

TEST REPORT

Applicant Name: Advanced Card Systems Limited
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Report Number: SZ1240219-08392E-RF-00
FCC ID: V5MACR1552U-A2

Test Standard (s)

FCC PART 15.225

Sample Description

Product Type: AquaGuard NFC USB Reader
Model No.: ACR1552U-A2
Multiple Model(s) No.: N/A
Trade Mark: N/A
Date Received: 2024/02/19
Issue Date: 2024/04/19

Test Result:	Pass▲
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▲ In the configuration tested, the EUT complied with the standards above.

Prepared and Checked By:

April Zhang

April Zhang
RF Engineer

Approved By:

Nancy Wang

Nancy Wang
RF Supervisor

Note: The information marked # is provided by the applicant, the laboratory is not responsible for its authenticity and this information can affect the validity of the result in the test report. Customer model name, addresses, names, trademarks etc. are included.

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	SZ1240219-08392E-RF-00	Original Report	2024/04/19

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	AquaGuard NFC USB Reader
Tested Model	ACR1552U-A2
Multiple Model(s)	N/A
Frequency Range	13.56 MHz
E-field Strength	82.27 dBuV/m@3m
Modulation Technique	ASK
Voltage Range	DC 5V from USB
Sample serial number	2HSH-1 (Assigned by BACL, Shenzhen)
Sample/EUT Status	Good condition
Adapter Information	N/A

Objective

This Type approval report is in accordance with Part 2- Subpart J, and Part 15-Subparts A and C of the Federal Communication Commissions rules.

The objective is to determine the compliance of the EUT with FCC rules, section 15.203, 15.205, 15.207, 15.209 and 15.225.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Each test item follows test standards and with no deviation.

Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		±5%
RF Frequency		213.55 Hz(k=2, 95% level of confidence)
AC Power Lines Conducted Emissions	9kHz-150kHz	3.94dB(k=2, 95% level of confidence)
	150kHz-30MHz	3.84dB(k=2, 95% level of confidence)
Radiated Emissions	9kHz - 30MHz	3.30dB(k=2, 95% level of confidence)
	30MHz~200MHz (Horizontal)	4.48dB(k=2, 95% level of confidence)
	30MHz~200MHz (Vertical)	4.55dB(k=2, 95% level of confidence)
	200MHz~1000MHz (Horizontal)	4.85dB(k=2, 95% level of confidence)
	200MHz~1000MHz (Vertical)	5.05dB(k=2, 95% level of confidence)
Temperature		±1°C
Humidity		±1%
Supply voltages		±0.4%

Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 5F(B-West) , 6F, 7F, the 3rd Phase of Wan Li Industrial Building D, Shihua Rd, FuTian Free Trade Zone, Shenzhen, China.

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 715558, the FCC Designation No. : CN5045.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in a typical fashion (as normally used by a typical user).

EUT Exercise Software

No Exercise Software was used.

Equipment Modifications

No modification on the EUT.

Support Equipment List and Details

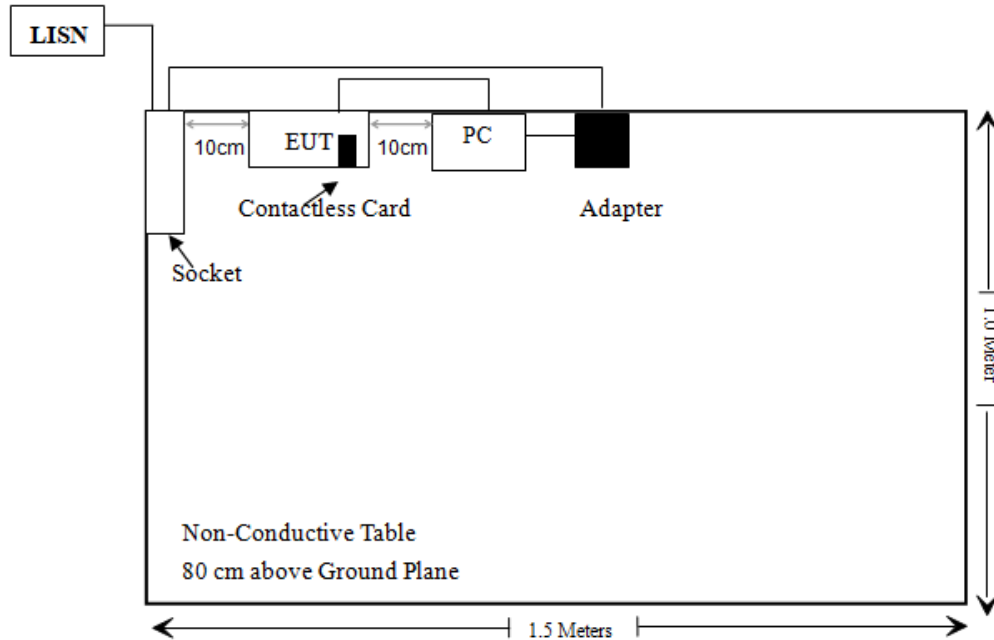
Manufacturer	Description	Model	Serial Number
Dell	Notebook	Latitude E6410	11429208685
Unknown	Contactless card	Unknown	Unknown
Dell	Adapter	Unknown	Unknown
BULL	Socket	Unknown	Unknown

External I/O Cable

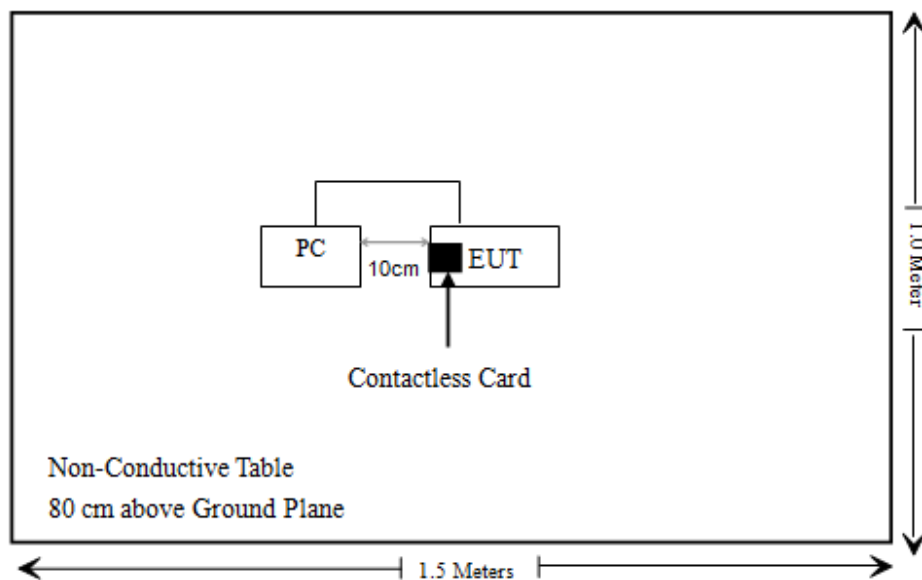
Cable Description	Length (m)	From Port	To
Unshielded Detachable DC Cable	1.5	EUT	Notebook
Unshielded Un-detachable DC Cable	1.0	Notebook	Adapter
Unshielded Un-detachable AC Cable	1.5	Socket	LISN

