TEST REPORT

Application No.:	KSEM2107001092CR
FCC ID:	2AZSCRDIIM10
Applicant:	DeepBlue Technology （Shanghai） Co.,Ltd
Address of Applicant:	9 / F, binggu building, Weining Road, Changning District, Shanghai
Manufacturer:	DeepBlue Technology （Shanghai） Co.,Ltd
Address of Manufacturer:	9 / F, binggu building, Weining Road, Changning District, Shanghai
Factory:	DeepBlue Robotics（changzhou）Co.,Ltd
Address of Factory:	No. 8, Hongyang Road, Tianning District, Changzhou City
Equipment Under Test (EUT):	
EUT Name:	LG CLOi UV-C Bot
Model No.:	RDIIM10
Trade mark:	LG
Standard(s) :	47 CFR Part 15, Subpart C 15.249
Date of Receipt:	2021-07-12
Date of Test:	2021-10-08 to 2021-10-15
Date of Issue:	2021-10-15
Test Result:	**Pass***

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

Eric Lin
Laboratory Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.

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Revision Record			
Version	**Description**	**Date**	**Remark**
00	Original	2021-10-15	/

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	**Standard**	**Method**	**Requirement**	**Result**
Antenna Requirement	47 CFR Part 15, Subpart C 15.249	N/A	47 CFR Part 15, Subpart C 15.203	Pass

N/A: Not applicable

Radio Spectrum Matter Part				
Item	**Standard**	**Method**	**Requirement**	**Result**
Conducted Emissions at AC Power Line (150kHz-30MHz)	47 CFR Part 15, Subpart C 15.249	ANSI C63.10 (2013) Section 6.2	47 CFR Part 15, Subpart C 15.207	Pass
20dB Emission bandwidth	47 CFR Part 15, Subpart C 15.249	ANSI C63.10 (2013) Section 6.9	47 CFR Part 15, Subpart C 15.215	Pass
Filed strength of fundamental	47 CFR Part 15, Subpart C 15.249	ANSI C63.10 (2013) Section 6.6	47 CFR Part 15, Subpart C 15.249(a)	Pass
Radiation Spurious Emission	47 CFR Part 15, Subpart C 15.249	ANSI C63.10 (2013) Section 6.6	47 CFR Part 15, Subpart C 15.249(a)	Pass

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4 General Information

4.1 Details of E.U.T.

Power supply:	DC 28.8V 25Ah rechargeable battery Charging Adapter Model: FY28816000 INPUT: 100-240V,50/60Hz,7A,700VA OUTPUT: 28.8V,16A,576.0W
Test voltage:	AC 120V/60Hz
Number of Channels:	1
Center Frequency:	24115MHz
Modulation Technique:	FMCW
Antenna Type:	Integrated Patch Antenna
Output Power:	Peak: 110.85dBuV/m @1m AV: 106.12dBuV/m @1m

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
/	/	/	/

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4.3 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	8.4×10^{-8}
2	Timeout	2s
4	Occupied Bandwidth	3%
8	RF Radiated Power	5.2dB (Below 1GHz)
		5.9dB (Above 1GHz)
9	Radiated Spurious Emission Test	4.2dB (Below 30MHz)
		4.5dB (30MHz-1GHz)
		5.1dB (1GHz-18GHz)
		5.4dB (Above 18GHz)
10	Temperature Test	1°C
11	Humidity Test	3%
12	Supply Voltages	1.5%
13	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

No tests were sub-contracted.

4.5 Test Facility

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

- **CNAS (No. CNAS L4354)**

CNAS has accredited Compliance Certification Services (Kunshan) Inc. to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

- **A2LA (Certificate No. 2541.01)**

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

- **FCC (Designation Number: CN1172)**

Compliance Certification Services Inc. has been recognized as an accredited testing laboratory.

Designation Number: CN1172.

- **ISED (CAB Identifier: CN0072)**

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

CAB Identifier: CN0072.

- **VCCI (Member No.: 1938)**

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

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5 Equipment List

Item	Equipment	Manufacturer	Model	Serial Number	Cal Date	Cal. Due Date
Conducted Emission at Mains Terminals (150kHz-30MHz)						
1	EMI Test Receive	R&S	ESCI	100781	02/01/2021	01/31/2022
2	LISN	R&S	ENV216	101604	10/19/2020	10/18/2021
3	LISN	Schwarzbeck	NNLK 8129	8129-143	10/19/2020	10/18/2021
4	Pulse Limiter	R&S	ESH3-Z2	100609	02/01/2021	01/31/2022
5	CE test Cable	Thermax	/	14	10/17/2020	10/16/2021
6	Test Software	Farad	EZ-EMC	CCS-03A1	N.C.R	N.C.R
RF Radiated Test						
Item	**Equipment**	**Manufacturer**	**Model**	**Serial Number**	**Cal Date**	**Cal. Due Date**
1	Spectrum Analyzer	R&S	FSV40	101493	10/19/2020	10/18/2021
2	Signal Generator	Agilent	E8257C	MY43321570	10/10/2020	10/18/2021
3	Loop Antenna	COM-POWER	AL-130R	10160008	04/29/2019	04/28/2021
4	Bilog Antenna	TESEQ	CBL 6112D	35403	06/22/2021	06/21/2023
5	Bilog Antenna	SCHWARZBECK	VULB9160	9160-3342	04/29/2021	04/28/2023
6	Horn-antenna(1-18GHz)	Schwarzbeck	BBHA9120D	267	10/26/2020	10/25/2022
7	Horn-antenna(1-18GHz)	ETS-LINDGREN	3117	00143290	02/22/2021	02/21/2023
8	Horn Antenna(18-40GHz)	Schwarzbeck	BBHA9170	BBHA9170171	02/22/2021	02/21/2024
9	Horn-antenna(40-60GHz)	REBES	SAZ-2410-19-S1	06299-01	N/A	N/A
10	Horn-antenna(50-75GHz)	REBES	SAZ-2410-15-S1	01731-01	N/A	N/A
11	Horn-antenna(75-110GHz)	REBES	SAZ-2410-10-S1	01773-09	N/A	N/A
12	Horn-antenna(110-170GHz)	REBES	SAZ-2410-06-S1	01776-05	N/A	N/A
13	Horn-antenna(140-220GHz)	REBES	SAZ-2410-05-S1	01759-04	N/A	N/A
14	Horn-antenna(220-325GHz)	REBES	SAR-2309-03-S2	06300-01	N/A	N/A
15	Extended waveguide(40-60GHz)	REBES	SWG-19025-FB	06303-01	N/A	N/A
16	Extended waveguide(50-75GHz)	REBES	SWG-15025-FB	01525-09	N/A	N/A
17	Extended waveguide(75-110GHz)	REBES	SWG-10025-FB	01509-01	N/A	N/A
18	Extended waveguide(110-170GHz)	REBES	SWG-06025-FB	06302-01	N/A	N/A
19	Extended waveguide(140-220GHz)	REBES	SWG-05025-FB	06304-01	N/A	N/A
20	Extended waveguide(220-325GHz)	REBES	SWG-03025-FB	06301-01	N/A	N/A
21	Harmonic mixer(110-170GHz)	REBES	STH-06SF-S1	06110-01	N/A	N/A
22	Harmonic mixer(40-60GHz)	REBES	STH-19SF-S1	06937-01	N/A	N/A
23	Waveguide Harmonic Mixer(50-75GHz)	KEYSIGHT	M1970V	MY51390966	N/A	N/A
24	Waveguide Harmonic Mixer(50-75GHz) cable	Silverline	SLU18-SMSM-01.00M	99612	N/A	N/A
25	Waveguide Harmonic Mixer(75-110GHz)	KEYSIGHT	M1970W	MY51430883	N/A	N/A
26	Waveguide Harmonic Mixer(75-110GHz) cable	Silverline	SLU18-SMSM-01.00M	94202	N/A	N/A
27	Waveguide Harmonic Mixer(140-220GHz)	REBES	HM 140-220	0220-210-002-3D	N/A	N/A
28	Waveguide Harmonic Mixer(220-325GHz)	REBES	HM 220-325	0325-210-002-2F	N/A	N/A

