TEST REPORT

Applicant:	NINA Labs LTD
Address of Applicant:	2 Menorat Ha'maor St.Tel Aviv, Israel 6744830
Manufacturer:	Ammonite
Address of Manufacturer:	Lifeng City Garden, Shipai Town, Dongguan City, Guangdong Province, China
Equipment Under Test (EUT)	
Product Name:	NINA V2
Model No.:	NINA V2
Trade Mark:	NINA
FCC ID:	2BC3N-NINA
Applicable standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.225
Date of sample receipt:	November 01, 2023
Date of Test:	November 02-14, 2023
Date of report issued:	November 15, 2023
Test Result :	PASS

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

Authorized Signature:

Robinson Luo
Laboratory Manager

TESTING
NVLAP LAB CODE 600179-0

This results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

2 Version

Version No.	Date	Description
00	*November 15, 2023*	*Original*

Prepared By: ***Date:*** *November 15, 2023*

Project Engineer

Check By: ***Date:*** *November 15, 2023*

Reviewer

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4 Test Summary

Test Item	Section in CFR 47	Result
Antenna Requirement	15.203	Pass
AC Power Line Conducted Emission	15.207	Pass
Field Strength of Fundamental Emissions and Mask Measurement	15.225(a)(b)(c)	Pass
Radiated Emission	15.225(d)&15.209	Pass
20dB Emission Bandwidth	15.225&15.215	Pass
Frequency Stability Measurement	15.225(e)	Pass

Remark:

1. *Pass: The EUT complies with the essential requirements in the standard.*

4.1 Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	30MHz-200MHz	3.8039dB	(1)
Radiated Emission	200MHz-1GHz	3.9679dB	(1)
Radiated Emission	1GHz-18GHz	4.29dB	(1)
AC Power Line Conducted Emission	0.15MHz ~ 30MHz	3.44dB	(1)
Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.			

5 General Information

5.1 General Description of EUT

Product Name:	NINA V2
Model No.:	NINA V2
S/N:	NINA V2
Test sample(s) ID:	GTS2023100264-2
Sample(s) Status	Engineered sample
Operation Frequency:	13.56MHz
Channel Number:	1
Modulation:	ASK
Antenna type:	PCB antenna
Antenna gain:	0dBi
Power supply:	Adapter Model No.: EP-TA50SWE Input: AC100-240V 50/60Hz 0.3A Output: DC 5.0V 1.55A Or DC 3.7V 500mAh Battery

Remark:
1. Antenna gain information provided by the customer
2. The relevant information of the sample is provided by the entrusting company, and the laboratory is not responsible for its authenticity.

5.2 Test mode

Transmitter mode	Keep the EUT in continuously transmitting.

Pre-test mode.

GTS has verified the construction and function in typical operation, The EUT was placed on three different polar directions; i.e. X axis, Y axis, Z axis. which was shown in this test report and defined as follows:

Axis	X	Y	Z
Field Strength(dBuV/m)	58.60	59.06	57.82

Final Test Mode:

According to ANSI C63.4 standards, the test results are both the “worst case” and “worst setup”: Y axis (see the test setup photo)

5.3 Test Facility

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

● **FCC —Registration No.: 381383**

Designation Number: CN5029

Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files.

● **ISED —Registration No.: 9079A**

CAB identifier: CN0091

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of ISED for radio equipment testing.

● **NVLAP (LAB CODE:600179-0)**

Global United Technology Services Co., Ltd., is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP).

5.4 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.
Address: No. 123-128, Tower A, Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China 518102
Tel: 0755-27798480
Fax: 0755-27798960

5.5 Description of Support Units

None.

