



Test Report No.:
FCC2024-0025-RF

TEST REPORT

FCC ID : 2BG7U-3600100X9D01
Applicant : Xiamen Yaxon Zhilian Technology Co.,Ltd.
Product Name : NFC ANTENNA
Mode No. : 3791101X9D01
Classification Of Test: **COMMISSION TEST**

CVC Testing Technology Co., Ltd.

Applicant	Name: Xiamen Yaxon Zhilian Technology Co.,Ltd. Address: 303-E,District C,Innovation Building,Software Park,Torch High-tech Zone, xiamen, fujian, china		
Manufacturer	Name: Xiamen Yaxon Zhilian Technology Co.,Ltd. Address: 303-E,District C,Innovation Building,Software Park,Torch High-tech Zone, xiamen, fujian, china		
Producer	Name: Xiamen Yaxon Zhilian Technology Co.,Ltd. Address: No.1899 Min'an Avenue, Torch High-tech Industrial Development Zone , Xiang' an District, Xiamen City, Fujian Province P.R. China		
Equipment Under Test	Product Name : NFC ANTENNA Model No. : 3791101X9D01 Trade mark : / Serial no. : — Sampling : 1-1		
Date of Receipt.	2024.05.23	Date of Testing	2024.07.20
Test Specification		Test Result	
FCC CFR47 Part 15C Radio Frequency Devices ANSI C63.10-2020/Cor1-2023		PASS	
Evaluation of Test Result	The equipment under test was found to comply with the requirements of the standards applied. Seal of CVC Issue Date: 2024-8-29		
Approved by: Chen Huawen 	Reviewed by: Xu Zhenfei 	Tested by: Lu Weiji 	
Other Aspects: NONE.			
Abbreviations:OK, Pass= passed Fail = failed N/A= not applicable EUT= equipment, sample(s) under tested			
This test report relates only to the EUT, and shall not be reproduced except in full, without written approval of CVC .			

TABLE OF CONTENTS

1. GENERAL PRODUCT INFORMATION 4

 1.1 GENERAL INFORMATION 4

2. TEST SITES 5

 2.1 TEST FACILITIES 5

 2.2 DESCRIPTION OF NON-STANDARD METHOD AND DEVIATIONS 5

 2.3 LIST OF TEST AND MEASUREMENT INSTRUMENTS 5

3. TEST CONFIGURATION 6

 3.1 TEST MODE 6

4. SUMMARY OF MEASUREMENT RESULTS 7

5. MEASUREMENT PROCEDURE 8

 5.1 CONDUCTED EMISSION 8

 5.2 RADIATED EMISSION 11

 5.3 FREQUENCY TOLERANCE 19

 5.4 20dB BANDWIDTH MEASUREMENT 21

6. APPENDIX A 23

1. General Product Information

1.1 General information

Product Name	NFC ANTENNA
Model No.	3791101X9D01
Additional model	/
Power Supply	DC 24V
Serial Number(SN)	/
firmware	Y04
software	V1.0.2
specific power settings	Default
Antenna Type	Internal Antenna
Antenna Connector	A permanently attached antenna
Antenna Gain	2.0 dBi (provided by client)
Beamforming gain	Unsupported (provided by client)
Frequency Range	13.56MHz
Channel Number	1 Channel
Type of Modulation	ASK
Max. Power	-28.05dBm
Operate Temp.Range	-40~85℃

Note:

1. The information of the EUT is declared by the manufacturer.
2. The laboratory is not responsible for the product technical specification provided by the client.

2. Test Sites

2.1 Test Facilities

The tests and measurements refer to this report were performed by RF testing Lab. of CVC Testing Technology Co., Ltd.

Add.: No.3, Tiantaiyi Road, Kaitai Avenue, Science City, Guangzhou,Guangdong,510663, People's Republic of China

Telephone : +86-20-32293888

Fax : +86-20-32293889

FCC(Test firm designation number: CN1282)

2.2 Description of Non-standard Method and Deviations

The testing and measurement methods used in this report are applied by all standard methods. Not any non-standard method or deviation from the used standards was used.

2.3 List of Test and Measurement Instruments

Refer to **Appendix A**.

3. Test Configuration

3.1 Test Mode

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

Test Mode	Antenna Delivery	Test Channel
Transmitting	1TX	13.56MHz

The radiated emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in lie-down position (X axis) and the worst case was recorded.

In order to find the worst case condition, Pre-tests are needed at the presence of different data rate and different channels. Preliminary tests have been done on all the configurations for confirming worst case. Data rate below means worst-case rate of each test item.

Worst-case data rates and channels are shown as following table.