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29	Pre-Amplifier(30MHz~18GHz)	CCSRF	AMP1277	1	10/19/2020	10/18/2021
30	Pre-Amplifier(0.1~26.5GHz)	EMCI	EMC012645	980060	04/21/2021	04/20/2022
31	Low Pass Filter	MICRO-TRONICS	VLFX-950	RV142900829	N.C.R	N.C.R
32	High Pass Filter	Mini-Circuits	VHF-1200	15542	N.C.R	N.C.R
33	RE test cable	/	RE01-RE04	/	04/21/2021	04/22/2022
34	Software	Faratronic	EZ_EMC-v 3A1	N/A	N/A	N/A

Note: N.C.R means Not Calibration Requirements.

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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 15.207

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.		

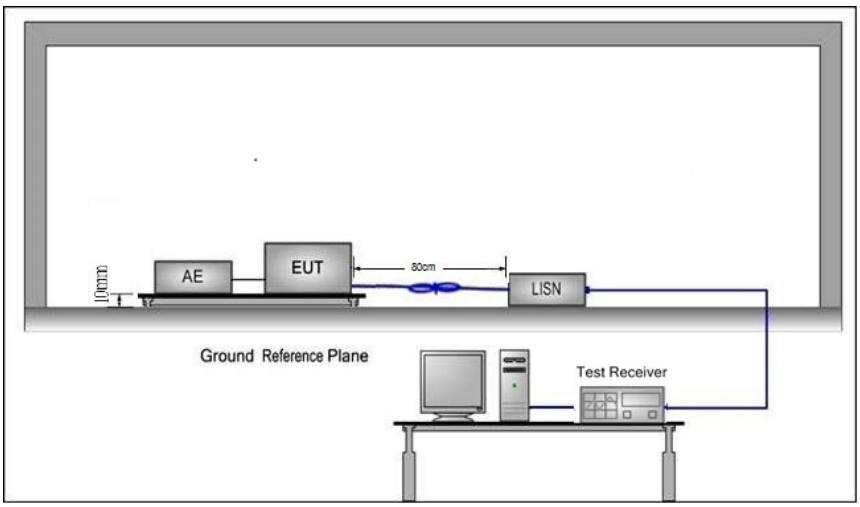
7.1.1 E.U.T. Operation

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) For floor-standing arrangement, the EUT was placed on 10 mm of insulating material 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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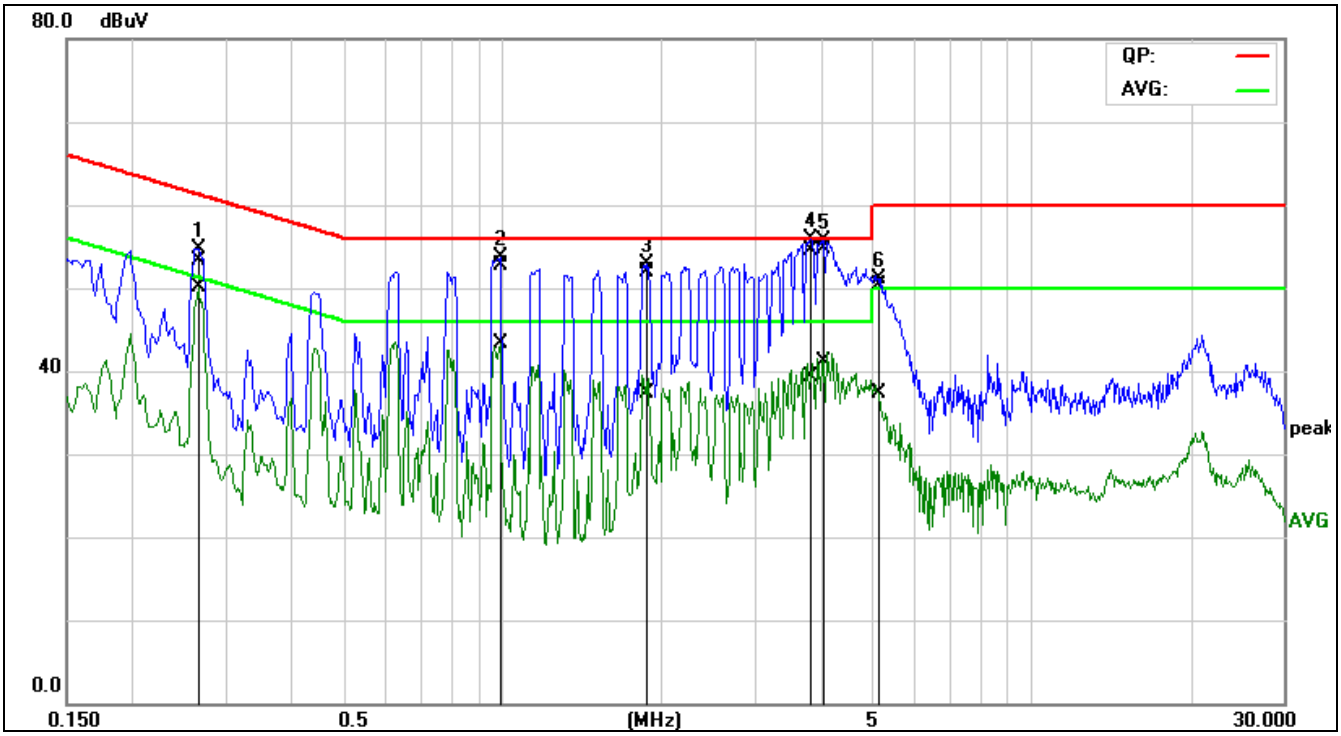
Mode: a; Line: Live Line



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	0.2655	33.84	30.55	19.47	53.31	50.02	61.25	51.26	-7.94	-1.24	Pass
2	0.9890	33.06	23.80	19.55	52.61	43.35	56.00	46.00	-3.39	-2.65	Pass
3	1.8680	32.30	17.70	19.59	51.89	37.29	56.00	46.00	-4.11	-8.71	Pass
4	3.8195	34.82	19.57	19.69	54.51	39.26	56.00	46.00	-1.49	-6.74	Pass
5*	4.0486	35.10	21.45	19.70	54.80	41.15	56.00	46.00	-1.20	-4.85	Pass
6	5.1390	30.50	17.63	19.76	50.26	37.39	60.00	50.00	-9.74	-12.61	Pass