6 Test Instruments list

Radiated Emission:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	June 23, 2021	June 22, 2024
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	April 14, 2023	April 13, 2024
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9168	GTS640	March 19, 2023	March 18, 2025
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	GTS208	April 17, 2023	April 16, 2025
6	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
7	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS575	April 14, 2023	April 13, 2024
8	Loop Antenna	ZHINAN	ZN30900A	GTS534	Nov. 13, 2023	Nov.12, 2024
9	Broadband Preamplifier	SCHWARZBECK	BBV9718	GTS535	April 14, 2023	April 13, 2024
10	Amplifier(1GHz-26.5GHz)	HP	8449B	GTS601	April 14, 2023	April 13, 2024
11	Horn Antenna (18-26.5GHz)	/	UG-598A/U	GTS664	Oct. 29, 2023	Oct. 28, 2024
12	Horn Antenna (26.5-40GHz)	A.H Systems	SAS-573	GTS665	Oct. 29, 2023	Oct. 28, 2024
13	FSV·Signal Analyzer (10Hz-40GHz)	Keysight	FSV-40-N	GTS666	March 13, 2023	March 12, 2024
14	Amplifier	/	LNA-1000-30S	GTS650	April 14, 2023	April 13, 2024
15	CDNE M2+M3-16A	HCT	30MHz-300MHz	GTS692	Nov. 08, 2023	Nov.07, 2024
16	Wideband Amplifier	/	WDA-01004000-15P35	GTS602	April 14, 2023	April 13, 2024
17	Thermo meter	JINCHUANG	GSP-8A	GTS643	April 19, 2023	April 18, 2024
18	RE cable 1	GTS	N/A	GTS675	July 31. 2023	July 30. 2024
19	RE cable 2	GTS	N/A	GTS676	July 31. 2023	July 30. 2024
20	RE cable 3	GTS	N/A	GTS677	July 31. 2023	July 30. 2024
21	RE cable 4	GTS	N/A	GTS678	July 31. 2023	July 30. 2024
22	RE cable 5	GTS	N/A	GTS679	July 31. 2023	July 30. 2024
23	RE cable 6	GTS	N/A	GTS680	July 31. 2023	July 30. 2024
24	RE cable 7	GTS	N/A	GTS681	July 31. 2023	July 30. 2024
25	RE cable 8	GTS	N/A	GTS682	July 31. 2023	July 30. 2024

RF Conducted Test:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	MXA Signal Analyzer	Agilent	N9020A	GTS566	April 14, 2023	April 13, 2024
2	EMI Test Receiver	R&S	ESCI 7	GTS552	April 14, 2023	April 13, 2024
3	PSA Series Spectrum Analyzer	Agilent	E4440A	GTS536	April 14, 2023	April 13, 2024
4	MXG vector Signal Generator	Agilent	N5182A	GTS567	April 14, 2023	April 13, 2024
5	ESG Analog Signal Generator	Agilent	E4428C	GTS568	April 14, 2023	April 13, 2024
6	USB RF Power Sensor	DARE	RPR3006W	GTS569	April 14, 2023	April 13, 2024
7	RF Switch Box	Shongyi	RFSW3003328	GTS571	April 14, 2023	April 13, 2024
8	Programmable Constant Temp & Humi Test Chamber	WEWON	WHTH-150L-40-880	GTS572	April 14, 2023	April 13, 2024
9	Thermo meter	JINCHUANG	GSP-8A	GTS641	April 19, 2023	April 18, 2024

Conducted Emission						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Shielding Room	ZhongYu Electron	7.3(L)x3.1(W)x2.9(H)	GTS252	July 12, 2022	July 11, 2027
2	EMI Test Receiver	R&S	ESCI 7	GTS552	April 14, 2023	April 13, 2024
3	LISN	ROHDE & SCHWARZ	ENV216	GTS226	April 14, 2023	April 13, 2024
4	Coaxial Cable	GTS	N/A	GTS227	N/A	N/A
5	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
6	Thermo meter	JINCHUANG	GSP-8A	GTS642	April 19, 2023	April 18, 2024
7	Absorbing clamp	Elektronik-Feinmechanik	MDS21	GTS229	April 14, 2023	April 13, 2024
8	ISN	SCHWARZBECK	NTFM 8158	GTS565	April 14, 2023	April 13, 2024
9	High voltage probe	SCHWARZBECK	TK9420	GTS537	April 14, 2023	April 13, 2024
10	Antenna end assembly	Weinschel	1870A	GTS560	April 14, 2023	April 13, 2024

General used equipment:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Barometer	KUMAO	SF132	GTS647	April 19, 2023	April 18, 2024

7 Test results and Measurement Data

7.1 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 are antennas PCB antenna, reference to the appendix II for details	

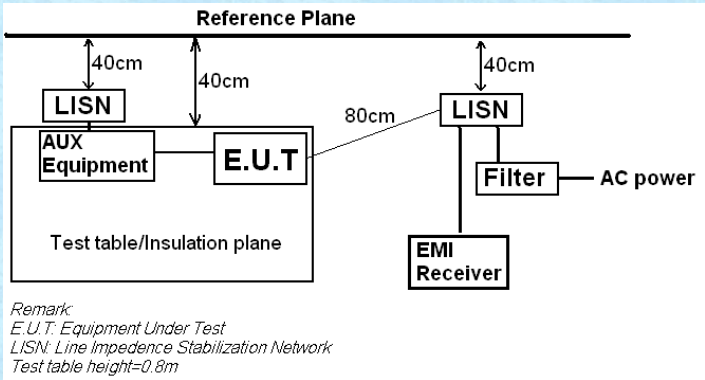
7.2 Conducted Emissions

Test Requirement:	FCC Part15 C Section 15.207
Test Method:	ANSI C63.10:2013
Test Frequency Range:	150KHz to 30MHz
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto
Limit:	

Frequency range (MHz)	Limit (dBuV)	
	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.