Block Diagram of Test Setup

For Conducted Emission:



For Radiated Emissions:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliant
§ 1.1307 (b) (3) & §2.1091	RF Exposure	Compliant
§15.207	AC Line Conducted Emission	Compliant
§15.225 §15.209§15.205	Radiated Emission Test	Compliant
§15.225(e)	Frequency Stability	Compliant
§15.215(c)	20dB Emission Bandwidth	Compliant

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted Emissions Test					
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2024/01/16	2025/01/15
Rohde & Schwarz	LISN	ENV216	101613	2024/01/16	2025/01/15
Rohde & Schwarz	Transient Limiter	ESH3Z2	DE25985	2023/08/03	2024/08/02
Unknown	CE Cable	CE Cable	UF A210B-1-0720-504504	2023/08/03	2024/08/02
Audix	EMI Test software	E3	191218	NCR	NCR
Radiated Emission Test					
R&S	EMI Test Receiver	ESR3	102455	2024/01/16	2025/01/15
Sonoma instrument	Pre-amplifier	310 N	186238	2023/06/08	2024/06/07
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2023/07/20	2024/07/19
BACL	Active Loop Antenna	1313-1A	4031911	2024/03/21	2024/07/06
Unknown	Cable	Chamber Cable 1	F-03-EM236	2023/08/03	2025/03/20
Unknown	Cable	Chamber Cable 4	EC-007	2023/08/03	2024/08/02
Frequency Stability					
BACL	Temperature & Humidity Chamber	BTH-150-40	30145	2024/01/16	2025/01/15
R&S	EMI Test Receiver	ESR3	102455	2024/01/16	2025/01/15
instek	DC Power Supply	GPS-3030DD	EM832096	NCR	NCR
Fluke	Digital Multimeter	287	19000011	2023/06/08	2024/06/07

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC§15.203 - ANTENNA REQUIREMENT

Applicable Standard

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 shall be considered sufficient to comply with the provisions of this section.

Antenna Connected Construction

The EUT has an internal antenna arrangement for NFC which was permanently attached; fulfill the requirement of this section. Please refer to the EUT photos.

Result: Compliant.

§1.1307 (b) (3) & §2.1091 –RF EXPOSURE

Applicable Standard

According to FCC §2.1091 and §1.1307(b) (3), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

According to KDB 447498 D04 Interim General RF Exposure Guidance

1-mW Test Exemption:

Per § 1.1307(b)(3)(i)(A), a single RF source is exempt RF device (from the requirement to show data demonstrating compliance to RF exposure limits, as previously mentioned) if the available maximum time-averaged power is no more than 1 mW, regardless of separation distance. This exemption applies to all operating configurations and exposure conditions, for the frequency range 100 kHz to 100 GHz, regardless of fixed, mobile, or portable device exposure conditions. This is a standalone exemption, and it cannot be applied in conjunction with any other test exemption.

For worst case:

Mode	Maximum E-Field (dBuV/m@3m)	Maximum EIRP (dBm)	Maximum EIRP (mW)	Exemption Limit (mW)	Test Exemption
NFC	82.27	-12.93	0.05093	1	Yes

Note: EIRP = E-Field – 95.2 @3m

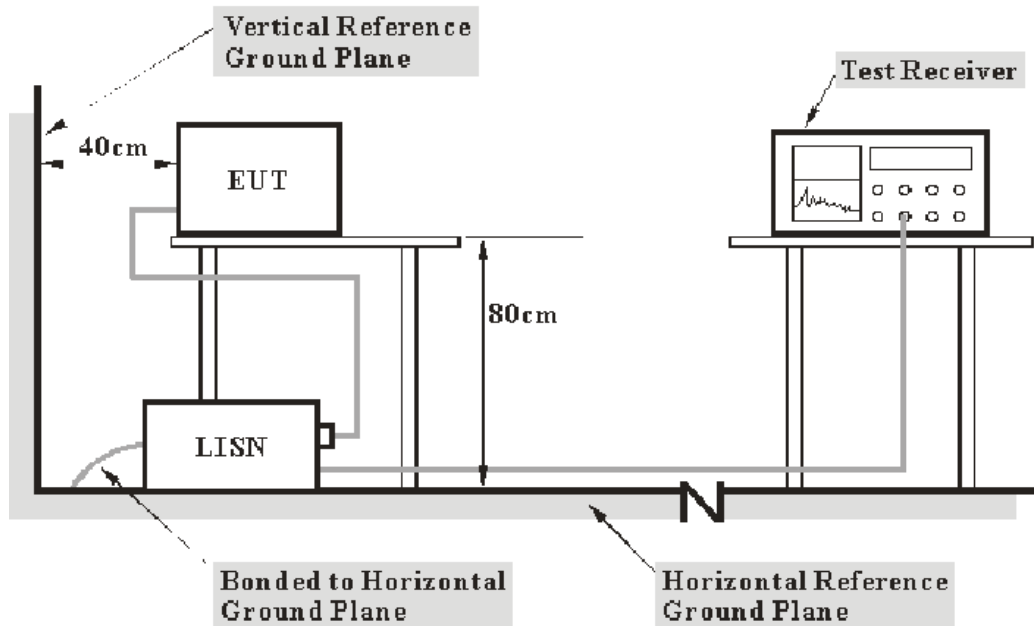
Result: Compliant

FCC §15.207 – AC LINE CONDUCTED EMISSION

Applicable Standard

FCC§15.207

EUT Setup



- Note: 1. Support units were connected to second LISN.
 2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30MHz	9 kHz

Test Procedure

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All final data was recorded in the Quasi-peak and average detection mode.

Factor & Over Limit Calculation

The factor is calculated by adding LISN VDF (Voltage Division Factor) and Cable Loss. The basic equation is as follows:

$$\text{Factor} = \text{LISN VDF} + \text{Cable Loss}$$

The “**Over limit**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, an Over limit of -7 dB means the emission is 7 dB below the limit. The equation for calculation is as follows:

$$\begin{aligned}\text{Over Limit} &= \text{Level} - \text{Limit} \\ \text{Level} &= \text{Read Level} + \text{Factor}\end{aligned}$$

Note: The term "cable loss" refers to the combination of a cable and a 10dB transient limiter (attenuator).