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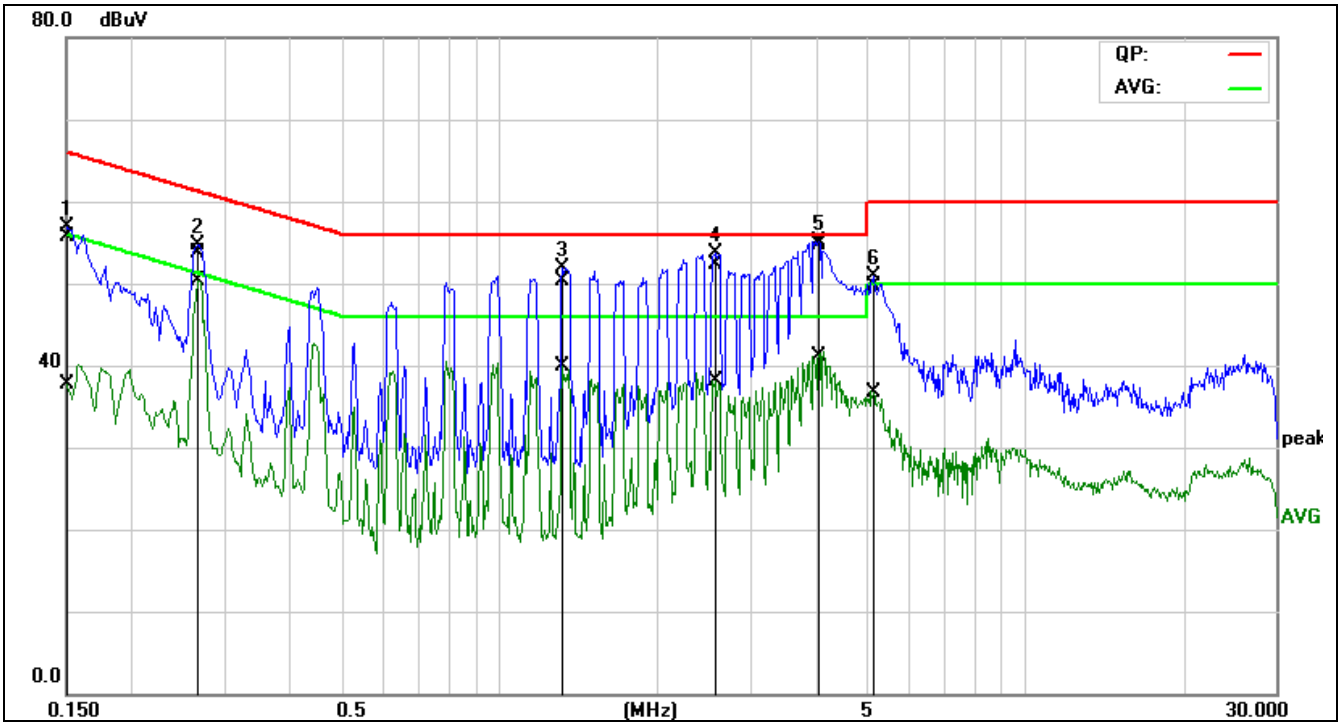
Mode: a; Line: Neutral Line



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	0.1500	36.21	18.28	19.46	55.67	37.74	65.99	56.00	-10.32	-18.26	Pass
2*	0.2656	34.15	30.79	19.47	53.62	50.26	61.25	51.25	-7.63	-0.99	Pass
3	1.3165	30.80	20.26	19.56	50.36	39.82	56.00	46.00	-5.64	-6.18	Pass
4	2.5670	32.71	18.46	19.62	52.33	38.08	56.00	46.00	-3.67	-7.92	Pass
5	4.0487	34.93	21.48	19.70	54.63	41.18	56.00	46.00	-1.37	-4.82	Pass
6	5.1390	29.88	17.01	19.76	49.64	36.77	60.00	50.00	-10.36	-13.23	Pass

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7.2 20dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.215

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

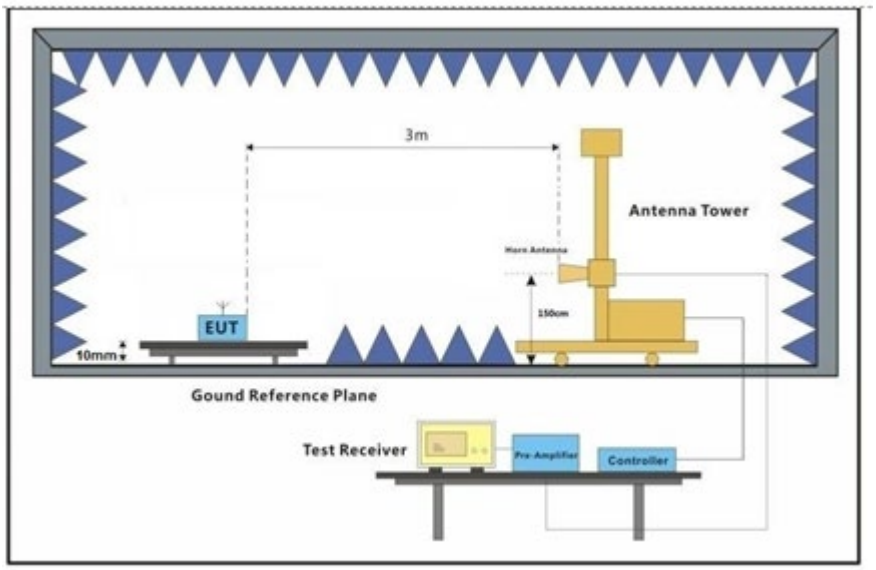
7.2.1 E.U.T. Operation

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

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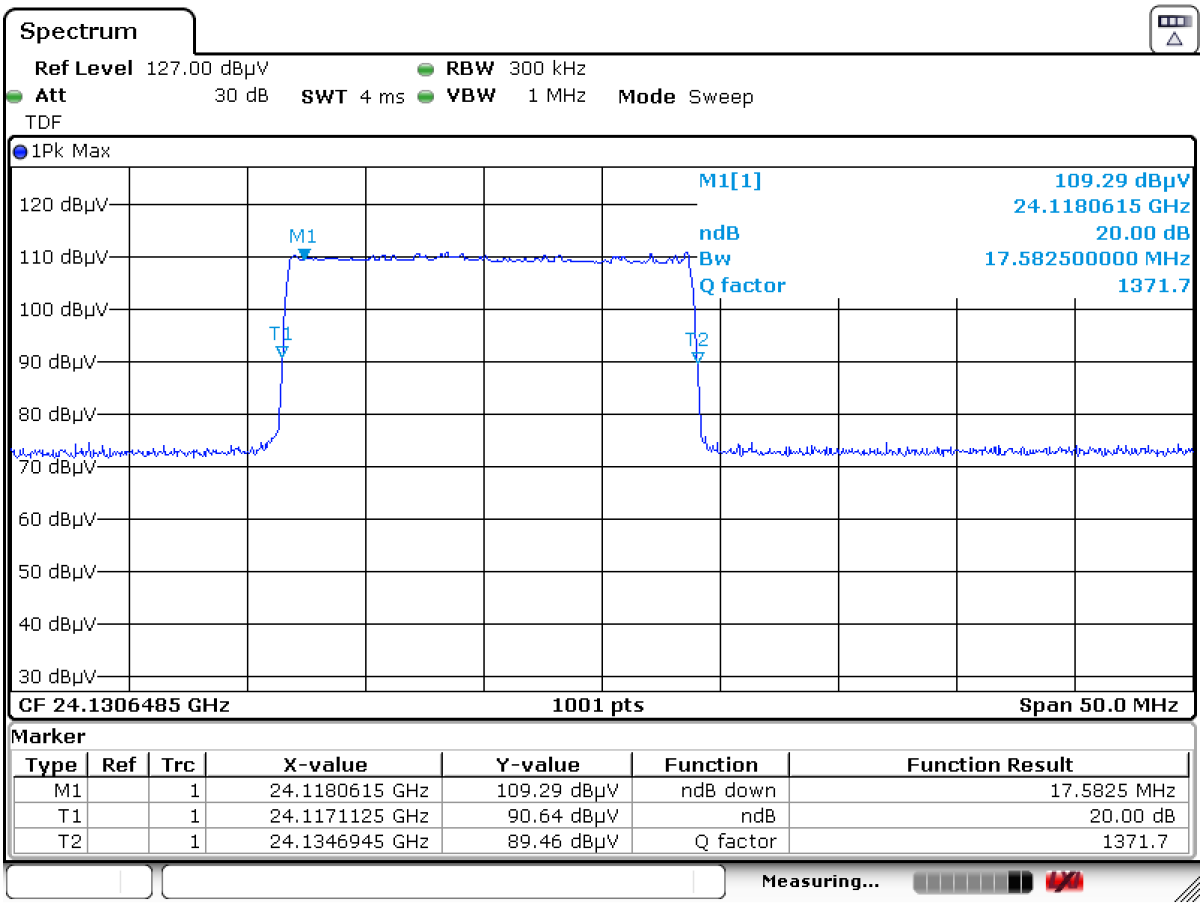