Test setup:



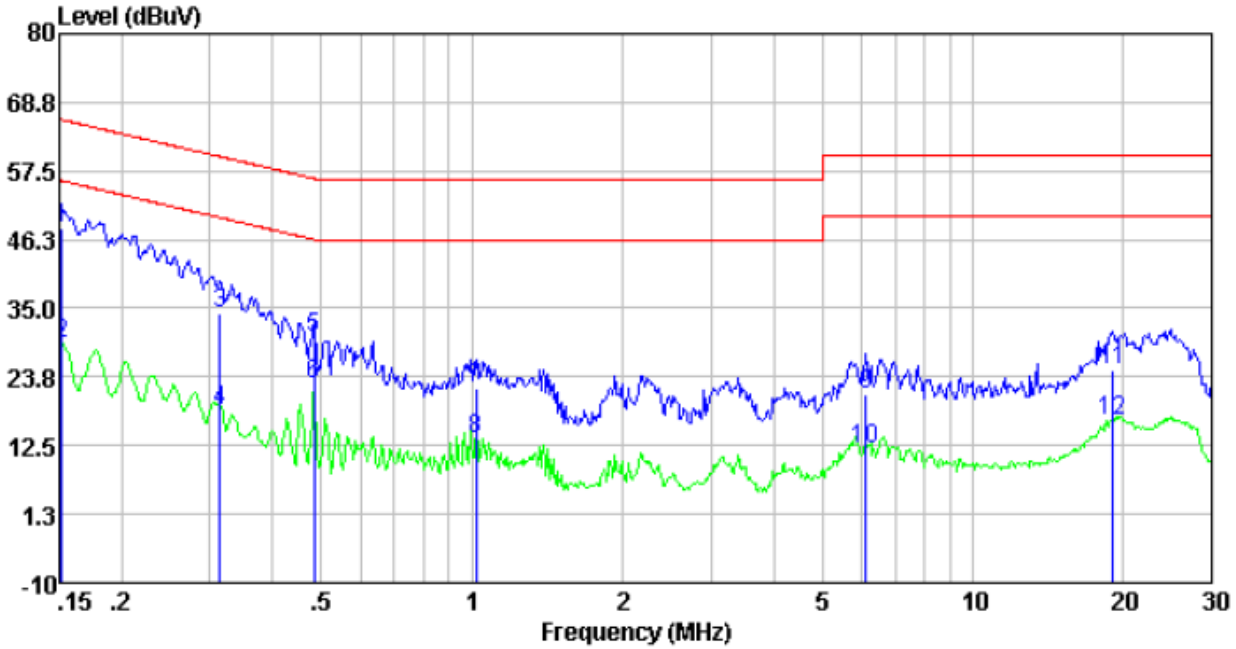
Test procedure:

1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment.
2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).
3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2013 on conducted measurement.

Test Instruments:	Refer to section 6.0 for details					
Test mode:	Refer to section 5.2 for details					
Test environment:	Temp.:	25 °C	Humid.:	52%	Press.:	1012mbar
Test voltage:	AC 120V, 60Hz					
Test results:	Pass					

