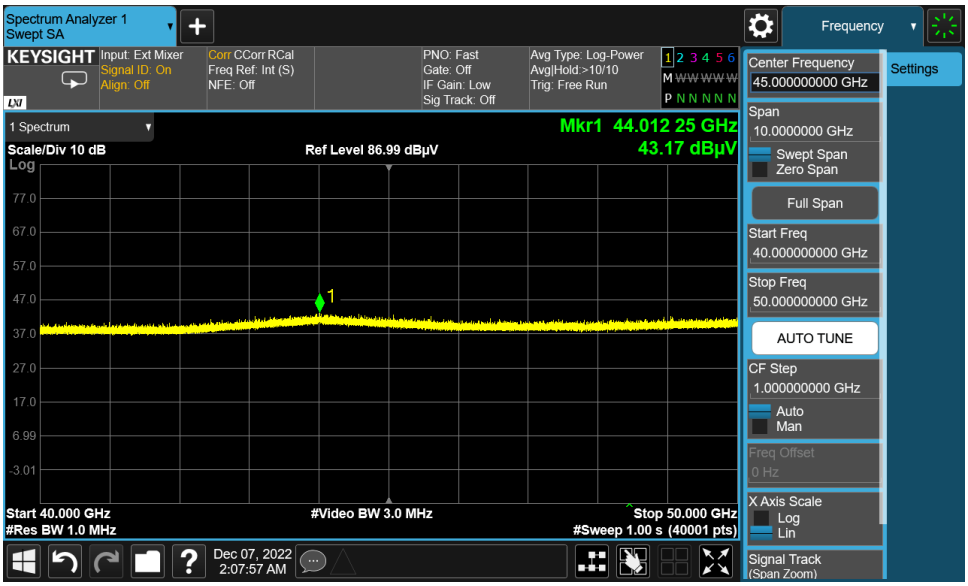
40-50GHz Vertical



40-50GHz Horizontal

Frequency (GHz)	Distance (M)	Peak Value (dBuv/m)	AV Limit (dBuv/m)	Polarization	Result
44.01225	0.15	43.17	80.00	V	PASS
44.03125	0.15	43.10	80.00	H	PASS

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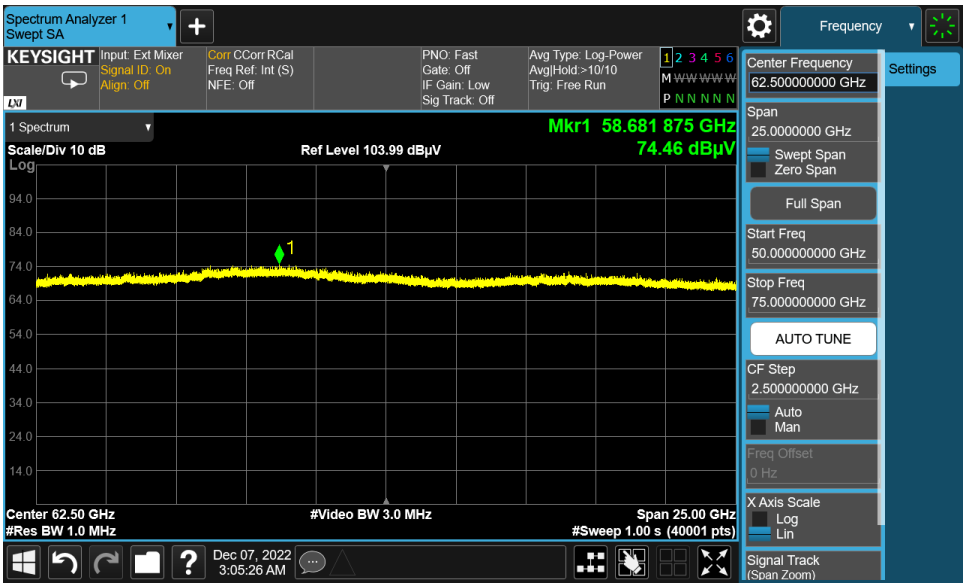
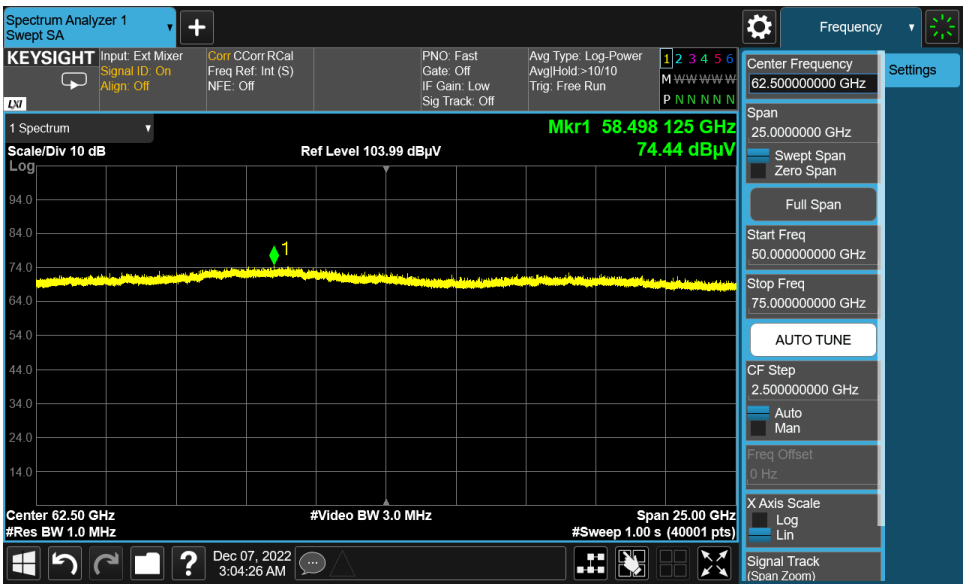
50-75GHz Vertical