Test Mode	Data Rate		
	Antenna 1	Antenna 2	MIMO
Transmitting	106kbps	/	/

Test Items	Test Antenna	Test Mode	Test Channel
Conducted Emissions	Antenna 1	N/A	N/A
The field strength of Fundamental Emission	Antenna 1	Transmitting	13.56MHz
Radiated Emissions	Antenna 1	Transmitting	13.56MHz
Frequency tolerance	Antenna 1	Transmitting	13.56MHz
20dB Bandwidth	Antenna 1	Transmitting	13.56MHz

4. Summary of measurement results

Summary of measurements of results	Clause in FCC rules	Verdict	Note
Conducted Emissions	15.207	N/A	See note 2
The field strength of Fundamental Emission	FCC 15.225(a)&(b)&(c)	PASS	/
Radiated Emissions	FCC 15.225 (d) FCC 15.209	PASS	/
Frequency tolerance	FCC 15.225 (e)	PASS	/
20dB Bandwidth	FCC 15.215 (c)	PASS	/
Antenna Requirement	15.203	PASS	See note 1

Note 1: According to 15.203, it is considered sufficient to comply with the provisions of this section.

Note 2: Not applicable to DC powered devices.

5. Measurement procedure

5.1 Conducted Emission

Ambient condition:

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.3kPa

Method of Measurement:

The EUT was setup according to ANSI C63.10-2020/Cor1-2023 for compliance to FCC 47CFR 15.247 requirements. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs) Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.

The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.

Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.

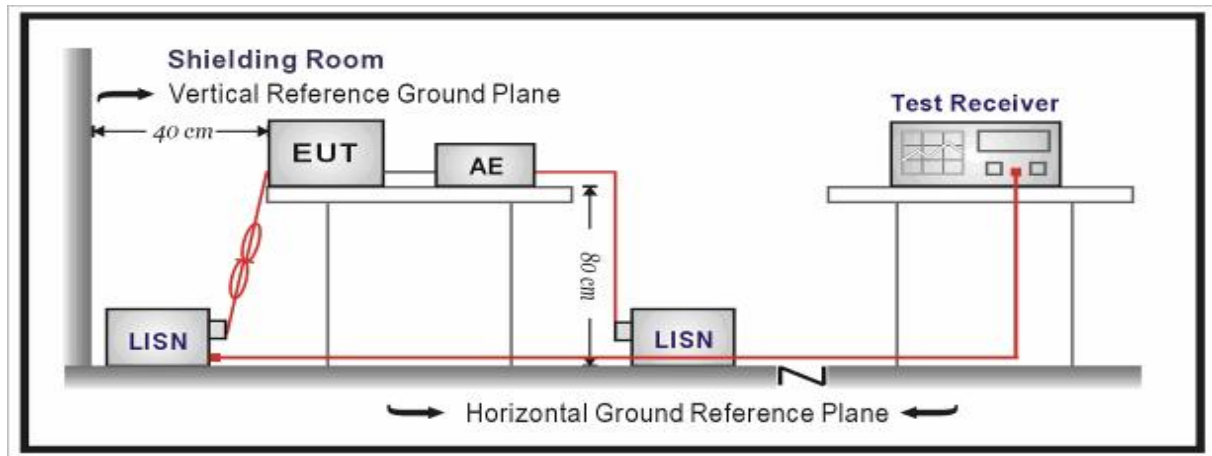
Limits:

Frequency (MHz)	Conducted Limits(dBμV)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56 *	56 to 46*
0.5 - 5	56	46
5 - 30	60	50

Note 1: The lower limit shall apply at the transition frequencies.

Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

Test Setup:



Measurement Data

An initial pre-scan was performed on the live and neutral lines with peak detector.

Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

Notes:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Level = Reading + Factor.

Measurement Uncertainty:

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 1.96$. $U = 3.12$ dB.

Test Results:

Conducted Emission applies to an intentional radiator that is designed to be connected to the public utility (AC) power line. Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines.

5.2 Radiated Emission

Ambient condition:

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.3kPa

Method of Measurement:

The EUT was setup and tested according to ANSI C63.10-2020/Cor1-2023.

The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from Antenna to the EUT was 3 meters.

The Antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the Antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2020/Cor1-2023 on radiated measurement. The resolution bandwidth below 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz.

The frequency range from 30MHz to 10th harmonic is checked.

Note: When doing emission measurement above 1GHz, the horn Antenna will be bended down a little (as horn Antenna has the narrow beamwidth) in order to keeping the Antenna in the “cone of radiation” of EUT. The 3dB beamwidth is 10~60 degrees for H-plane and 10~90 degrees for E-plane.