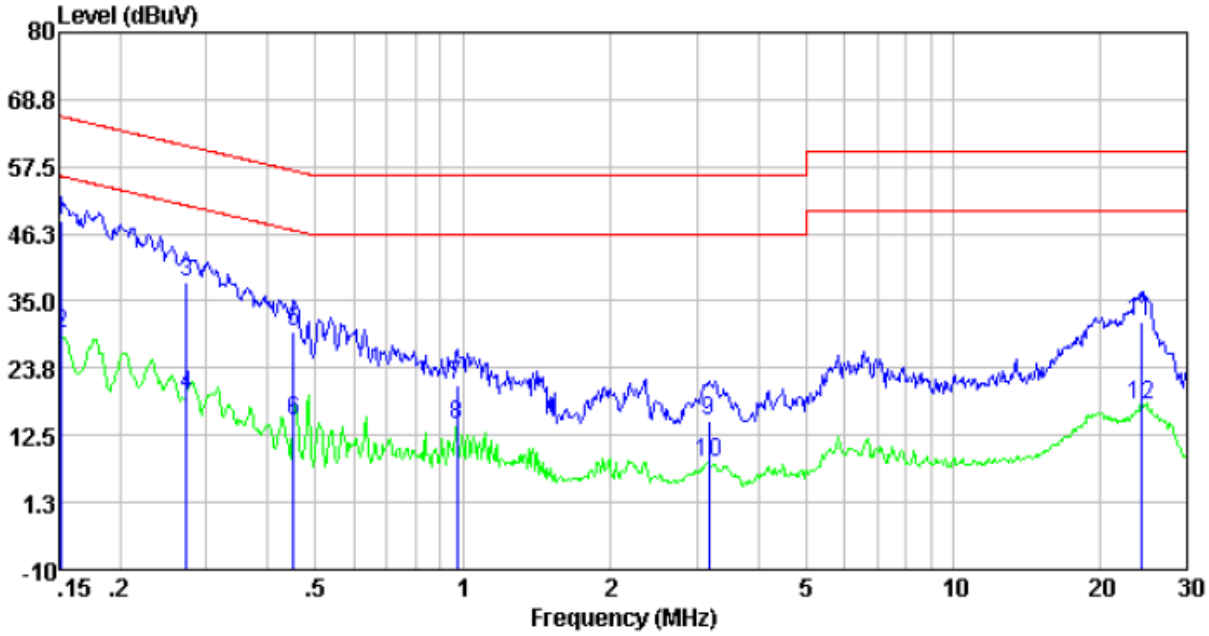
Measurement data:

Line:



Freq	Reading level	LISN/ISN factor	Cable loss	Level	Limit level	Over limit	Remark
MHz	dBuV	dB	dB	dBuV	dBuV	dB	
0.15	38.45	9.56	0.01	48.02	65.91	-17.89	QP
0.15	19.77	9.56	0.01	29.34	55.91	-26.57	Average
0.31	24.68	9.49	0.01	34.18	59.88	-25.70	QP
0.31	8.89	9.49	0.01	18.39	49.88	-31.49	Average
0.48	20.73	9.49	0.01	30.23	56.27	-26.04	QP
0.48	13.04	9.49	0.01	22.54	46.27	-23.73	Average
1.02	12.49	9.49	0.03	22.01	56.00	-33.99	QP
1.02	4.15	9.49	0.03	13.67	46.00	-32.33	Average
6.12	11.36	9.38	0.08	20.82	60.00	-39.18	QP
6.12	2.56	9.38	0.08	12.02	50.00	-37.98	Average
19.02	14.87	9.92	0.18	24.97	60.00	-35.03	QP
19.02	6.60	9.92	0.18	16.70	50.00	-33.30	Average

Neutral:



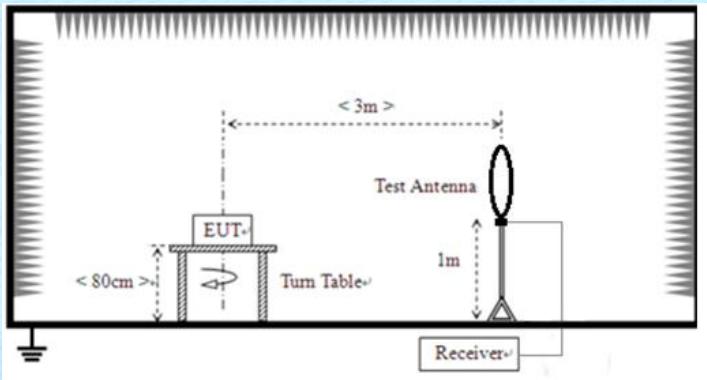
Freq	Reading level	LISN/ISN factor	Cable loss	Level	Limit level	Over limit	Remark
MHz	dBuV	dB	dB	dBuV	dBuV	dB	
0.15	38.84	9.55	0.01	48.40	65.91	-17.51	QP
0.15	19.85	9.55	0.01	29.41	55.91	-26.50	Average
0.27	28.65	9.56	0.01	38.22	61.03	-22.81	QP
0.27	9.72	9.56	0.01	19.29	51.03	-31.74	Average
0.45	20.15	9.57	0.01	29.73	56.85	-27.12	QP
0.45	5.29	9.57	0.01	14.87	46.85	-31.98	Average
0.97	11.37	9.55	0.03	20.95	56.00	-35.05	QP
0.97	4.51	9.55	0.03	14.09	46.00	-31.91	Average
3.17	5.36	9.56	0.05	14.97	56.00	-41.03	QP
3.17	-1.67	9.56	0.05	7.94	46.00	-38.06	Average
24.14	21.03	10.25	0.19	31.47	60.00	-28.53	QP
24.14	7.13	10.25	0.19	17.57	50.00	-32.43	Average

Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.