50-75GHz Horizontal



Frequency (GHz)	Distance (M)	Peak Value (dBuv/m)	AV Limit (dBuv/m)	Polarization	Result
58.681875	0.15	74.46	80.00	H	PASS
58.498125	0.15	74.44	80.00	V	PASS

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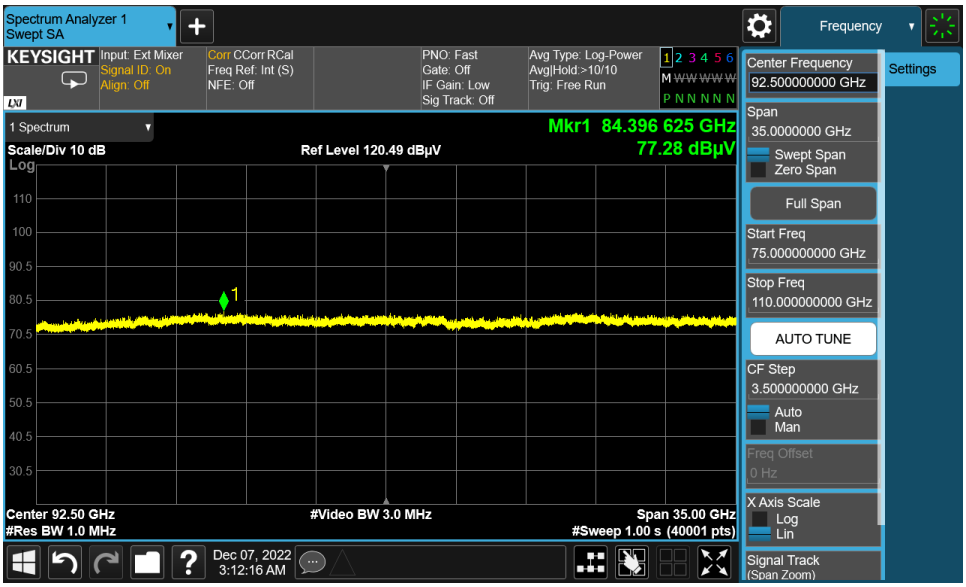
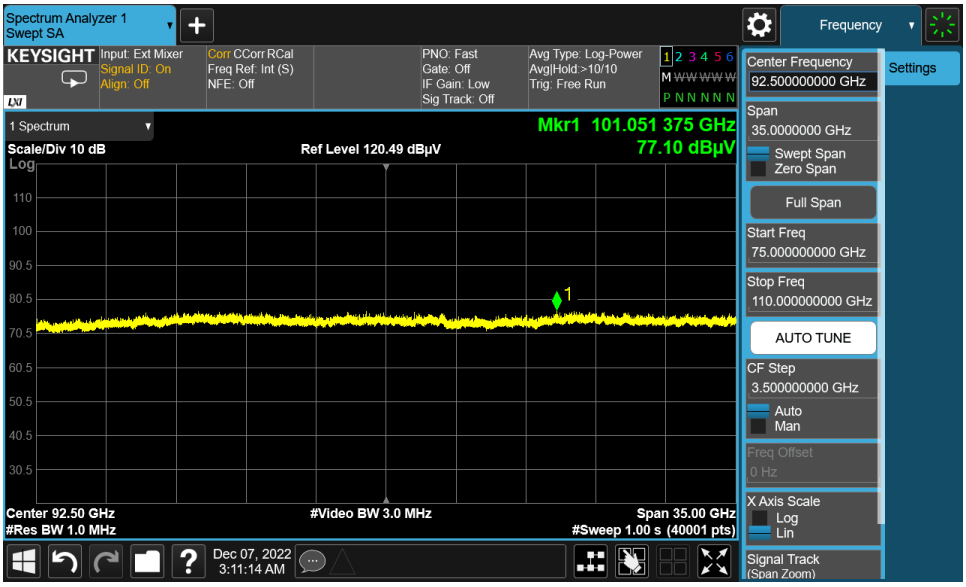
75-110GHz Vertical