Low Frequency (GHz)	High Frequency (GHz)	20db Bandwidth(MHz)	Result
24.1171125	24.1346945	17.582	Pass

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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
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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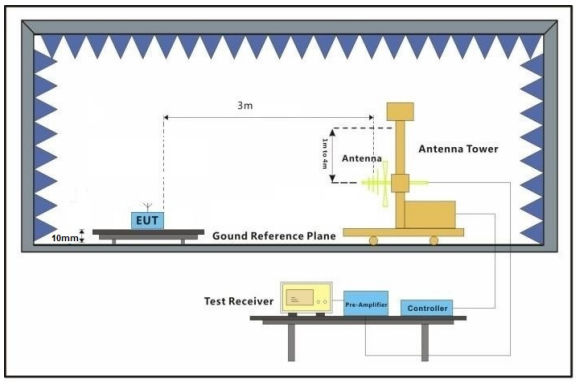
7.3.1 E.U.T. Operation

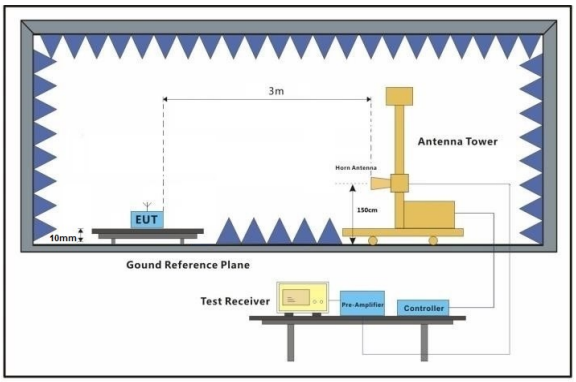
Operating Environment:

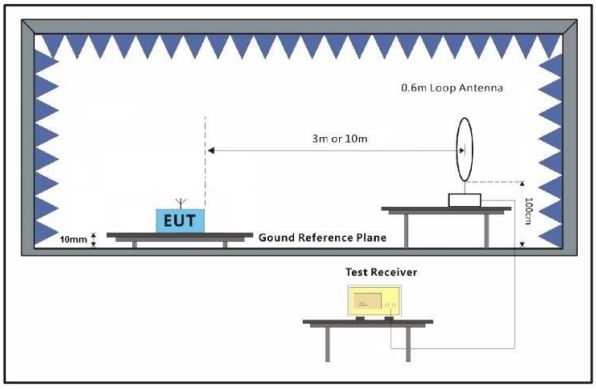
Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1002 mbar

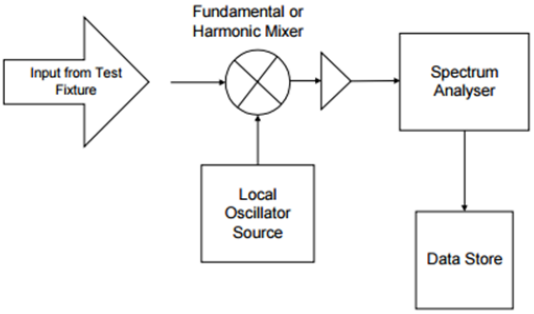
Test Mode: a: TX mode _ Keep the EUT in continuously transmitting mode.

7.3.2 Test Setup Diagram









Above 40GHz

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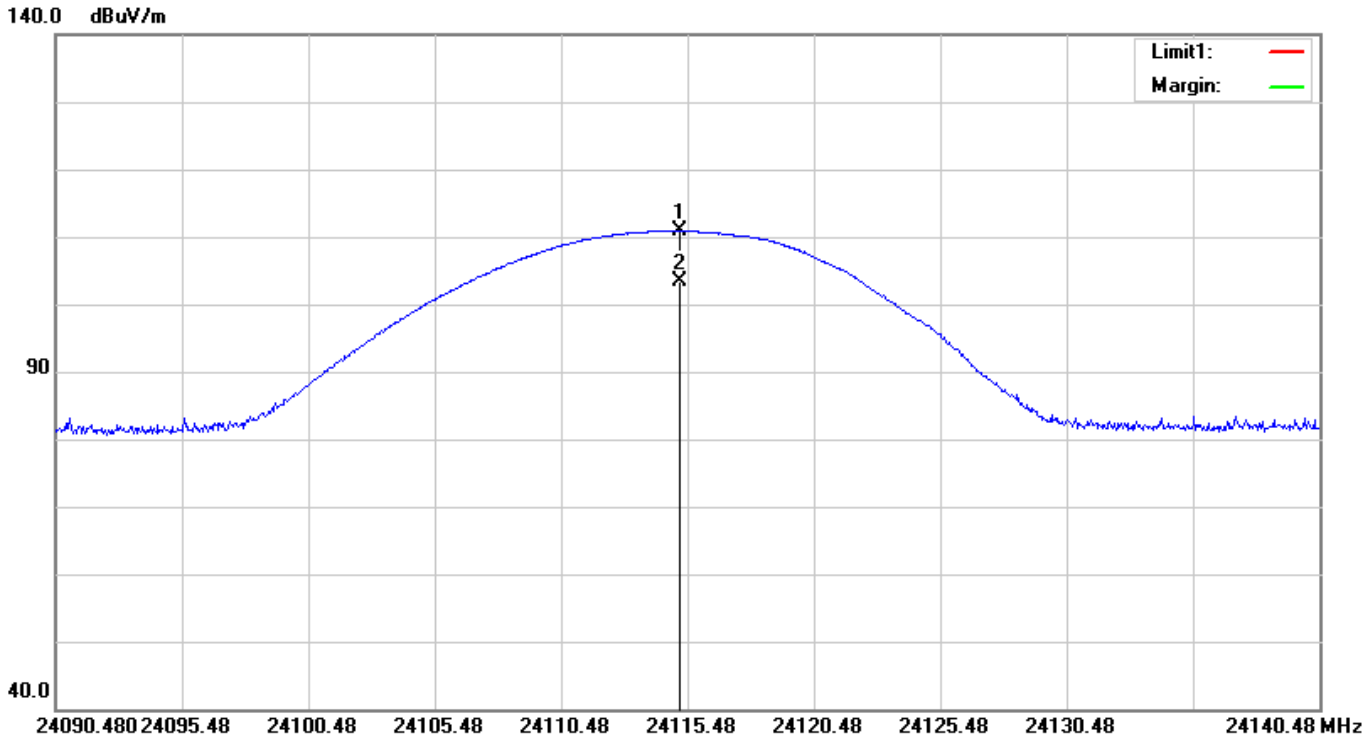
7.3.3 Measurement Procedure and Data

Filed Strength of Fundamental

Frequency (GHz)	Distance(m)	Polarity	dBuV/m	Limit	Result	Remark
24.115	1	Horizontal	110.85	137.50	Pass	peak
24.115	1	Horizontal	106.12	117.50	Pass	AVG
24.115	1	Vertical	105.42	137.50	Pass	peak
24.115	1	Vertical	99.78	117.50	Pass	AVG

Note: Only the data of horizontal polarity is shown which is worst.