Final Level =Receiver Read level + LISN Factor + Cable Loss

7.3 Field Strength of Fundamental Emissions and Mask Measurement

Test Requirement:	FCC Part15 C Section 15.225(a)(b)(c)
Test Method:	ANSI C63.10:2013 & ANSI C63.4: 2014
Test site:	Measurement Distance: 3m
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=Auto
limit:	FCC Part 15.225 & 15.209
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement data:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
13.56	37.98	20.57	0.51	59.06	70.47	-14.41	QP

7.4 Radiated Emission

Test Requirement:	FCC Part15 C Section 15.225(d) and 15.209
Test Method:	ANSI C63.10: 2013 & ANSI C63.4: 2014
Test Frequency Range:	9KHz to 1000MHz
Test site:	Measurement Distance: 3m
Receiver setup:	

Frequency	Detector	RBW	VBW	Remark
9kHz-150kHz	Quasi-peak	200Hz	300Hz	Quasi-peak Value
150kHz-30MHz	Quasi-peak	9kHz	10kHz	Quasi-peak Value
30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak Value

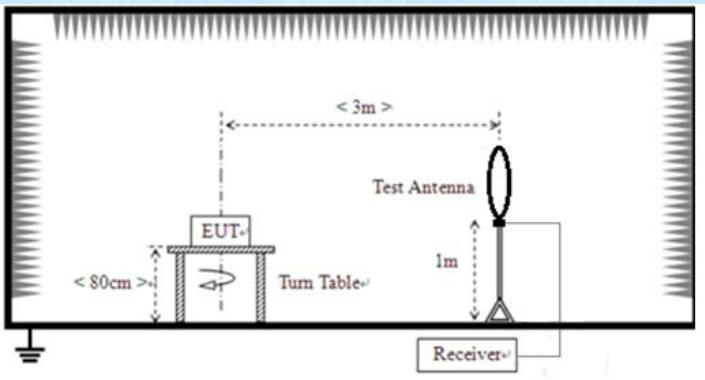
FCC Limit:

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

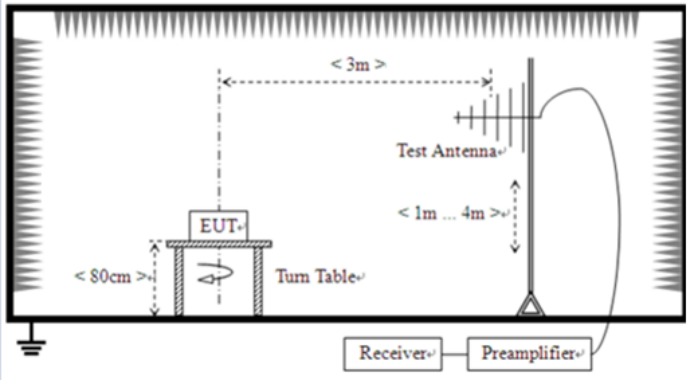
The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

Test setup:

Below 30MHz



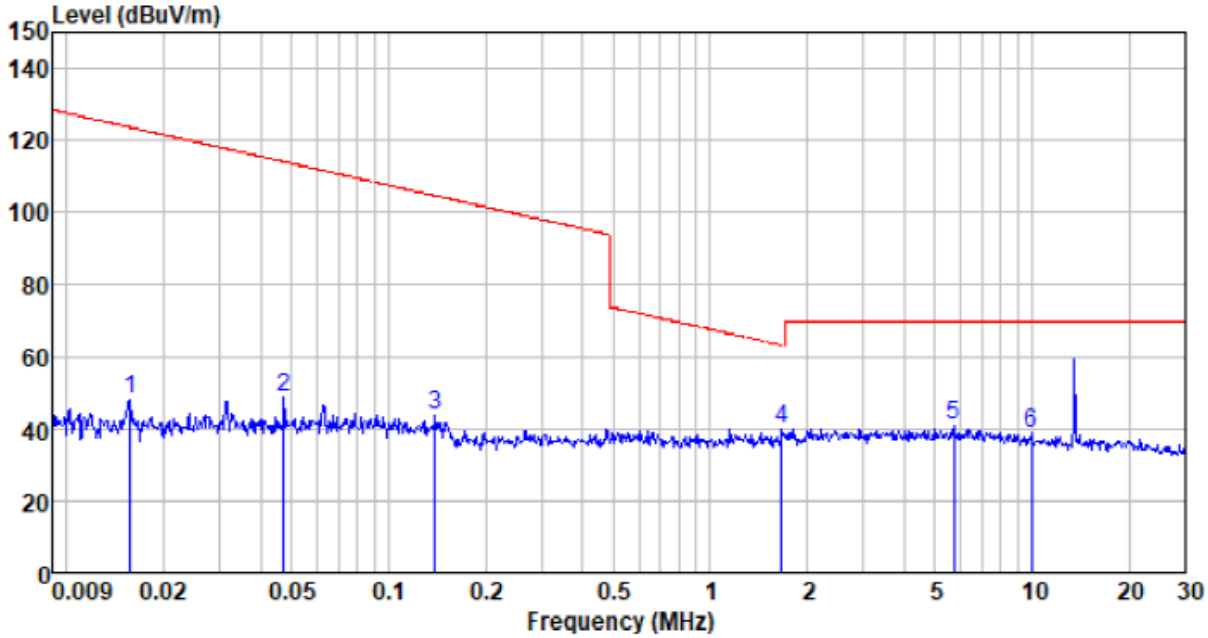
Above 30MHz

						
Test Instruments:	Refer to section 6.0 for details					
Test mode:	Refer to section 5.2 for details					
Test environment:	Temp.:	25 °C	Humid.:	52%	Press.:	1012mbar
Test voltage:	AC 120V, 60Hz					
Test results:	Pass					

Measurement data:

■ **9kHz~30MHz**

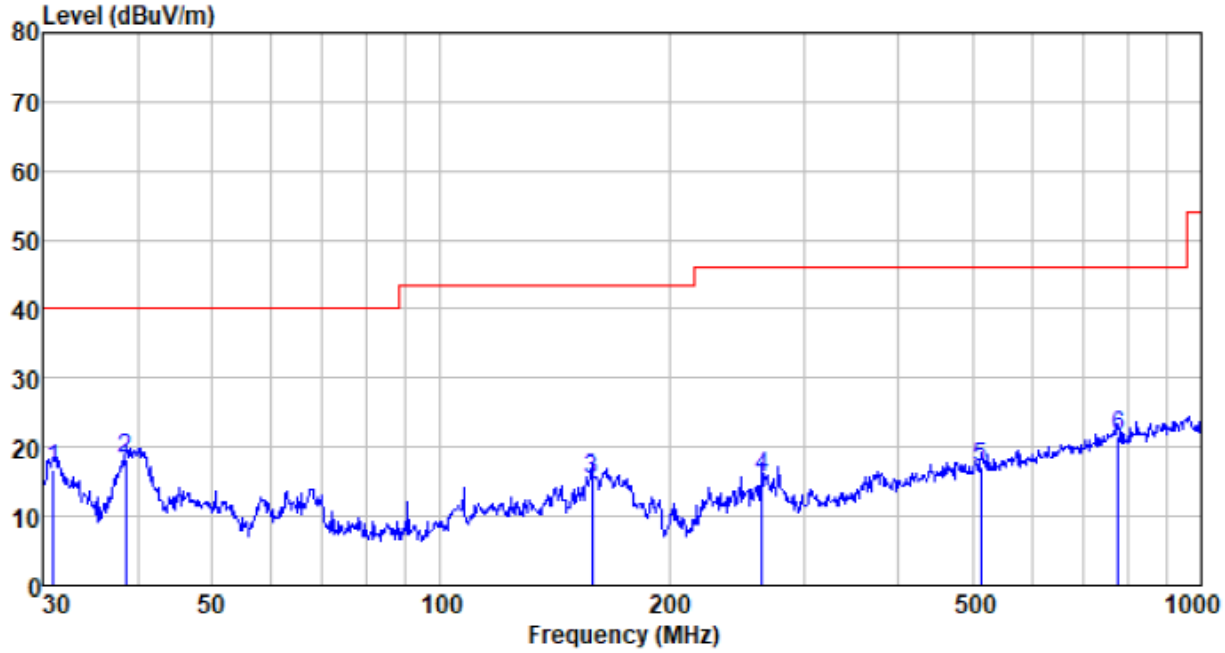
the radiation emission more than 20dB below the limit.