75-110GHz Horizontal



Frequency (GHz)	Distance (M)	Peak Value (dBuv/m)	AV Limit (dBuv/m)	Polarization	Result
84.396625	0.15	77.28	80.00	H	PASS
101.051375	0.15	77.10	80.00	V	PASS

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7.4 Radiated Emissions which fall in the restricted bands

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209
Test Method: ANSI C63.10 (2013) Section 6.10.5
Limit:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3
Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. Remark: For measurement distance 1m, the filed strength doesn't exceed 80.00 dBuV/m		

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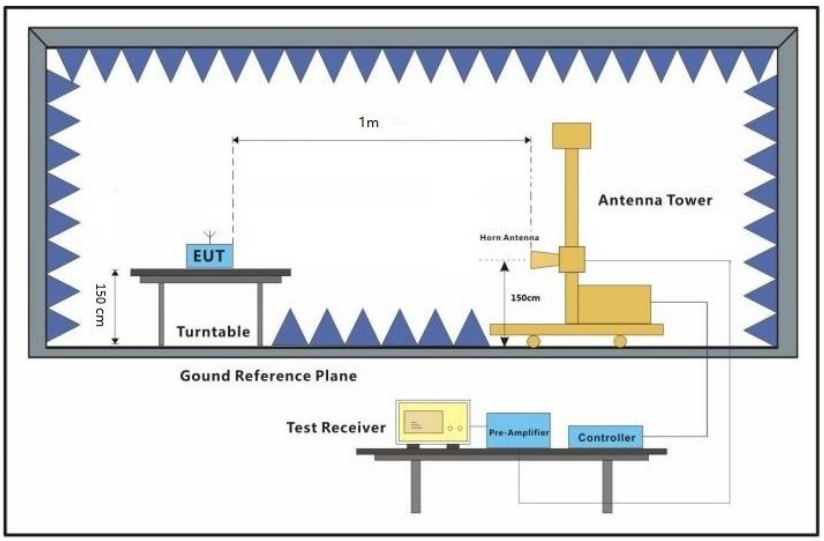
7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1002 mbar

Test Mode: a: TX mode _ Keep the EUT in continuously transmitting mode.

7.4.2 Test Setup Diagram



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7.4.3 Measurement Procedure and Data

1) The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
2) 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.
3) 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 (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
4) The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
5) 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.
6) The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
7) Repeat above procedures until all frequencies measured was complete.