Test Data

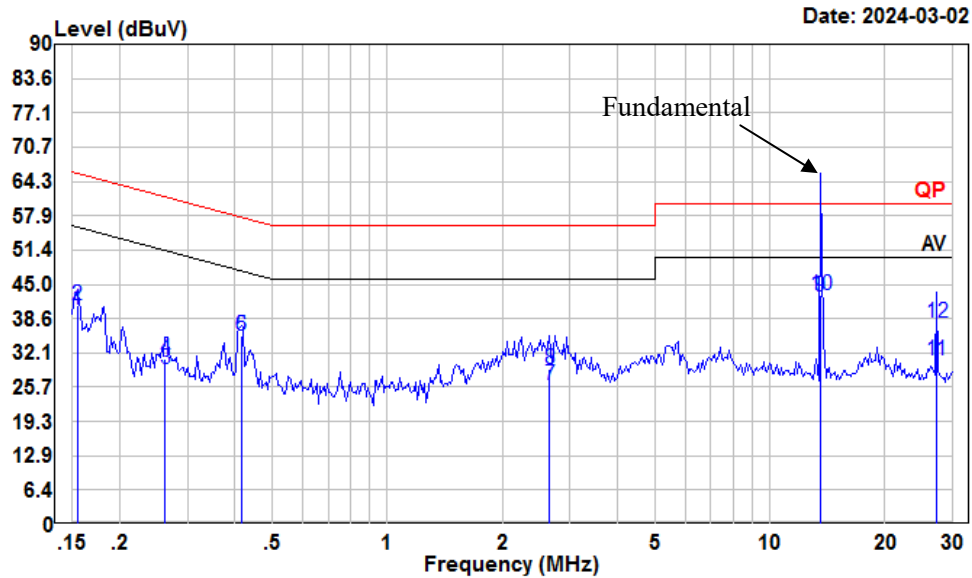
Environmental Conditions

Temperature:	26 °C
Relative Humidity:	45 %
ATM Pressure:	101.0 kPa

The testing was performed by Macy Shi on 2024-03-02.

Test mode: Transmitting

AC 120 V/60 Hz, Line



Condition: Line

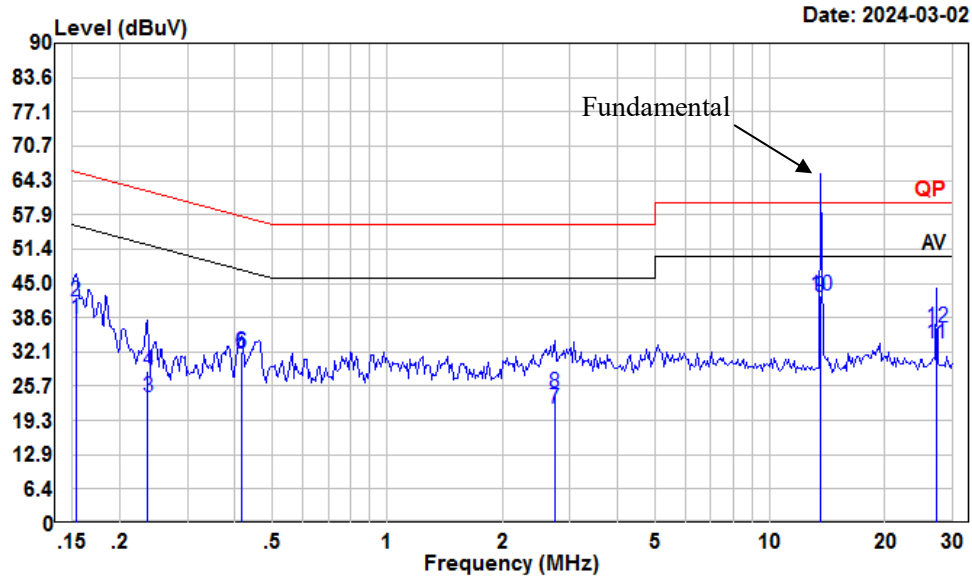
Project : SZ1240219-08392E-RF

Tester : Macy shi

Note : NFC Transmitting

		Read		LISN	Cable	Limit	Over	
	Freq	Level	Level	Factor	Loss	Line	Limit	Remark
	MHz	dBuV	dBuV	dB	dB	dBuV	dB	
1	0.15	19.24	40.28	10.89	10.15	55.74	-15.46	Average
2	0.15	20.13	41.17	10.89	10.15	65.74	-24.57	QP
3	0.26	8.32	29.22	10.71	10.19	51.34	-22.12	Average
4	0.26	9.98	30.88	10.71	10.19	61.34	-30.46	QP
5	0.41	14.57	35.34	10.56	10.21	47.55	-12.21	Average
6	0.41	14.65	35.42	10.56	10.21	57.55	-22.13	QP
7	2.65	5.45	26.16	10.48	10.23	46.00	-19.84	Average
8	2.65	8.40	29.11	10.48	10.23	56.00	-26.89	QP
9	13.55	22.03	42.78	10.60	10.15	50.00	-7.22	Average
10	13.55	22.26	43.01	10.60	10.15	60.00	-16.99	QP
11	27.27	10.00	30.84	10.59	10.25	50.00	-19.16	Average
12	27.27	17.10	37.94	10.59	10.25	60.00	-22.06	QP

AC 120V/ 60 Hz, Neutral



Condition: Neutral

Project : SZ1240219-08392E-RF

Tester : Macy shi

Note : NFC Transmitting

		Read		LISN	Cable	Limit	Over	
	Freq	Level	Level	Factor	Loss	Line	Limit	Remark
	MHz	dBuV	dBuV	dB	dB	dBuV	dB	
1	0.15	17.63	38.37	10.59	10.15	55.82	-17.45	Average
2	0.15	20.80	41.54	10.59	10.15	65.82	-24.28	QP
3	0.24	3.09	23.72	10.45	10.18	52.22	-28.50	Average
4	0.24	7.88	28.51	10.45	10.18	62.22	-33.71	QP
5	0.41	10.93	31.78	10.64	10.21	47.55	-15.77	Average
6	0.41	11.38	32.23	10.64	10.21	57.55	-25.32	QP
7	2.74	0.97	21.61	10.40	10.24	46.00	-24.39	Average
8	2.74	3.88	24.52	10.40	10.24	56.00	-31.48	QP
9	13.55	21.48	42.43	10.80	10.15	50.00	-7.57	Average
10	13.55	21.71	42.66	10.80	10.15	60.00	-17.34	QP
11	27.27	13.00	33.80	10.55	10.25	50.00	-16.20	Average
12	27.27	16.00	36.80	10.55	10.25	60.00	-23.20	QP

FCC§15.225, §15.205& §15.209 - RADIATED EMISSIONS TEST

Applicable Standard

As per FCC Part 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.