Horizontal



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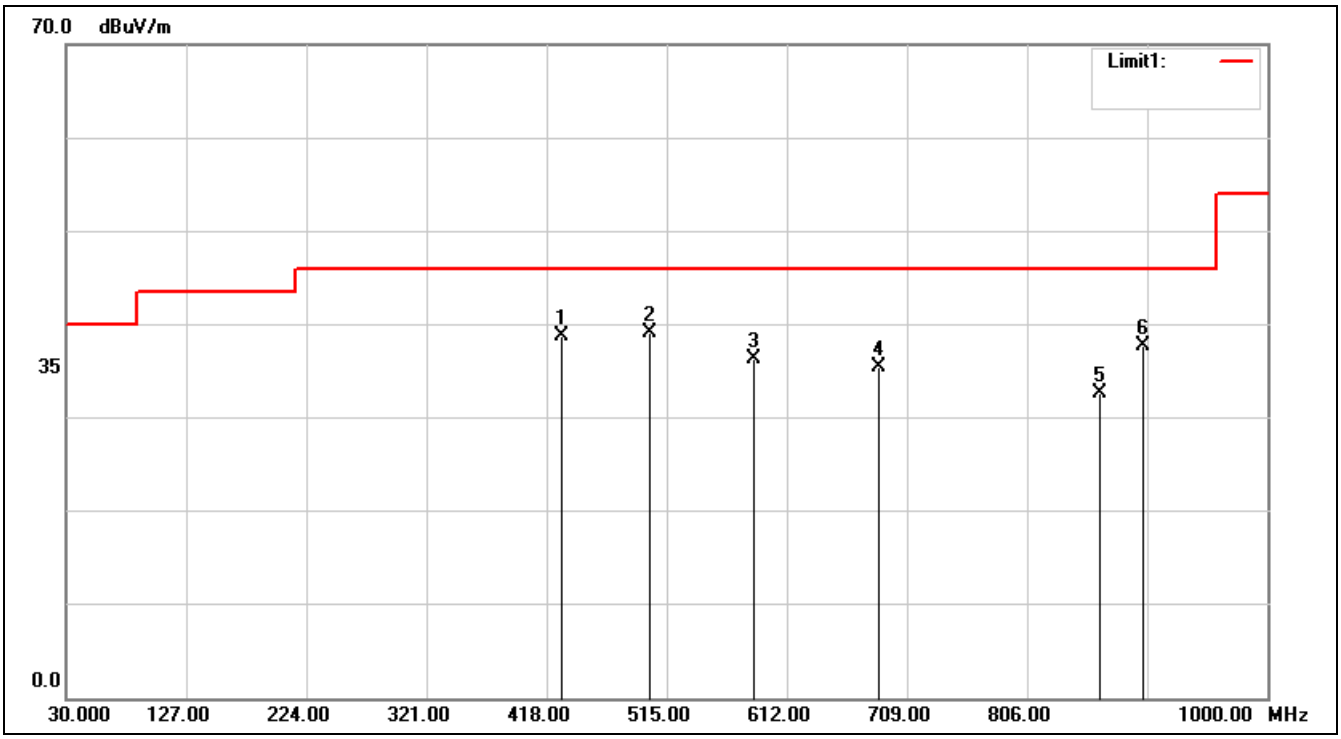
Radiation Spurious Emission
30MHz-1GHz Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	429.6400	14.76	24.01	38.77	46.00	-7.23	QP
2	501.4200	13.89	25.26	39.15	46.00	-6.85	QP
3	585.8100	9.97	26.32	36.29	46.00	-9.71	QP
4	686.6900	8.03	27.40	35.43	46.00	-10.57	QP
5	865.1700	4.39	28.26	32.65	46.00	-13.35	QP
6	899.1200	8.97	28.66	37.63	46.00	-8.37	QP

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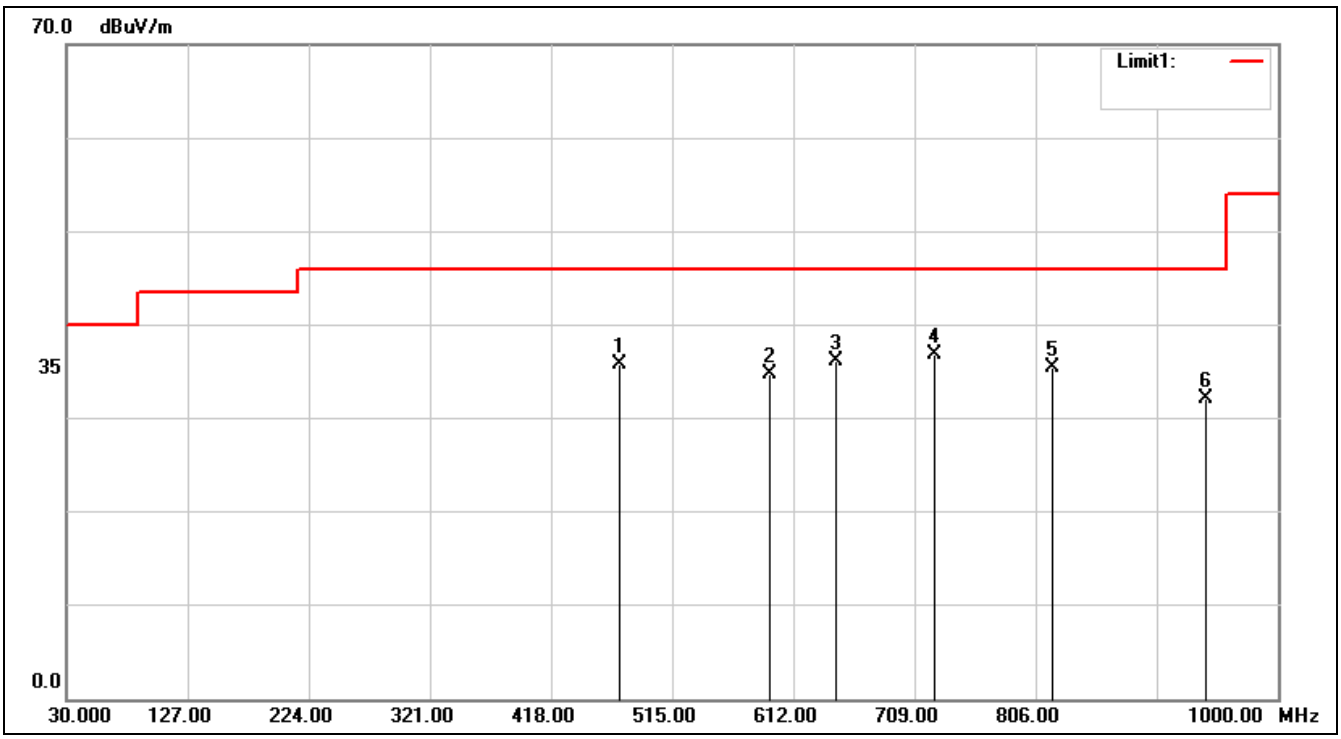
30MHz-1GHz Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	473.2900	11.05	24.74	35.79	46.00	-10.21	QP
2	592.6000	8.25	26.41	34.66	46.00	-11.34	QP
3	645.9500	9.11	27.06	36.17	46.00	-9.83	QP
4	724.5200	9.35	27.49	36.84	46.00	-9.16	QP
5	819.5800	7.59	27.93	35.52	46.00	-10.48	QP
6	941.8000	2.95	29.20	32.15	46.00	-13.85	QP