Limits:

§15.225

(a) The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters. (124.00dBμV/m@3m)

(b) Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters. (90.50dBμV/m@3m)

(c) Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters. (80.50dBμV/m@3m)

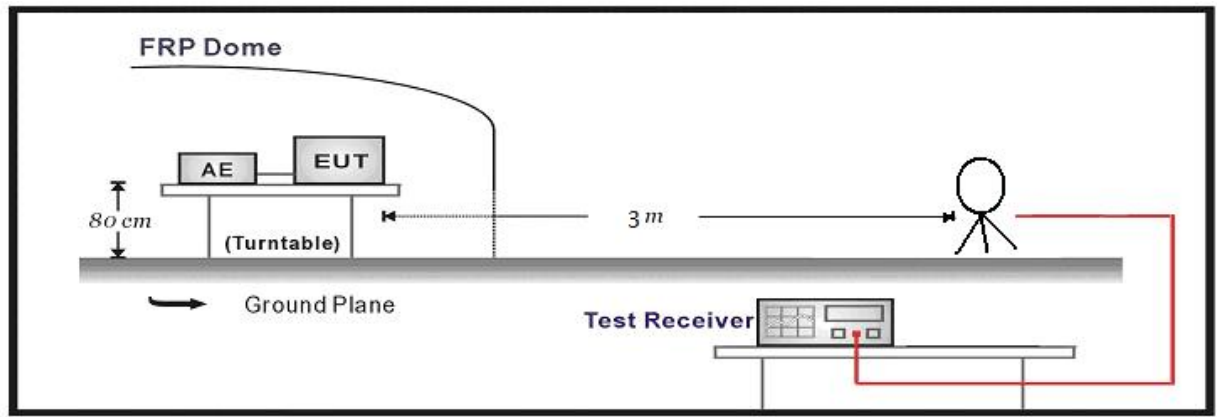
(d) The field strength of any emissions appearing outside of the 13.110– 14.010 MHz and shall not exceed the general radiated emission limits in § 15.209 as follows:

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a) of FCC part 15, must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

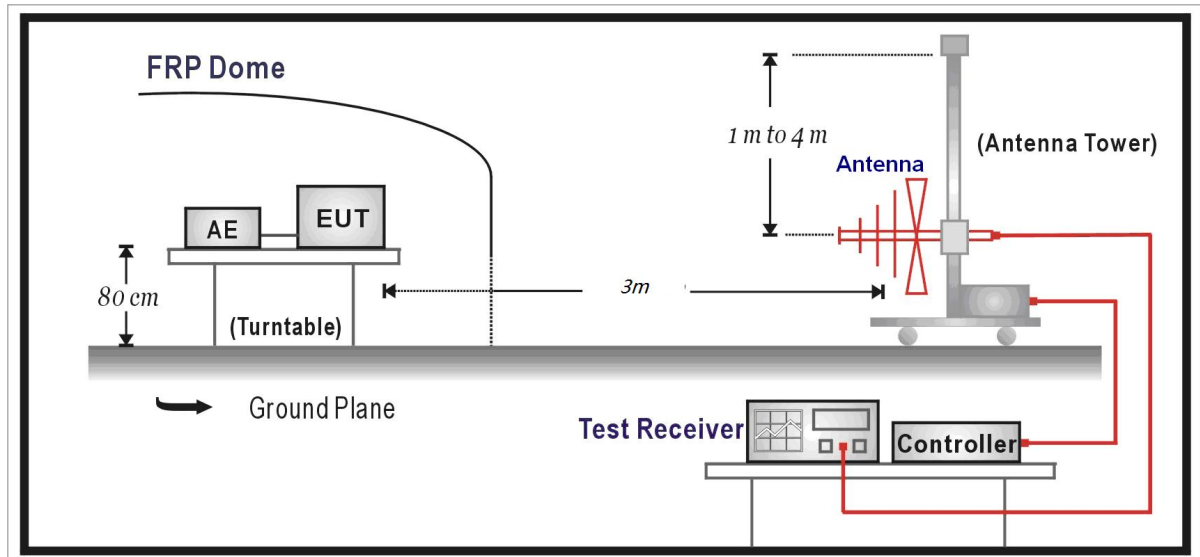
Frequency	Limit ($\mu\text{V/m}$)	Limit ($\text{dB}\mu\text{V/m @3m}$)	Remark
0.009MHz-0.490MHz	$2400/F(\text{kHz})@300\text{m}$	$20\lg(24000000/F(\text{kHz}))$	Quasi-peak Level
0.490MHz~1.705MHz	$24000/F(\text{kHz})@30\text{m}$	$20\lg(2400000/F(\text{kHz}))$	Quasi-peak Level
1.705MHz~30.0MHz	$30@30\text{m}$	69.54	Quasi-peak Level
30MHz-88MHz	$100@3\text{m}$	40.0	Quasi-peak Level
88MHz-216MHz	$150@3\text{m}$	43.5	Quasi-peak Level
216MHz-960MHz	$200@3\text{m}$	46.0	Quasi-peak Level
960MHz-1GHz	$500@3\text{m}$	54.0	Quasi-peak Level
Above 1GHz	$500@3\text{m}$	54.0	Average Level
	$5000@3\text{m}$	74.0	Peak Level

Test Setup:

Below 30MHz Test Setup:



Below 1GHz Test Setup:



Measurement Data:

The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Level = Reading - Factor

Factor = Preamplifier Factor – Antenna Factor–Cable Loss

Measurement Uncertainty:

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 1.96$.