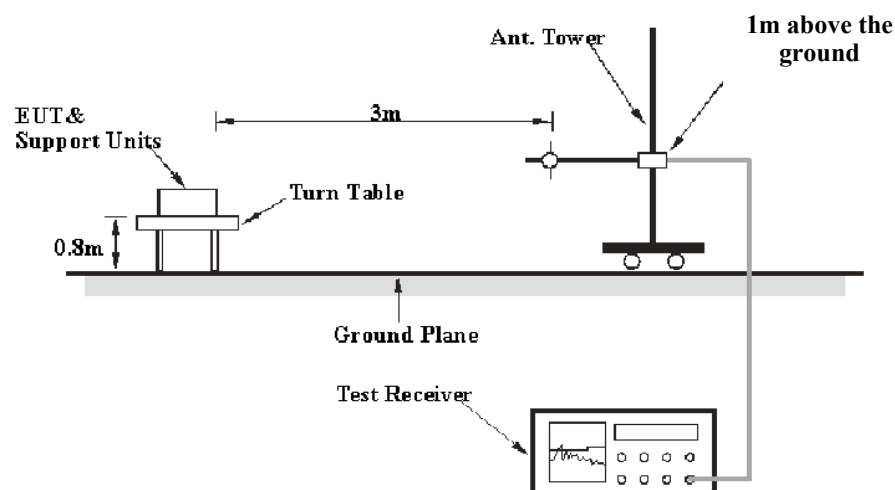
(b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

(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.

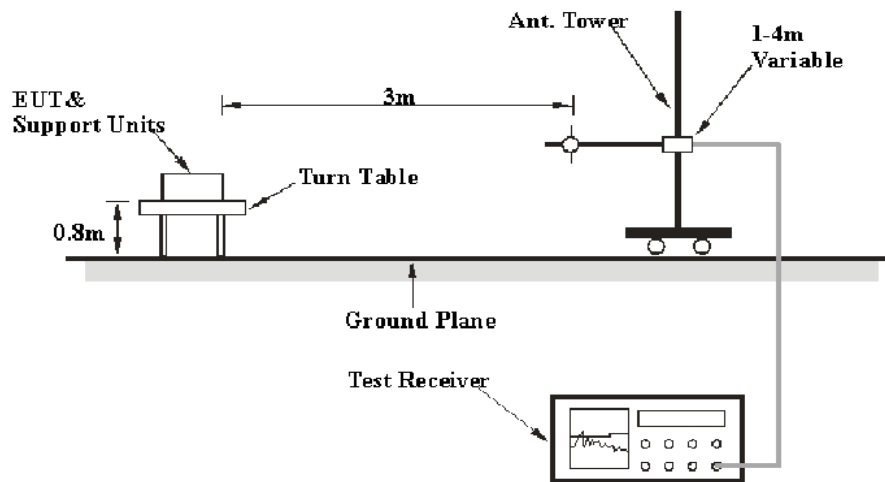
(d) The field strength of any emissions appearing outside of the 13.110–14.010 MHz band shall not exceed the general radiated emission limits in §15.209.

EUT Setup

9 kHz-30MHz:



Note: Antenna is set up at 1m during test for below 30MHz.

30MHz-1GHz:

The radiated emission tests were performed in the 3-meter chamber a test site, using the setup accordance with the ANSI C63.10-2013.

EMI Test Receiver Setup

According to FCC Rules, 47 CFR 15.33, the EUT emissions were investigated up to 1000 MHz.

During the radiated emission test, the EMI test Receiver was set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Measurement
9 kHz – 150 kHz	/	/	200 Hz	QP
	300 Hz	1 kHz	/	PK
150 kHz – 30 MHz	/	/	9 kHz	QP
	10 kHz	30 kHz	/	PK
30 MHz – 1000 MHz	/	/	120 kHz	QP
	100 kHz	300 kHz	/	PK

All final data was recorded in Quasi-peak detection mode except for the frequency bands 9–90 kHz, 110–490 kHz, average detection modes for frequency bands 9–90 kHz and 110–490 kHz.

If the maximized peak measured value complies with under the QP/Average limit more than 6dB, then it is unnecessary to perform QP/Average measurement.

Factor & Over Limit/Margin Calculation

The Level is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\begin{aligned}\text{Factor} &= \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain} \\ \text{Level} &= \text{Read Level} + \text{Factor}\end{aligned}$$

The “**Over Limit**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, an Over Limit/margin of -7dB means the emission is 7dB below the limit. The equation for calculation is as follows:

$$\text{Over Limit} = \text{Level} - \text{Limit}$$

Test Data

Environmental Conditions

Temperature:	24-26 °C
Relative Humidity:	54~56 %
ATM Pressure:	101.0 kPa

The testing was performed by Anson Su on 2024-03-06 and Warren Huang on 2024-04-19.

Test mode: Transmitting (Pre-scan in the X, Y and Z axes of orientation, the worst case of X-axis orientation were recorded)

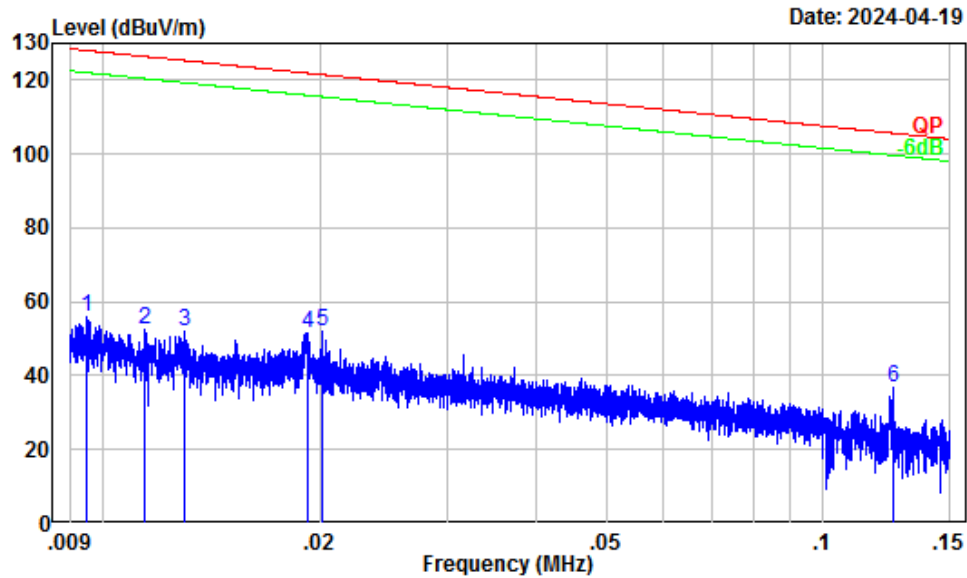
1) Spurious Emissions (9 kHz~30 MHz):

Part 15 Section 15.31(f)(2) (9kHz-30MHz)