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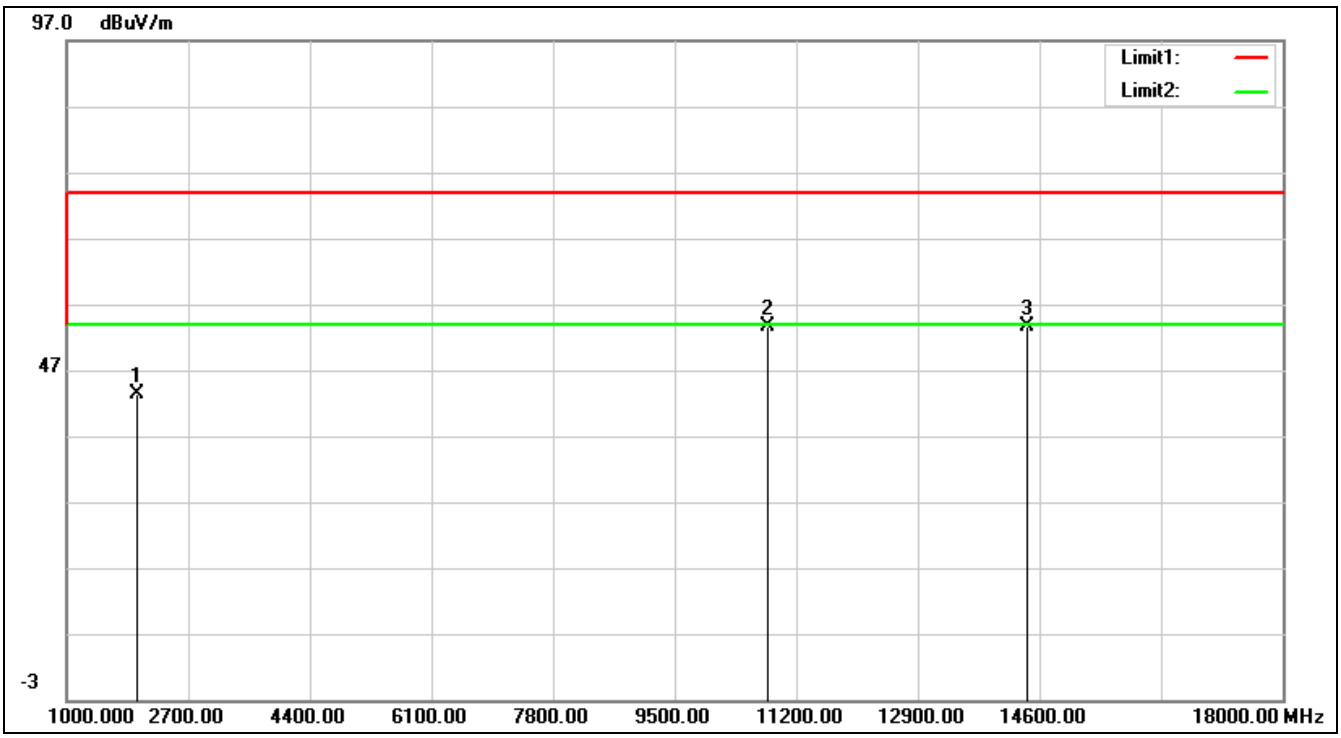
1-18GHz Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1986.000	55.70	-12.39	43.31	74.00	-30.69	peak
2	10809.000	43.85	9.79	53.64	74.00	-20.36	peak
3	14430.000	41.14	12.39	53.53	74.00	-20.47	peak

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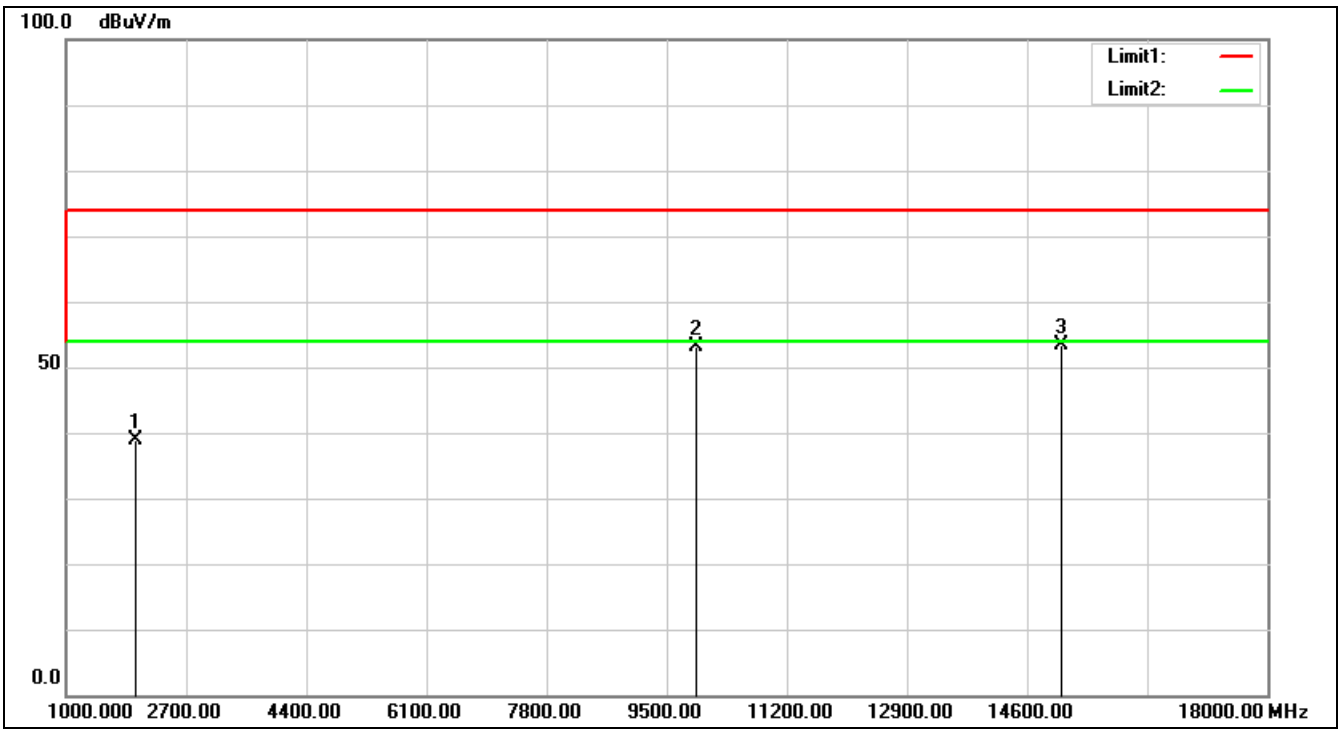
1-18GHz Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1986.000	51.33	-12.39	38.94	74.00	-35.06	peak
2	9925.000	45.01	8.22	53.23	74.00	-20.77	peak
3	15093.000	41.35	11.99	53.34	74.00	-20.66	peak