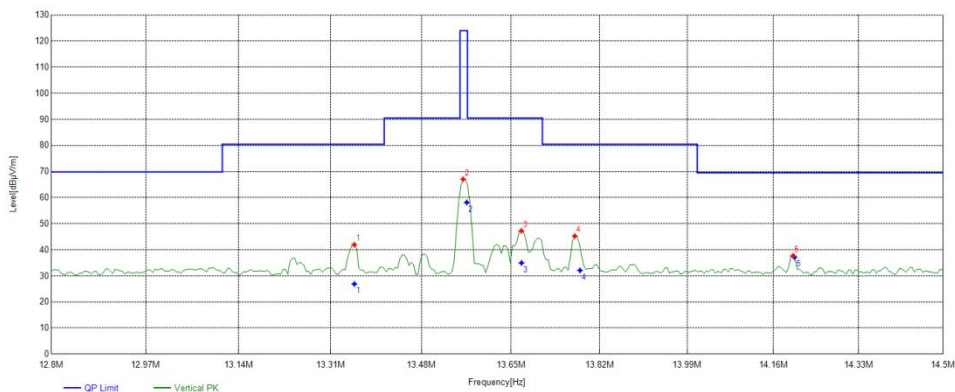
Frequency	Uncertainty
9KHz-30MHz	3.55 dB
30MHz-200MHz	4.19 dB
200MHz-1GHz	3.63 dB
Above 1GHz	3.68 dB

Test Results:

Result of The field strength of Fundamental Emission

During the test, the Radiates Emission from 9kHz to 1GHz was performed in NFC all modes with all channels and all antennas. Transmitting, 13.56MHz, Antenna 1, X Polarity are selected as the worst condition. The test data of the worst-case condition was recorded in this report.

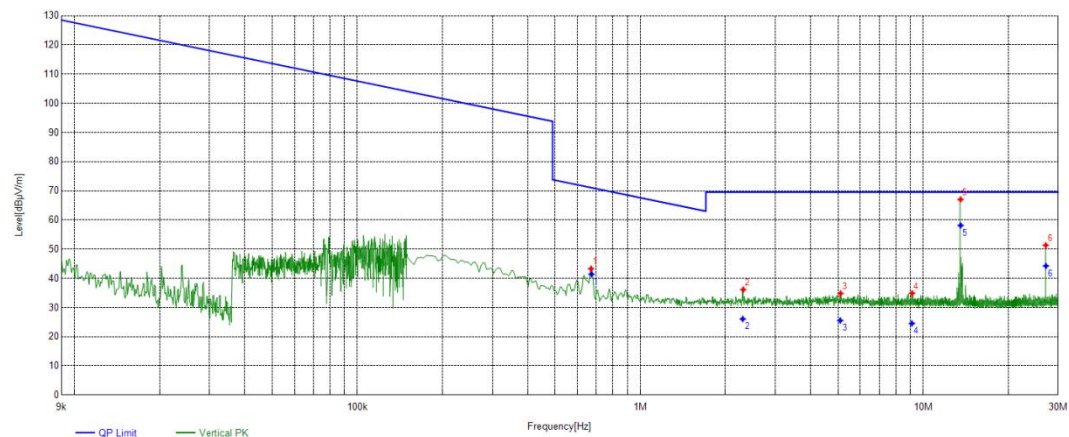
Test channel		13.56MHz							
Polarity		X							
Suspected List									
Frequency [MHz]	Factor [dB]	Reading [dBµV/m]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/Fail
13.3541	20.02	21.93	41.95	80.50	38.55	PK	100	142	PASS
13.5588	20.04	47.00	67.04	124.00	56.96	PK	100	159	PASS
13.6697	20.05	27.20	47.25	90.50	43.25	PK	100	159	PASS
13.7721	20.05	25.21	45.26	80.50	35.24	PK	100	159	PASS
14.1986	20.08	17.58	37.66	69.50	31.84	PK	100	129	PASS
Final Data List									
Frequency [MHz]	Factor [dB]	QP Value [dBµV/m]	QP Limit [dBµV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Pass/Fail		
13.3542	20.02	26.88	80.50	53.62	100	142	PASS		
13.5637	20.04	58.14	124.00	65.86	100	159	PASS		
13.6699	20.05	34.96	90.50	55.54	100	159	PASS		
13.7821	20.05	32.08	80.50	48.42	130	164	PASS		
14.2017	20.08	37.17	69.50	32.33	100	129	PASS		