Limit @ 3m = Limit @ 300m - 40 * log(3(m)/300(m))

Limit @ 3m = Limit @ 30m - 40 * log(3(m)/30(m))

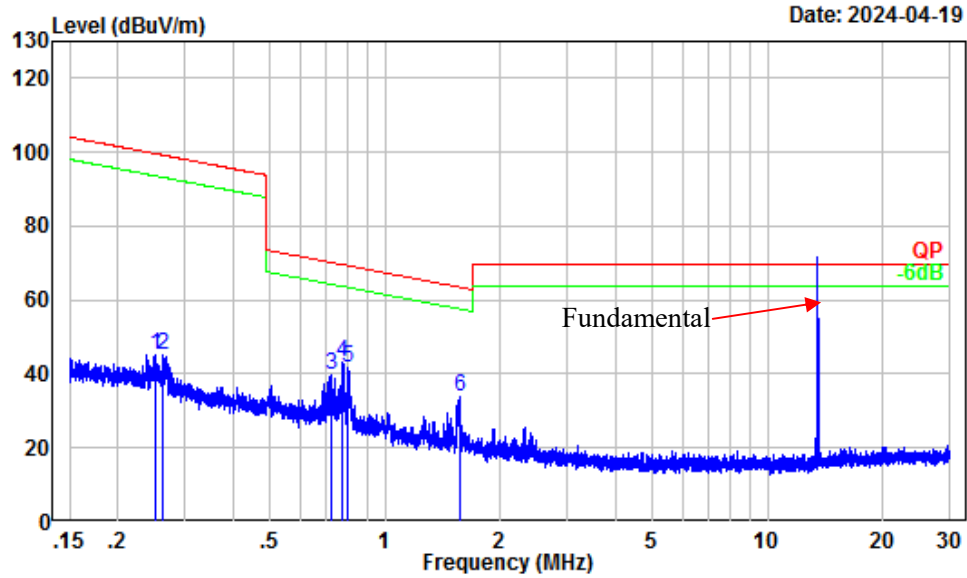
Ground-parallel
9 kHz~150 kHz



Site : Chamber A
Condition : 3m
Project Number: SZ1240219-08392E-RF
Note : NFC Transmitting
Note : Ground-parallel
Tester : Warren Huang

	Freq	Factor	Read Level	Limit Level	Over Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	0.01	38.10	17.66	55.76	128.07	-72.31	Peak
2	0.01	36.94	15.70	52.64	126.42	-73.78	Peak
3	0.01	36.18	15.58	51.76	125.36	-73.60	Peak
4	0.02	32.96	18.47	51.43	121.91	-70.48	Peak
5	0.02	32.52	19.50	52.02	121.53	-69.51	Peak
6	0.12	15.89	21.04	36.93	105.67	-68.74	Peak

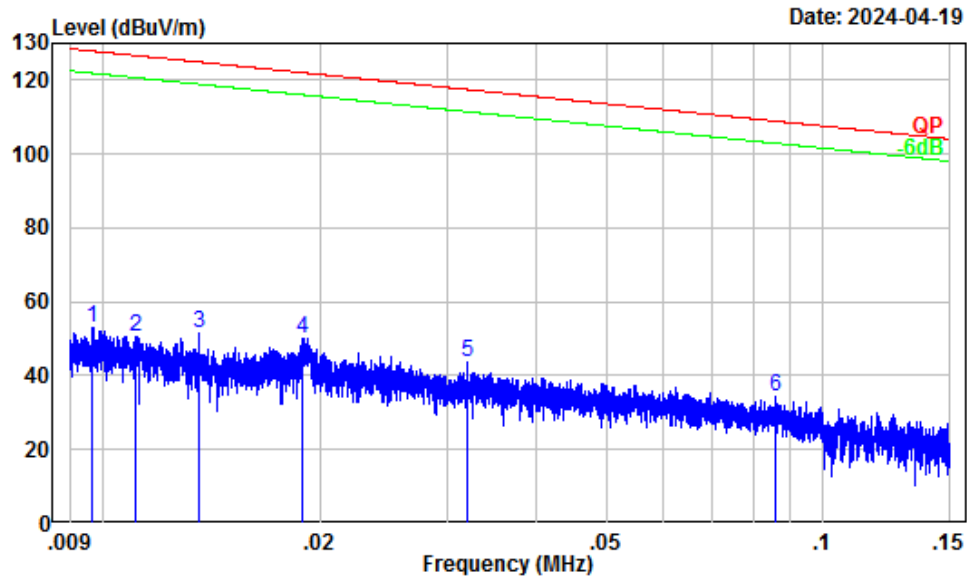
150 kHz~30 MHz



Site : Chamber A
 Condition : 3m
 Project Number: SZ1240219-08392E-RF
 Note : NFC Transmitting
 Note : Ground-parallel
 Tester : Warren Huang

	Freq Factor		Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	0.25	10.02	35.21	45.23	99.62	-54.39	Peak
2	0.26	9.40	35.90	45.30	99.18	-53.88	Peak
3	0.73	0.79	39.17	39.96	70.32	-30.36	Peak
4	0.77	0.20	43.00	43.20	69.74	-26.54	Peak
5	0.80	-0.13	41.59	41.46	69.42	-27.96	Peak
6	1.58	-3.59	37.45	33.86	63.44	-29.58	Peak

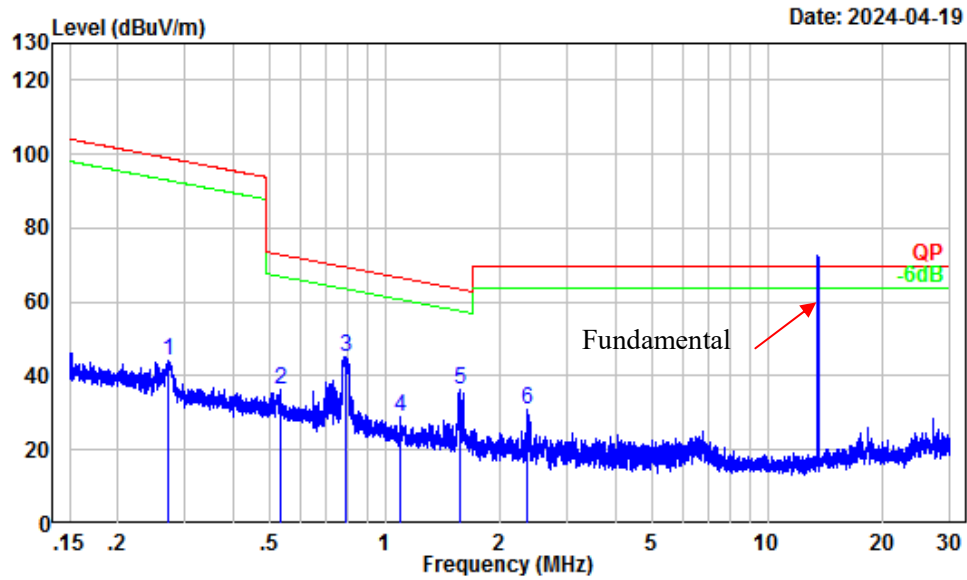
Perpendicular
9 kHz~150 kHz



Site : Chamber A
Condition : 3m
Project Number: SZ1240219-08392E-RF
Note : NFC Transmitting
Note : Perpendicular
Tester : Warren Huang