Remark 1: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

Remark 2: For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

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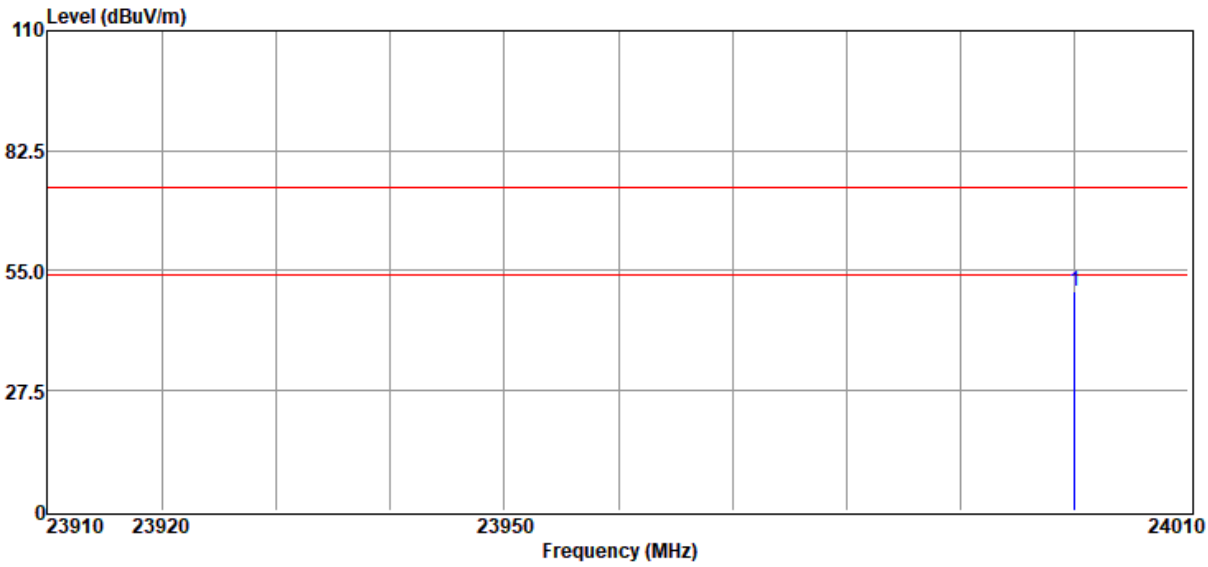
Polarization:Horizontal; Modulation: FMCW;



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	24000.00	42.82	5.62	48.44	54	-5.56	peak

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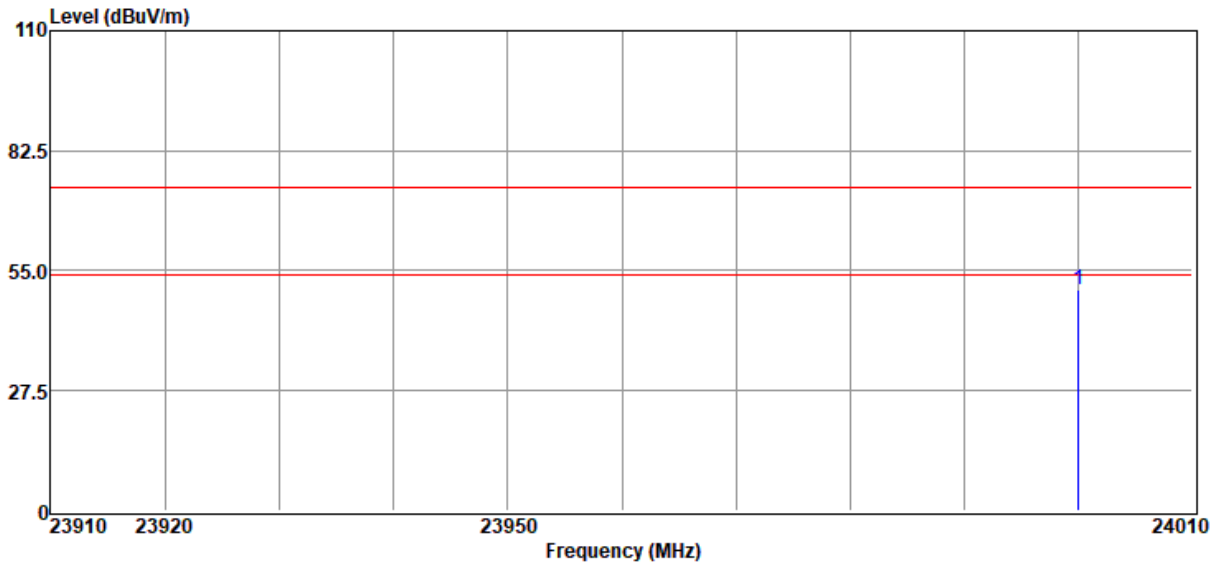
Polarization:Vertical; Modulation: FMCW;



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	24000.00	43.34	5.62	48.86	54	-5.14	peak