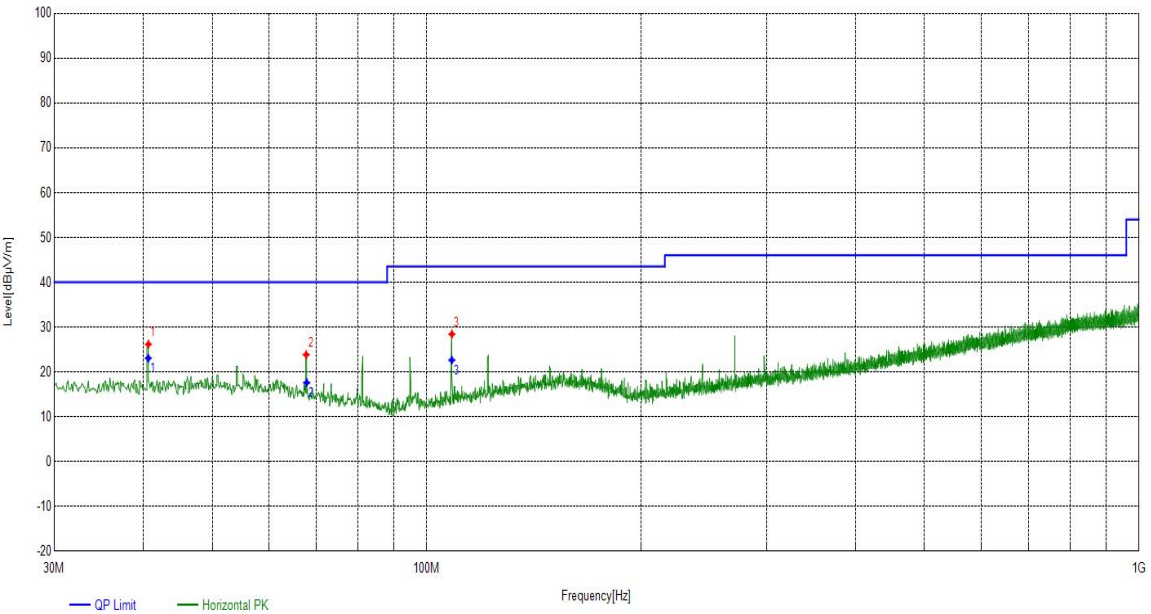
Result of Radiated Emissions

During the test, the Radiates Emission from 9kHz to 1GHz was performed in NFC all modes with all channels and all antennas. Transmitting, 13.56MHz, Antenna 1 are selected as the worst condition. The test data of the worst-case condition was recorded in this report.