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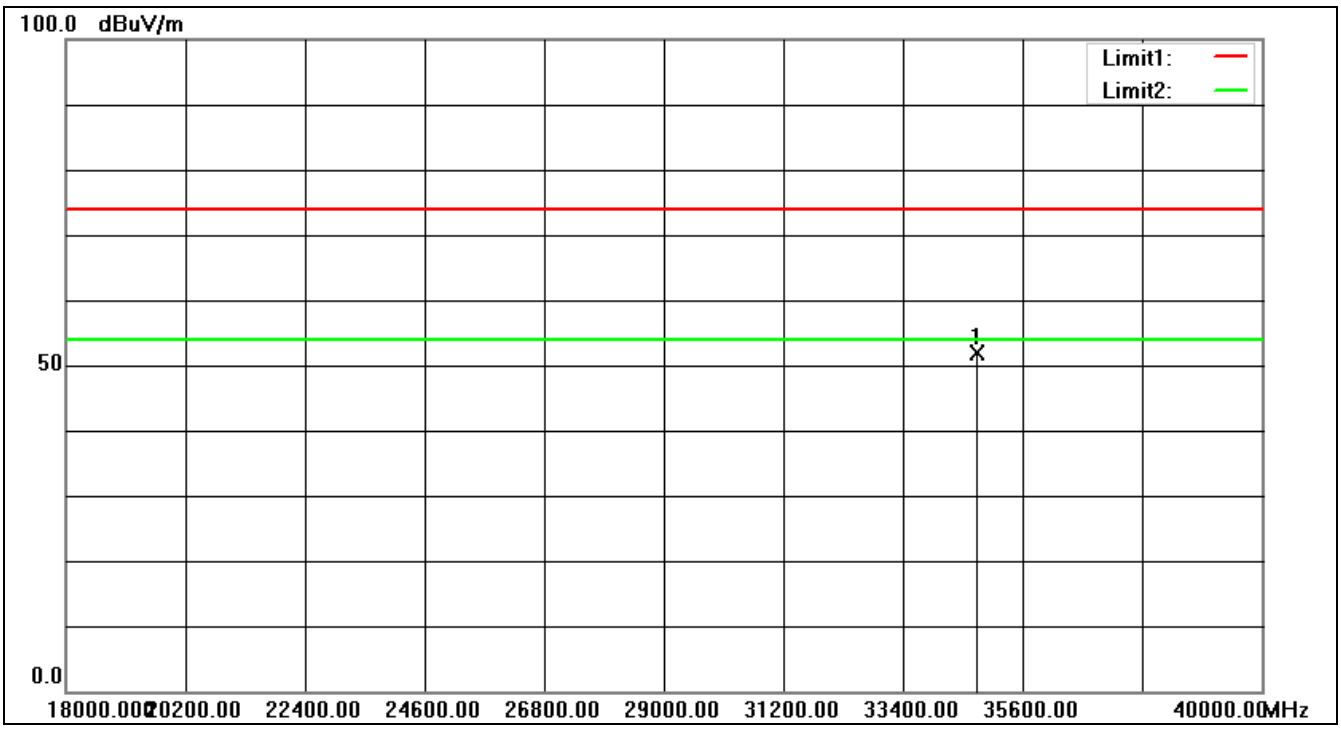
18-40GHz Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	34764.000	43.60	8.39	51.99	74.00	-22.01	peak

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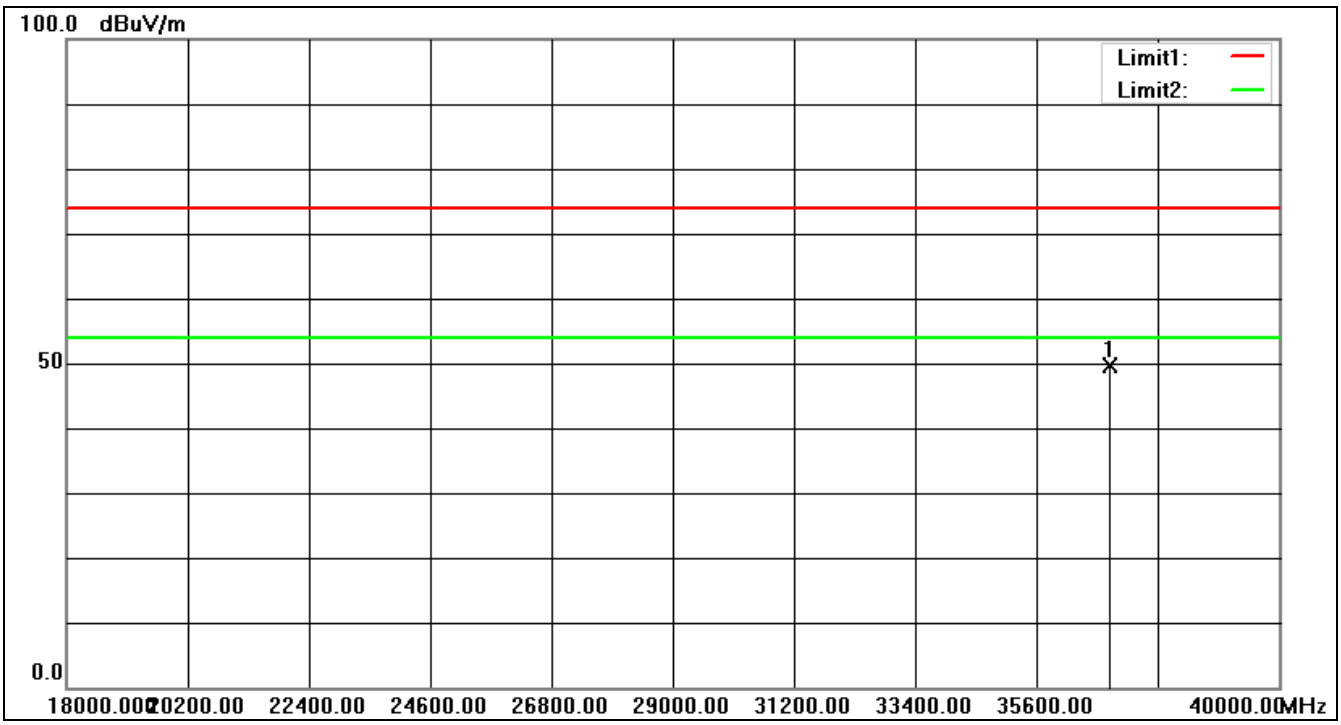
18-40GHz Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	36942.000	40.34	9.18	49.52	74.00	-24.48	peak

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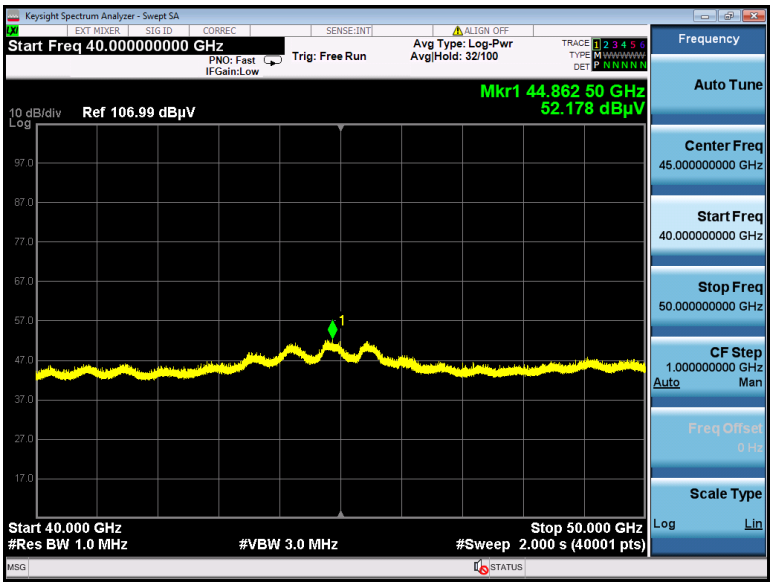
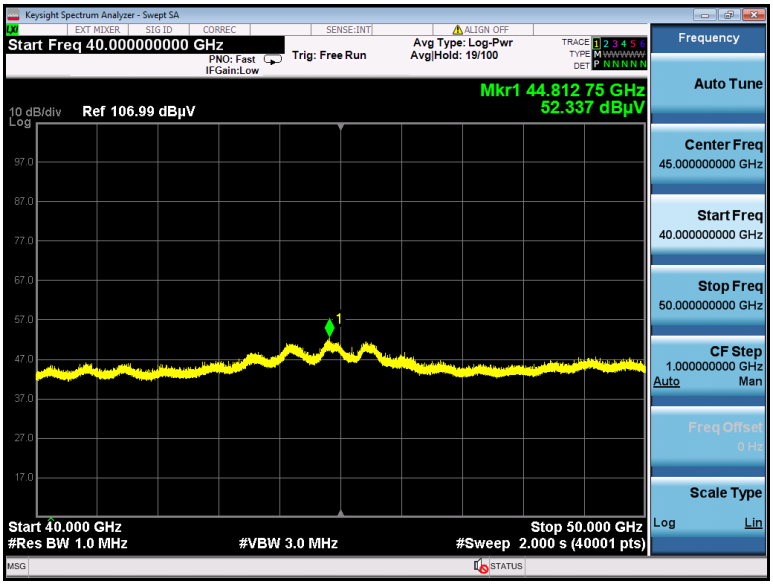
40-50GHz Horizontal