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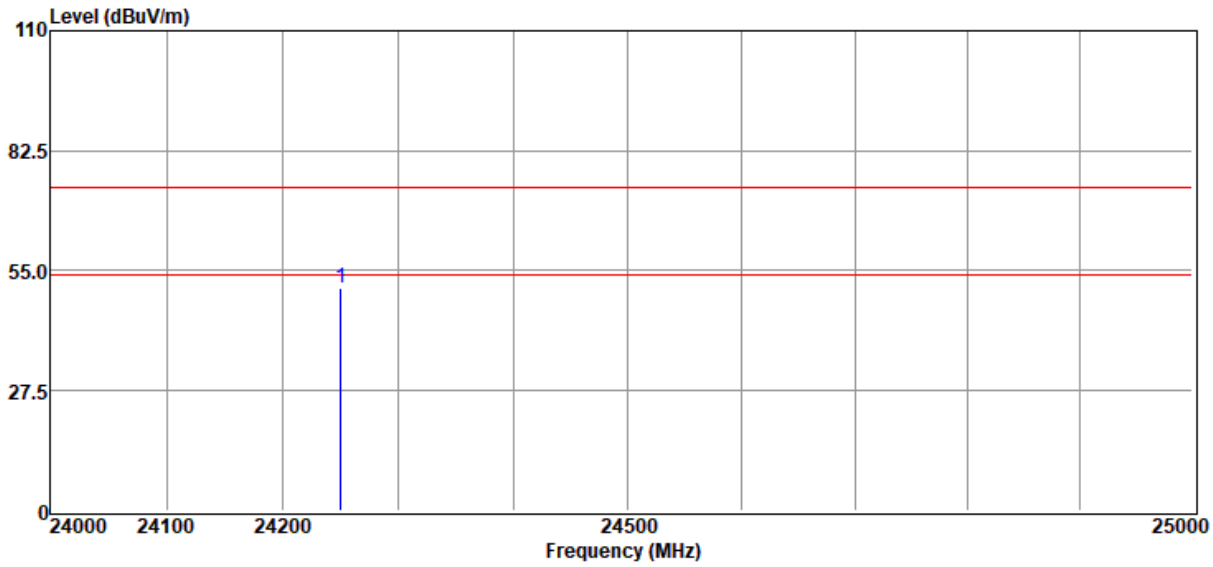
Polarization:Horizontal; Modulation: FMCW;



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	24250.00	43.44	5.98	49.42	54	-4.58	peak

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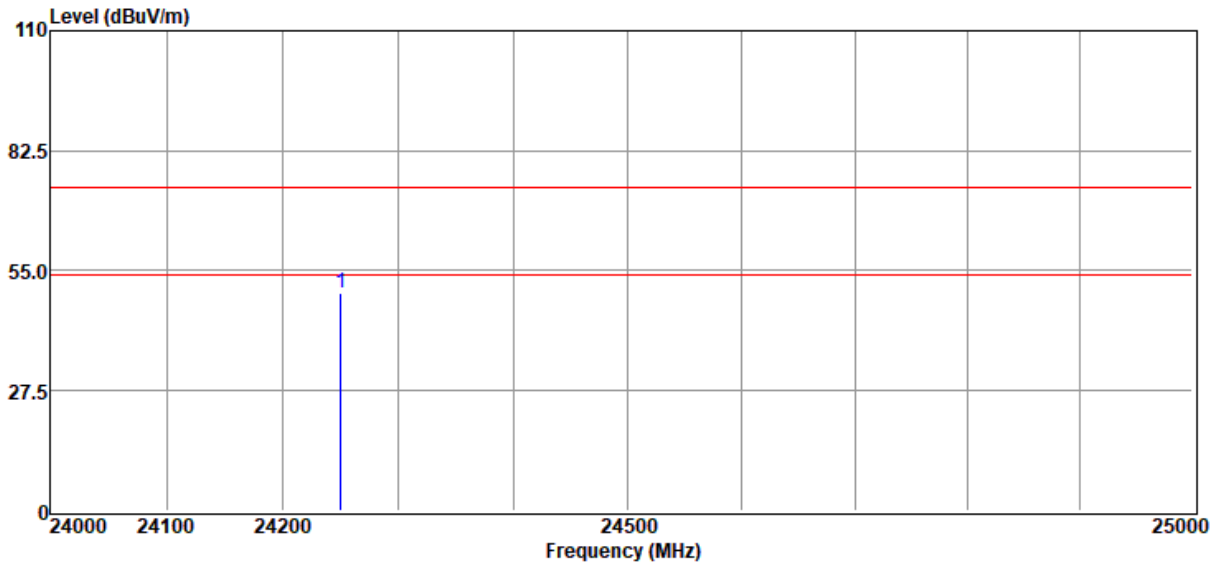
Polarization:Vertical; Modulation: FMCW;



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	24250.00	42.40	5.98	48.38	54	-5.62	peak