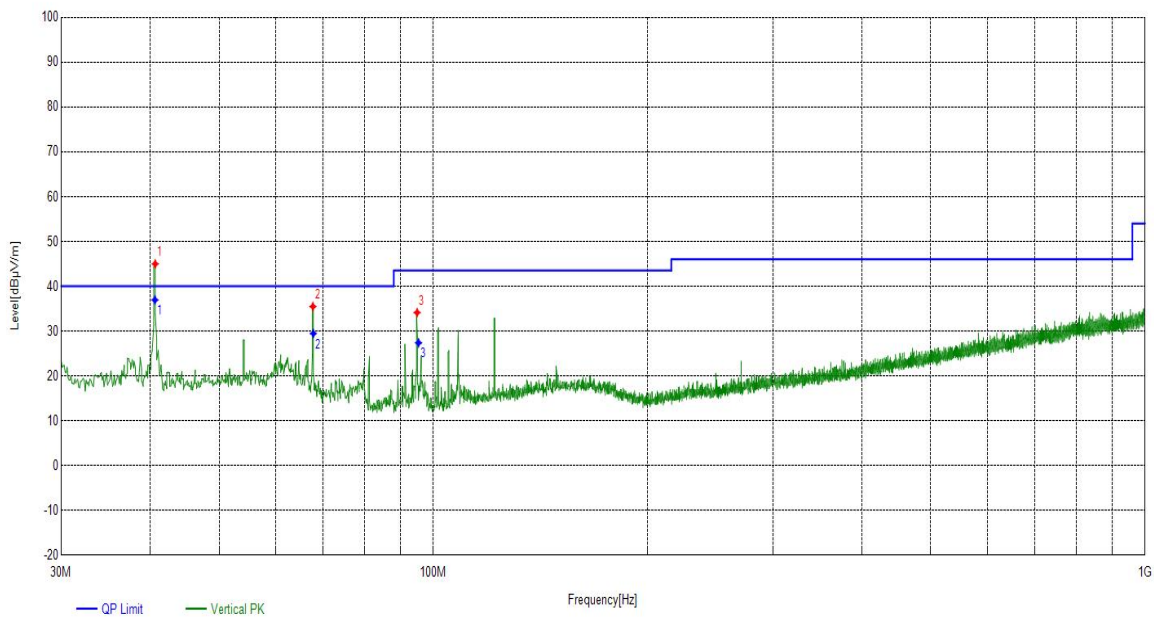
Radiates Emission		9k~30M							
Test channel		13.56MHz							
Polarity		X							
Suspected List									
Frequency [MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/Fail
0.6703	19.68	23.60	43.28	71.09	27.81	PK	100	278	PASS
2.3123	19.91	16.22	36.13	69.50	33.37	PK	100	58	PASS
5.1058	19.64	15.18	34.82	69.50	34.68	PK	100	53	PASS
9.1404	19.80	15.10	34.90	69.50	34.60	PK	100	83	PASS
13.5598	20.02	47.13	67.15	69.50	2.35	PK	100	144	PASS
27.1255	20.65	30.67	51.32	69.50	18.18	PK	100	307	PASS
Final Data List									
Frequency [MHz]	Factor [dB]	QP Value [dBμV/m]	QP Limit [dBμV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Pass/Fail		
0.6726	19.68	41.42	71.06	29.64	210	283	PASS		
2.303	19.91	26.07	69.50	43.43	210	63	PASS		
5.0909	19.64	25.54	69.50	43.96	160	58	PASS		
9.1221	19.80	24.52	69.50	44.98	110	88	PASS		
13.5617	20.01	58.10	69.50	11.40	100	142	PASS		
27.1675	20.65	44.24	69.50	25.26	140	309	PASS		



Radiates Emission		30M~1G							
Test channel		13.56MHz							
Polarity		Horizontal							
Suspected List									
Frequency [MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/Fail
40.6711	19.94	6.22	26.16	---	---	PK	100	6	---
67.7368	18.63	5.21	23.84	---	---	PK	100	318	---
108.4808	17.18	11.24	28.42	---	---	PK	100	220	---
Final Data List									
Frequency [MHz]	Factor [dB]	QP Value [dBμV/m]	QP Limit [dBμV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Pass/Fail		
40.6581	19.94	23.06	40.00	16.94	100	6	PASS		
67.8477	18.63	17.60	40.00	22.40	100	318	PASS		
108.4619	17.18	22.63	43.50	20.87	100	220	PASS		



Radiates Emission		30M~1G							
Test channel		13.56MHz							
Polarity		Vertical							
Suspected List									
Frequency [MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/Fail
40.6711	19.94	25.04	44.98	---	---	PK	100	282	---
67.7368	18.63	16.85	35.48	---	---	PK	100	1	---
94.8995	15.32	18.81	34.13	---	---	PK	100	20	---
Final Data List									
Frequency [MHz]	Factor [dB]	QP Value [dBμV/m]	QP Limit [dBμV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Pass/Fail		
40.634	19.94	36.95	40.00	3.05	110	236	PASS		
67.8222	18.63	29.46	40.00	10.54	100	224	PASS		
95.3341	15.32	27.38	43.50	16.12	100	220	PASS		



5.3 FREQUENCY TOLERANCE

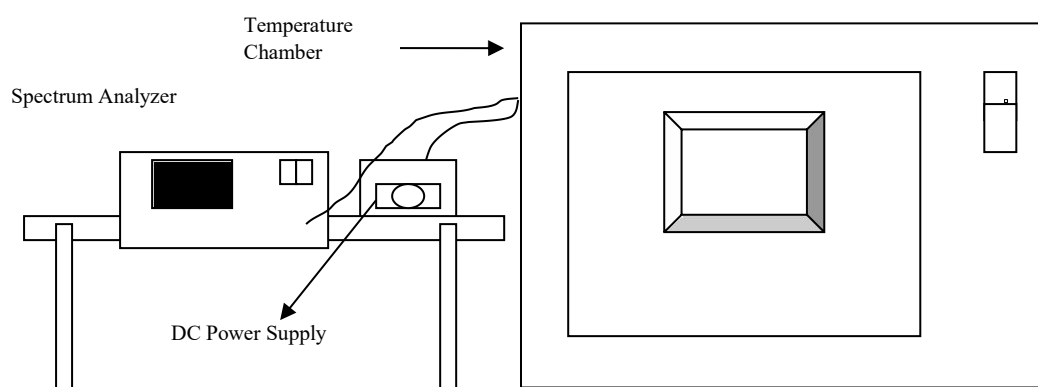
Ambient condition:

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.3kPa

Method of Measurement:

- The EUT was placed inside the environmental test chamber and powered by nominal DC voltage.
- Turn the EUT on and couple its output to a spectrum analyzer.
- Turn the EUT off and set the chamber to the highest temperature specified.
- Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 minutes.
- Repeat step c) and d) with the temperature chamber set to the lowest temperature.
- The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

Test Setup:



LIMITS OF FREQUENCY TOLERANCE

The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ (100ppm) of the operating frequency over a temperature variation of -20 degrees to $+50$ degrees C at normal supply voltage, and 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.

Measurement Uncertainty:

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 2$, $U = 936$ Hz.

Test Results:

FREQUENCY STABILITY VERSUS TEMP.											
TEMP. (°C)	POWER SUPPLY (V)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE		Limit (ppm)	PASS/ FAIL
		Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift		
		(MHz)	ppm	(MHz)	ppm	(MHz)	ppm	(MHz)	ppm		
50	24	13.5613	93.6578	13.5613	94.5428	13.5613	94.3953	13.5613	94.5428	100	PASS
40	24	13.5613	93.8053	13.5613	93.7316	13.5613	94.5428	13.5613	93.8791	100	PASS
30	24	13.5613	93.8053	13.5613	93.9528	13.5613	93.6578	13.5613	93.7316	100	PASS
20	24	13.5613	93.7316	13.5613	93.6578	13.5613	93.8791	13.5613	93.7316	100	PASS
10	24	13.5613	93.6578	13.5613	93.7316	13.5613	93.8791	13.5613	93.7316	100	PASS
0	24	13.5613	93.6578	13.5613	94.0265	13.5613	93.7316	13.5613	93.9528	100	PASS
-10	24	13.5613	93.8053	13.5613	93.7316	13.5613	93.7316	13.5613	93.8791	100	PASS
-20	24	13.5613	93.7316	13.5613	93.6578	13.5613	93.9528	13.5613	93.8791	100	PASS
20	20.4	13.5613	93.8791	13.5613	93.7316	13.5613	93.8053	13.5613	93.6578	100	PASS
	27.6	13.5613	93.6578	13.5613	93.6578	13.5613	93.6578	13.5613	93.6578	100	PASS

5.4 20dB BANDWIDTH MEASUREMENT

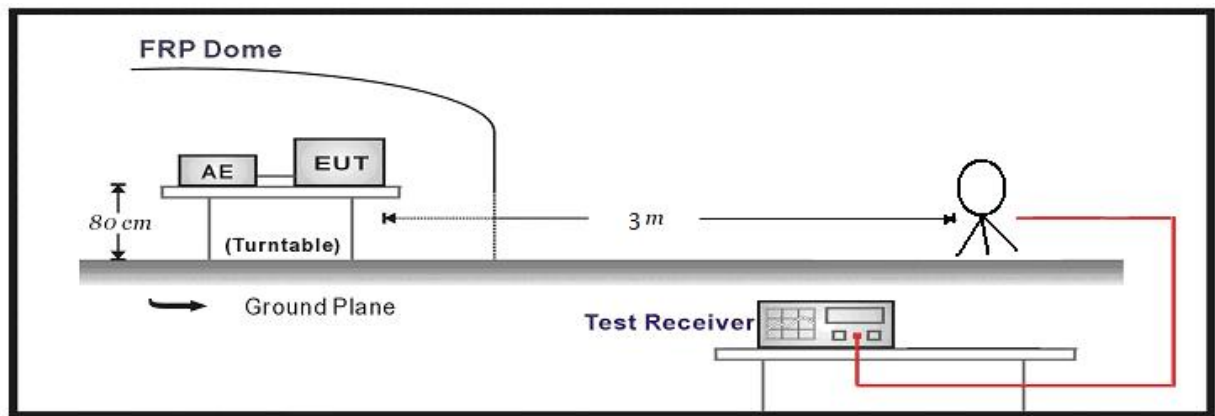
Ambient condition:

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.3kPa

Method of Measurement:

The spectrum analyzer was receiving the maximum emission level. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

Test Setup:



LIMITS OF 20dB BANDWIDTH MEASUREMENT

The 20dB bandwidth shall be specified in operating frequency band. (13.11MHz ~ 14.01MHz)