	Freq	Factor	Read Level	Read Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	0.01	37.96	14.81	52.77	127.91	-75.14	Peak
2	0.01	37.12	13.45	50.57	126.68	-76.11	Peak
3	0.01	35.84	15.43	51.27	124.92	-73.65	Peak
4	0.02	33.13	17.14	50.27	122.06	-71.79	Peak
5	0.03	27.04	16.51	43.55	117.50	-73.95	Peak
6	0.09	18.45	15.99	34.44	108.93	-74.49	Peak

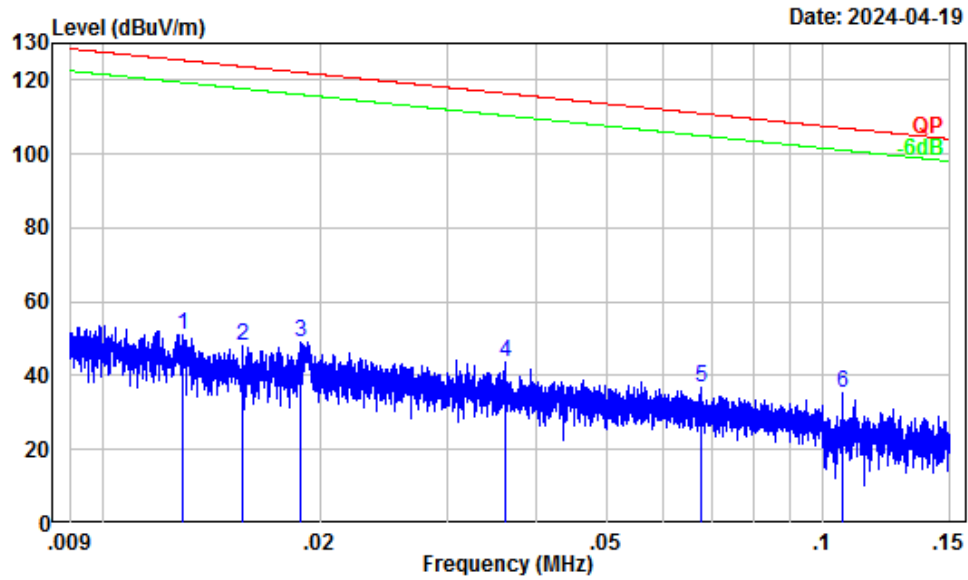
150 kHz~30 MHz



Site : Chamber A
 Condition : 3m
 Project Number: SZ1240219-08392E-RF
 Note : NFC Transmitting
 Note : Perpendicular
 Tester : Warren Huang

	Freq Factor		Read Level		Limit	Over	Remark
	MHz	dB/m	dBuV	dBuV/m	Line	Limit	
1	0.27	9.10	34.98	44.08	98.96	-54.88	Peak
2	0.53	3.09	33.02	36.11	73.06	-36.95	Peak
3	0.79	0.02	45.19	45.21	69.57	-24.36	Peak
4	1.09	-1.91	30.81	28.90	66.68	-37.78	Peak
5	1.58	-3.60	39.84	36.24	63.43	-27.19	Peak
6	2.35	-5.36	36.15	30.79	69.54	-38.75	Peak

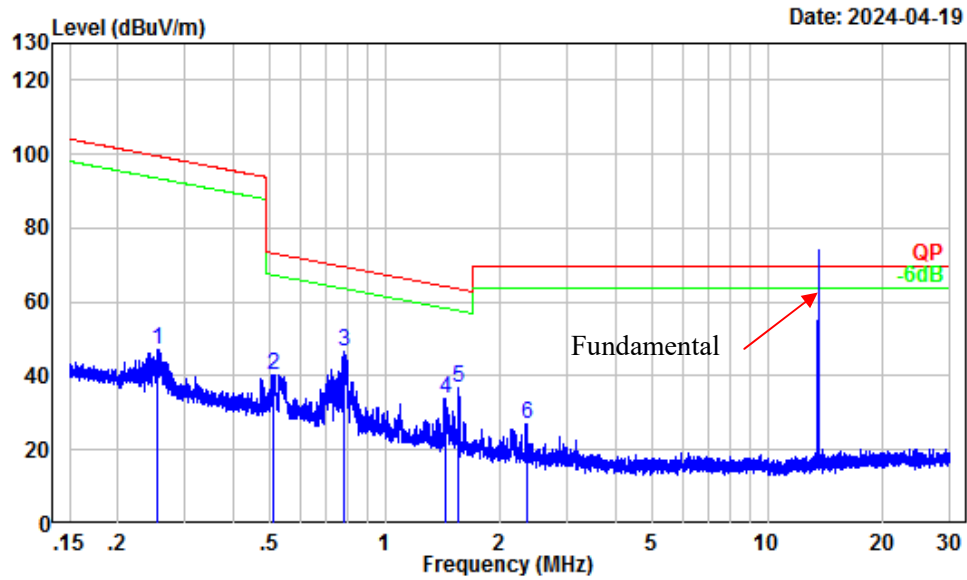
Parallel
9 kHz~150 kHz



Site : Chamber A
Condition : 3m
Project Number: SZ1240219-08392E-RF
Note : NFC Transmitting
Note : Parallel
Tester : Warren Huang

	Freq	Factor	Read Level	Read Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	0.01	36.22	14.98	51.20	125.40	-74.20	Peak
2	0.02	34.81	13.36	48.17	123.72	-75.55	Peak
3	0.02	33.21	15.91	49.12	122.13	-73.01	Peak
4	0.04	26.13	17.43	43.56	116.45	-72.89	Peak
5	0.07	20.68	16.31	36.99	110.99	-74.00	Peak
6	0.11	16.75	18.56	35.31	107.06	-71.75	Peak