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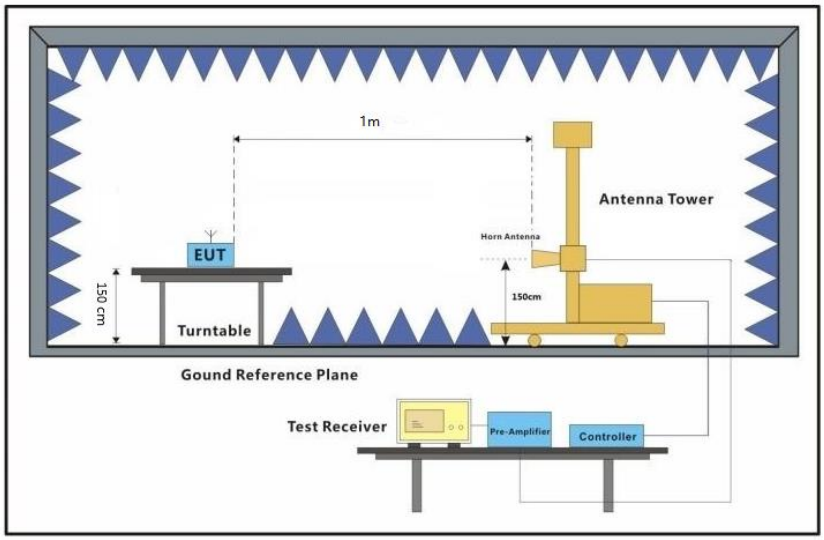
7.5 99% Occupied Bandwidth

Test Configuration:



Test Procedure:

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: Span = approximately 2 to 3 times the 20dB bandwidth, centred on the hopping channel;
3. Set the spectrum analyzer: RBW = 3 kHz. VBW >= RBW. Sweep = auto; Detector Function = Peak. Trace = Max Hold.
4. Mark the peak frequency and using the 99% OBW function measure the bandwidth.

Test Result: Pass

Test Date:

Frequency (GHz)	Bandwidth (kHz)	Result
24.084	188.85	PASS

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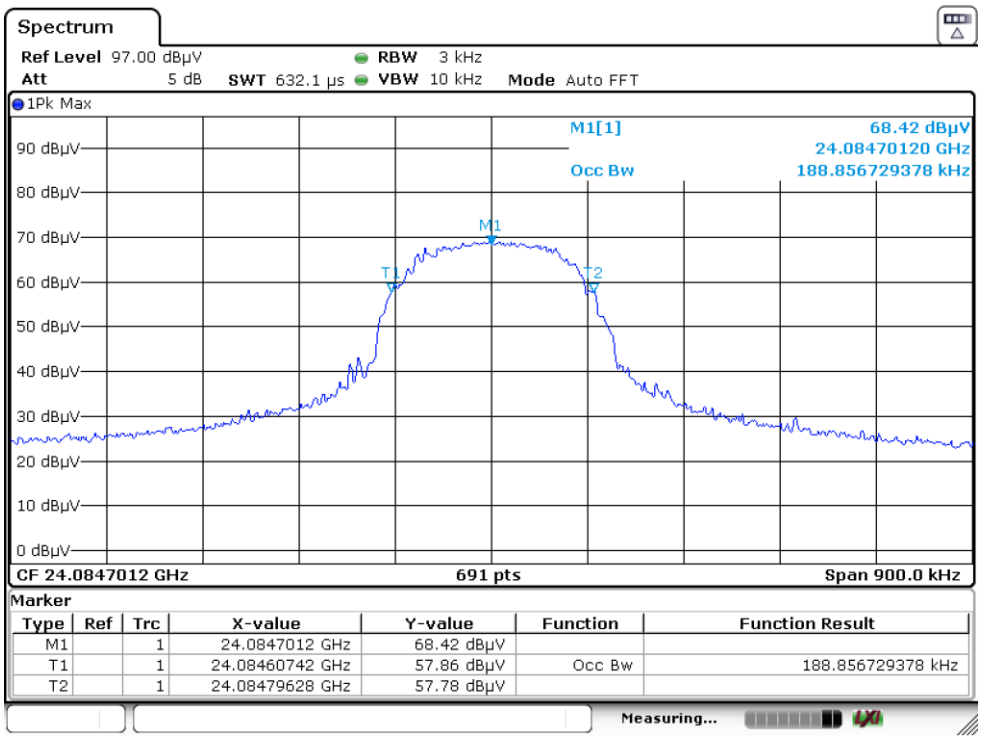
Test plot as follows:



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8 Test Setup Photographs

Refer to the < Test Setup photos>.

9 EUT Constructional Details

Refer to the < External Photos > & < Internal Photos >.

- End of the Report -

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