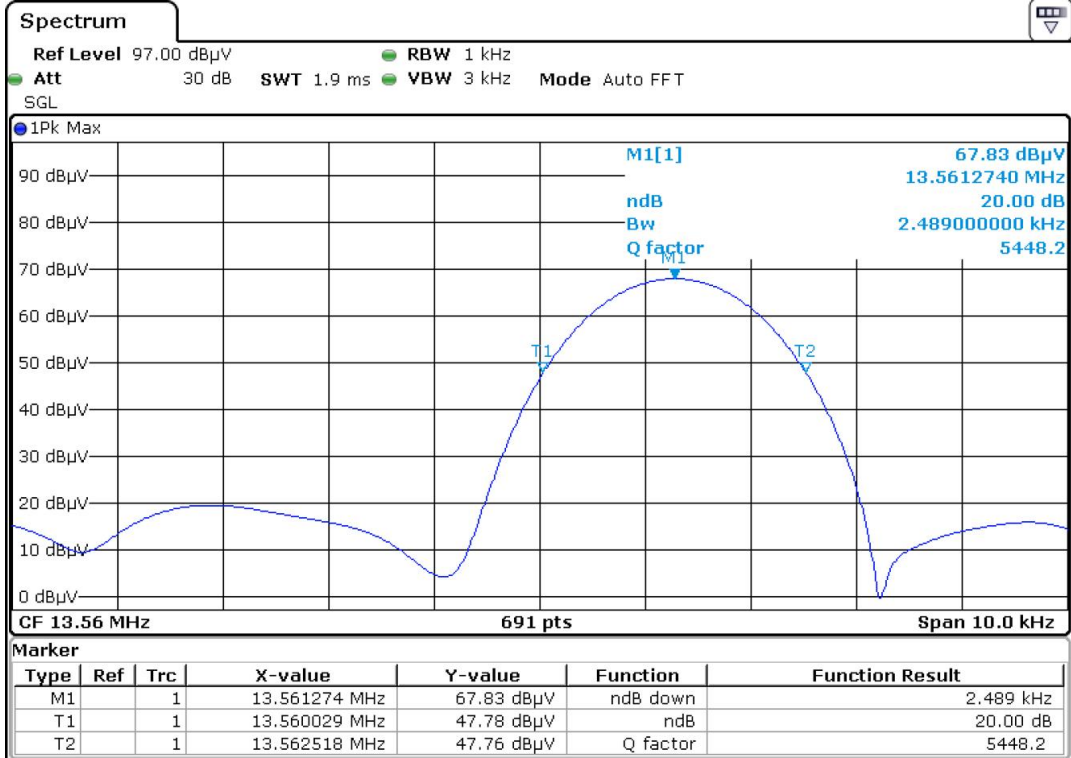
Measurement Uncertainty:

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 2$, $U = 936$ Hz.

Test Results:

Frequency (MHz)	20dB Bandwidth (kHz)	Lower (MHz)	Upper (MHz)	Limit (MHz)	PASS/FAIL
13.56	2.49	13.5600	13.5625	13.11~14.01	PASS

The plots of test results are attached as below.



6. Appendix A

Test Equipment	Type/Mode	SERIAL NO.	Equipment No.	Manufact urer	Cal. Due
Spectrum Analyzer	FSV40	101580	DZ-000238-3	R&S	2025/04/22
5m Semi-Anechoic Chamber	SAC-5	SAC-5-2.0	EM-000557	COMTEST	2024/11/02
EMI Test Receiver	N9038A-508	MY532290079	EM-000397	Agilent	2025/01/13
EMI Test Receiver	ESR7	102235	EM-000574	R&S	2025/01/13
loop antenna	HLA 6121	540046	EM-000546	TESEQ	2025/06/04
Broadband Antenna	VULB 9163	9163-530	EM-000342	SCHWAR ZBECK	2025/06/09
Constant temperature and humidity (high and low temperature) test chamber	LGH-80LA	LG20210902-A 10	DZ-000328	/	2024/10/17
Temperature and humidity meter	MHO-C201	/	DZ-000249-2	Seconds test	2025/07/28

Dynacomm	Software Release	Software Developer
TS+ (5m,Radiation test)	JS32-RE 5.0.0	Tonscend

_____ The End _____

Important

1. The test report is invalid without the official stamp of CVC;
2. Any part photocopies of the test report are forbidden without the written permission from CVC;
3. The test report is invalid without the signatures of Author and Reviewer;
4. The test report is invalid if altered;
5. Objections to the test report must be submitted to CVC within 15 days;
6. Generally, commission test is responsible for the tested samples only;
7. As for the test result, “—” or “N” means “not applicable”, “ / ”means “not testing”, “P” means “pass” and “F” means “fail”.

Address: No.3,Tiantaiyi Road, Kaitai Avenue, Science City, Guangzhou, China (Test location)

Post Code: 510663 Tel: 020-32293888

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