150 kHz~30 MHz

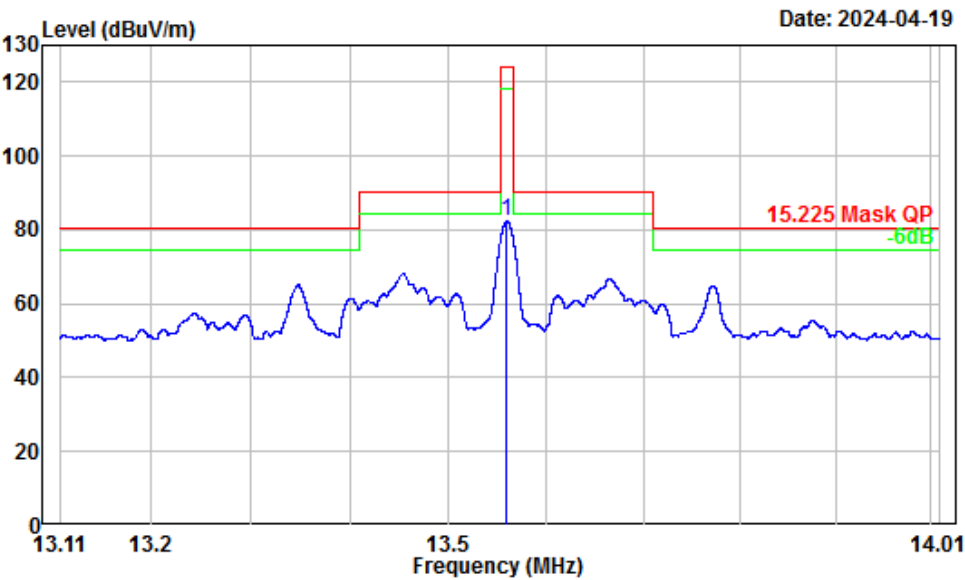


Site : Chamber A
 Condition : 3m
 Project Number: SZ1240219-08392E-RF
 Note : NFC Transmitting
 Note : Parallel
 Tester : Warren Huang

	Freq Factor		Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	0.26	9.81	37.49	47.30	99.46	-52.16	Peak
2	0.51	3.34	36.98	40.32	73.42	-33.10	Peak
3	0.78	0.11	46.26	46.37	69.66	-23.29	Peak
4	1.44	-3.11	36.97	33.86	64.25	-30.39	Peak
5	1.56	-3.54	40.35	36.81	63.53	-26.72	Peak
6	2.34	-5.36	32.49	27.13	69.54	-42.41	Peak

2) Emission Mask & Fundamental:

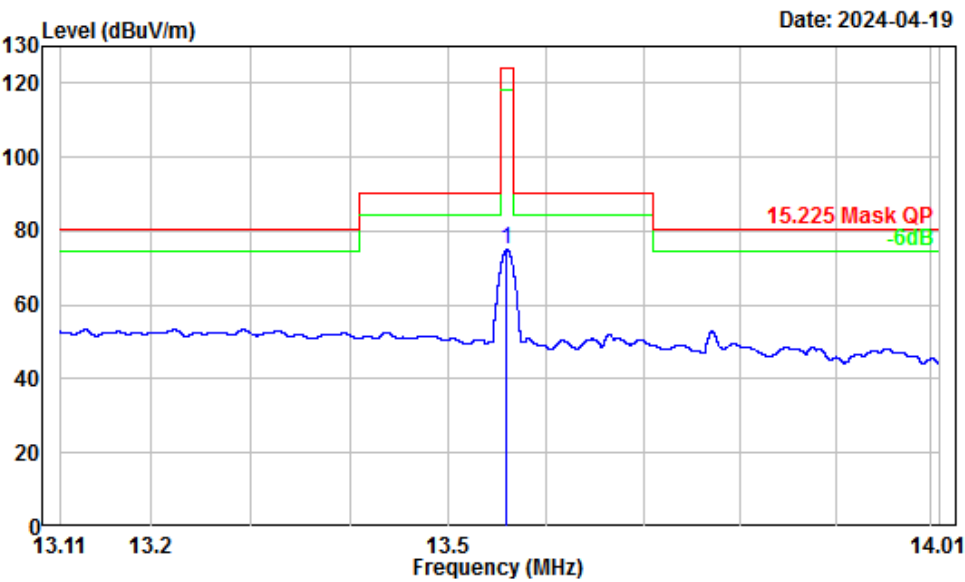
Ground-parallel



Site : Chamber A
Condition : 3m
Project Number: SZ1240219-08392E-RF
Note : NFC Transmitting
Note : Ground-parallel
Tester : Warren Huang

	Freq Factor		Read Level		Limit	Over	Remark
	MHz	dB/m	dBuV	dBuV/m	Line	Limit	
1	13.56	-5.69	87.96	82.27	124.00	-41.73	Peak

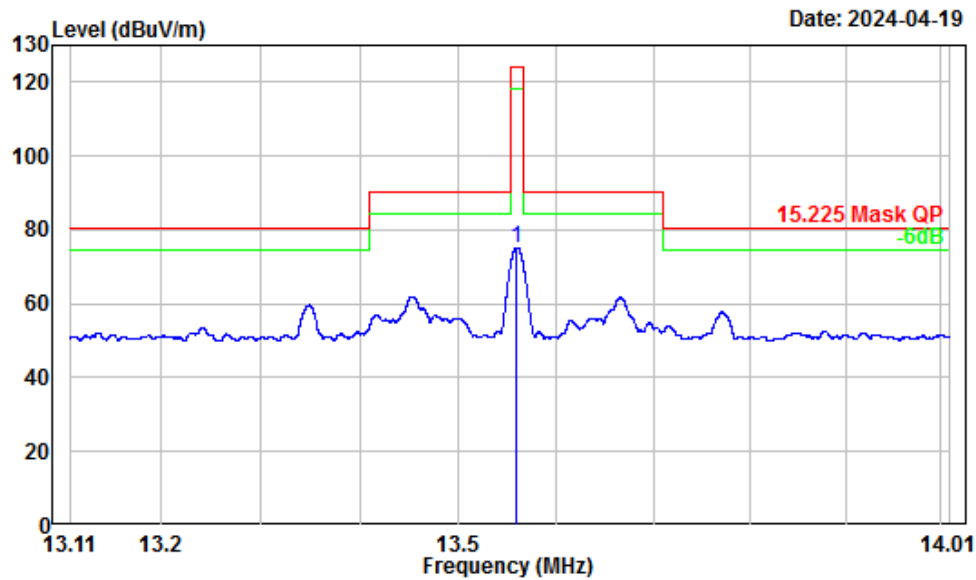
Perpendicular



Site : Chamber A
Condition : 3m
Project Number: SZ1240219-08392E-RF
Note : NFC Transmitting
Note : Perpendicular
Tester : Warren Huang

	Freq Factor		Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	13.56	-5.69	80.57	74.88	124.00	-49.12	Peak