40-50GHz Vertical



Frequency (GHz)	Distance (M)	Peak Value (dBuv/m)	AV Limit (dBuv/m)	Polarization	Result
44.86250	0.15	52.178	80.02	H	PASS
44.81275	0.15	52.337	80.02	V	PASS

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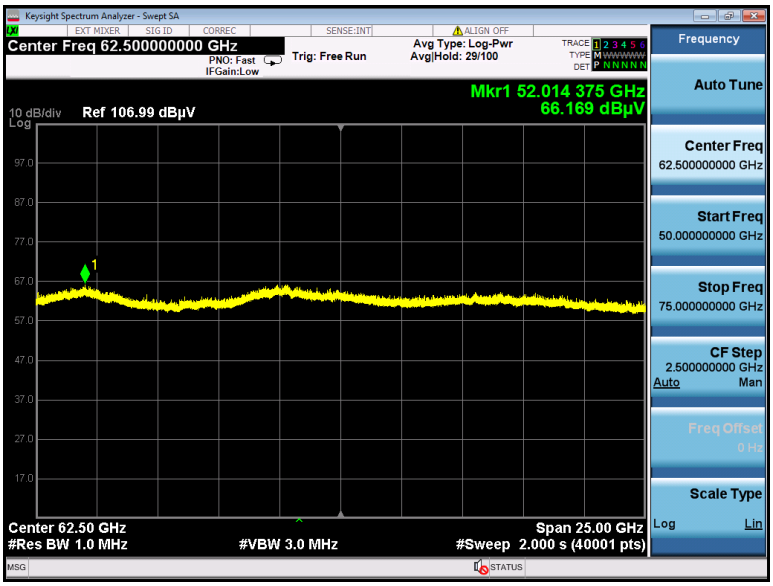
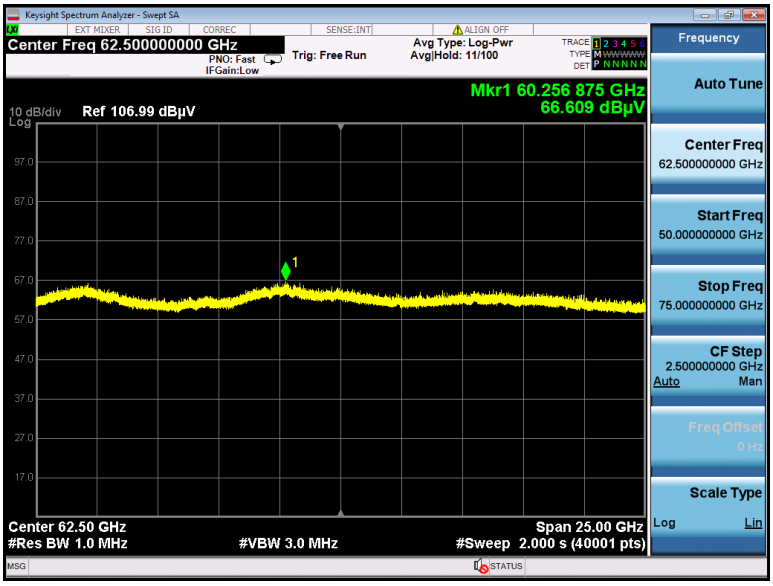
50-75GHz Horizontal



50-75GHz Vertical



Frequency (GHz)	Distance (M)	Peak Value (dBuv/m)	AV Limit (dBuv/m)	Polarization	Result
52.014375	0.15	66.169	80.02	H	PASS
60.256875	0.15	66.609	80.02	V	PASS

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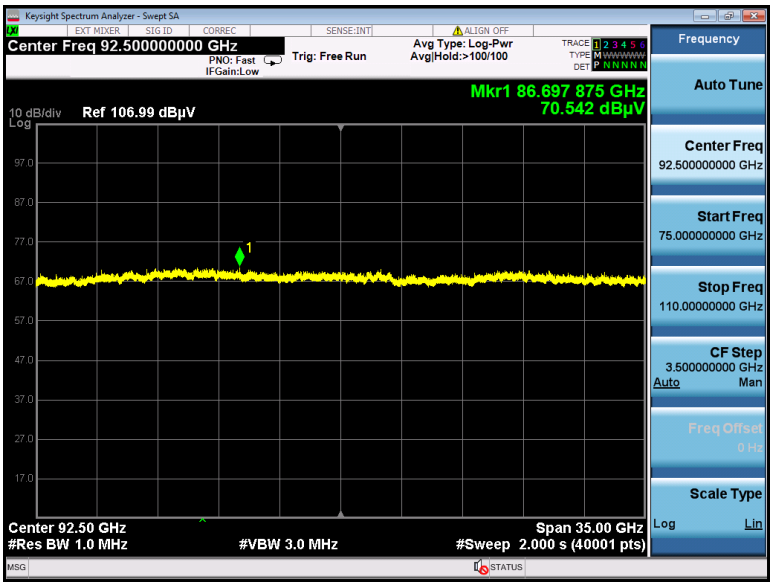
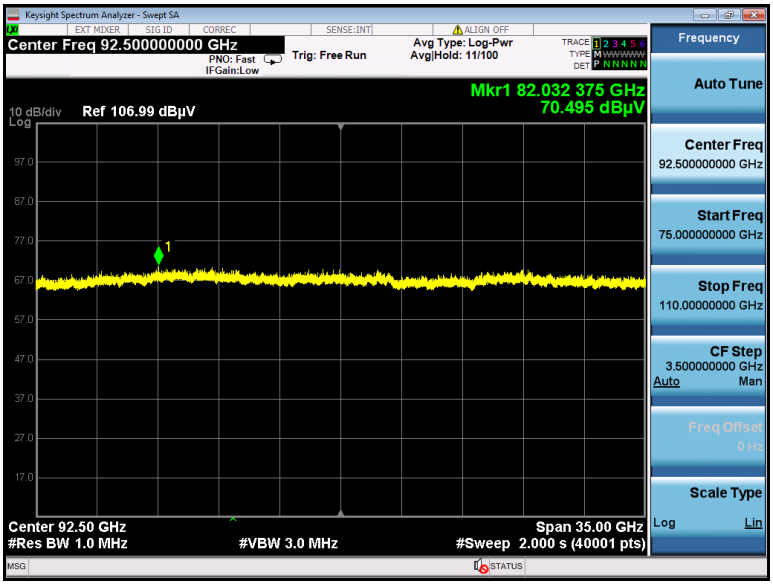
75-110GHz Horizontal



75-110GHz Vertical



Frequency (GHz)	Distance (M)	Peak Value (dBuv/m)	AV Limit (dBuv/m)	Polarization	Result
86.697875	0.15	70.542	80.02	H	PASS
82.032375	0.15	70.495	80.02	V	PASS

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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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