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
0.016	27.01	21.29	0.04	0.00	48.34	123.65	-75.31	QP
0.047	27.44	21.00	0.11	0.00	48.55	114.14	-65.59	QP
0.140	23.50	20.10	0.19	0.00	43.79	104.70	-60.91	QP
1.671	18.82	20.69	0.36	0.00	39.87	63.15	-23.28	QP
5.734	19.54	20.94	0.45	0.00	40.93	69.54	-28.61	QP
9.954	17.91	20.50	0.48	0.00	38.89	69.54	-30.65	QP

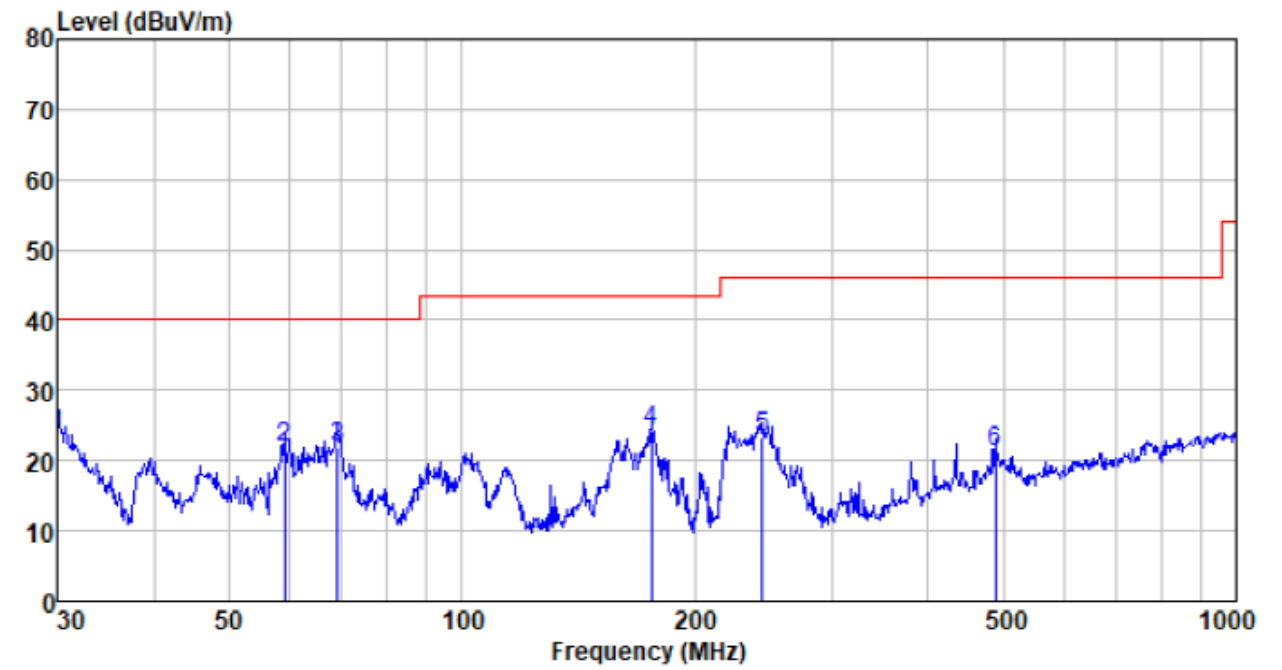
■ **30MHz~1GHz**

Horizontal:



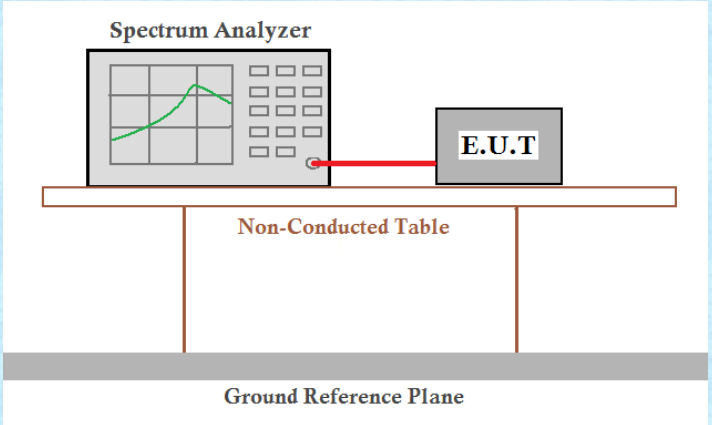
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
30.962	33.96	12.22	0.56	30.00	16.74	40.00	-23.26	QP
38.616	34.36	13.29	0.65	30.00	18.30	40.00	-21.70	QP
158.112	31.19	12.58	1.62	30.00	15.39	43.50	-28.11	QP
264.746	31.71	11.69	2.19	30.00	15.59	46.00	-30.41	QP
513.633	26.03	17.85	3.36	30.00	17.24	46.00	-28.76	QP
776.878	24.81	22.28	4.37	30.00	21.46	46.00	-24.54	QP

Vertical:



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
30.000	41.10	12.10	0.55	30.00	23.75	40.00	-16.25	QP
59.025	38.30	12.65	0.85	30.00	21.80	40.00	-18.20	QP
69.114	40.39	10.67	0.93	30.00	21.99	40.00	-18.01	QP
175.652	41.82	10.78	1.72	30.00	24.32	43.50	-19.18	QP
244.232	39.77	11.53	2.09	30.00	23.39	46.00	-22.61	QP
489.027	30.44	17.41	3.26	30.00	21.11	46.00	-24.89	QP

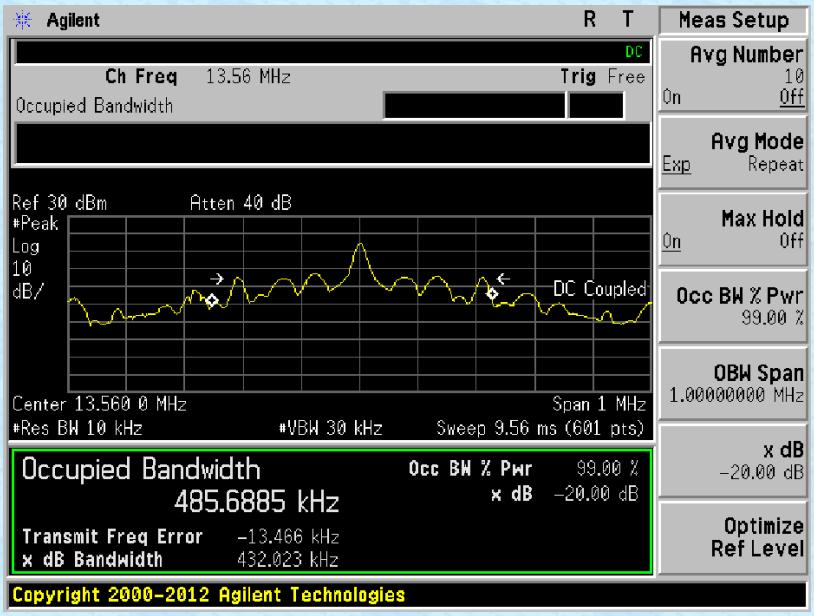
7.5 Channel Bandwidth

Test Requirement:	FCC Part15 C Section 15.225 and 15.215
Test Method:	ANSI C63.10:2013
Limit:	N/A
Test Procedure:	1. According to the follow Test-setup, keep the relative position between the artificial antenna and the EUT. 2. Set the EUT to proper test channel. 3. Max hold the radiated emissions, mark the peak power frequency point and the -20dB upper and lower frequency points. 4. Read 20dB bandwidth & 99%bandwidth.
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

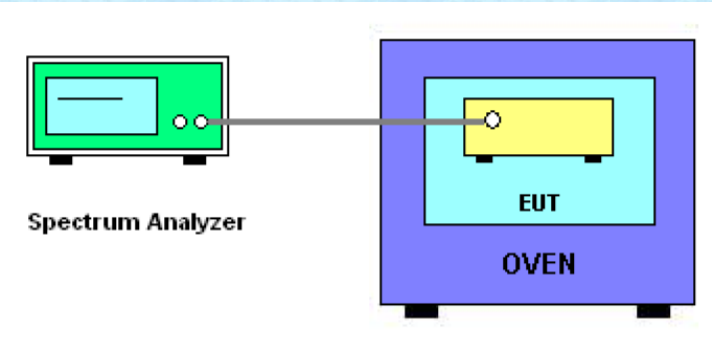
Measurement Data

Test ANT	Test frequency (MHz)	20dB bandwidth(KHz)	Result
1	13.56	432.023	Pass

Test plot as follows:



7.6 Frequency Stability Measurement

Test Requirement:	FCC Part15 C Section 15.225 (e)
Test Method:	ANSI C63.10: 2013
Receiver setup:	RBW=1KHz, VBW=1KHz, Sweep time=Auto
Limit:	The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of –20 degrees to +50 degrees C at normal supply voltage, for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement data:

Reference Frequency: 13.56MHz					
Power supplied (Vac)	Temperature (℃)	Frequency error		Limit	Result
		Hz	%		
120	-20	90	0.0005	+/- 0.01%	Pass
	-10	80	0.0005		
	0	79	0.0006		
	10	58	0.0005		
	20	48	0.0005		
	30	55	0.0003		
	40	46	0.0005		
	50	79	0.0006		

Reference Frequency: 13.56MHz					
Temperature (℃)	Power supplied (Vac)	Frequency error		Limit	Result
		Hz	Ppm		
20	90	185	0.0012	+/- 0.01%	Pass
	110	120	0.0008		

8 Test Setup Photo

Reference to the **appendix I** for details.

9 EUT Constructional Details

Reference to the **appendix II** for details.

------ End ------