Parallel

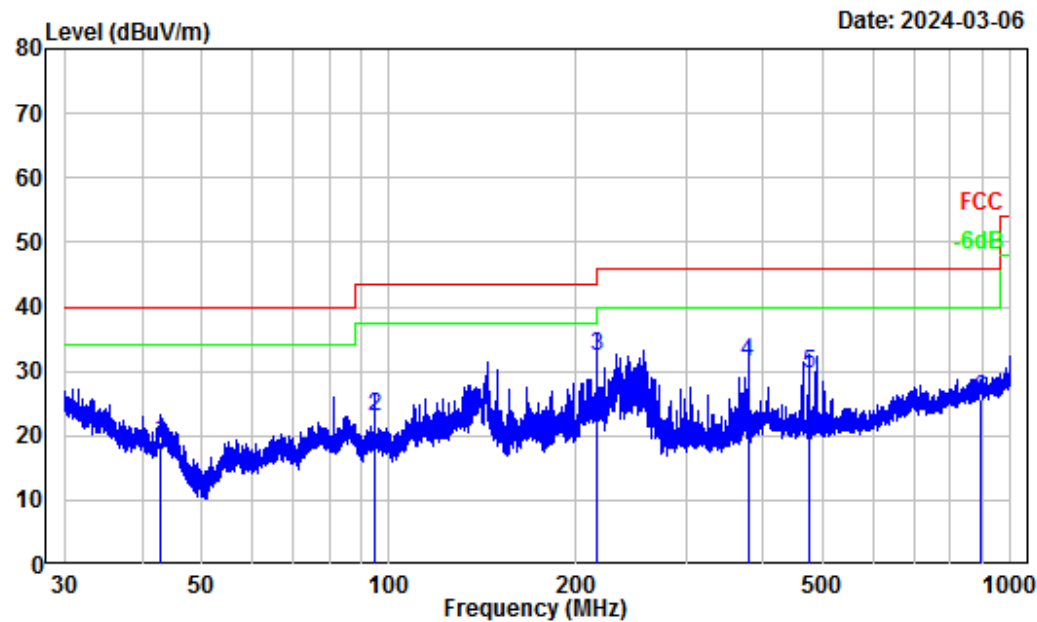


Site : Chamber A
Condition : 3m
Project Number: SZ1240219-08392E-RF
Note : NFC Transmitting
Note : Parallel
Tester : Warren Huang

	Freq Factor		Read Level		Limit	Over	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	13.56	-5.69	80.99	75.30	124.00	-48.70	Peak

3) Spurious Emissions (30 MHz~1GHz):

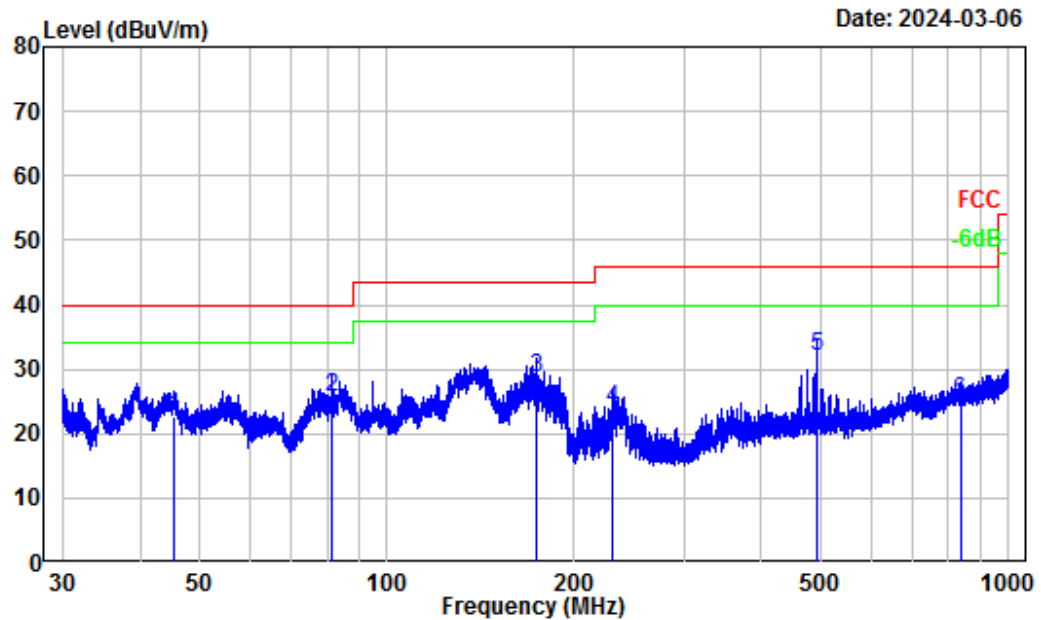
Horizontal



Site : chamber
Condition : 3m Horizontal
Project Number: SZ1240219-08392E-RF
Note : NFC Transmitting
Tester : Anson Su

	Freq Factor		Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	42.69	-12.11	31.23	19.12	40.00	-20.88	QP
2	94.93	-15.17	38.03	22.86	43.50	-20.64	QP
3	216.02	-11.29	43.73	32.44	46.00	-13.56	QP
4	377.92	-8.46	39.82	31.36	46.00	-14.64	QP
5	474.04	-5.35	35.07	29.72	46.00	-16.28	QP
6	893.07	0.90	24.75	25.65	46.00	-20.35	QP

Vertical



Site : chamber
Condition : 3m Vertical
Project Number: SZ1240219-08392E-RF
Note : NFC Transmitting
Tester : Anson Su

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	45.24	-14.86	37.43	22.57	40.00	-17.43	QP
2	81.35	-17.24	42.97	25.73	40.00	-14.27	QP
3	173.59	-12.46	40.99	28.53	43.50	-14.97	QP
4	231.11	-12.24	36.06	23.82	46.00	-22.18	QP
5	490.74	-5.41	37.27	31.86	46.00	-14.14	QP
6	836.24	-0.26	25.41	25.15	46.00	-20.85	QP

FCC§15.225(e) - FREQUENCY STABILITY

Applicable Standard

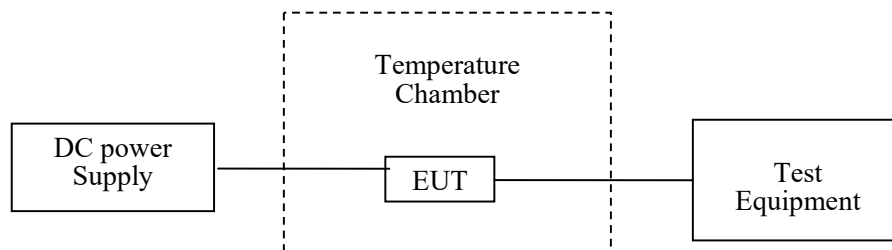
The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency over a temperature variation of -20 degrees to $+50$ degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and inductive antenna was connected to a Spectrum Analyzer. The EUT was placed inside the temperature chamber.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the Spectrum Analyzer.

Frequency Stability vs. Voltage: An external DC power supply Source. The voltage was set to 115% of the nominal value and was then decreased until the transmitter light no longer illuminated; i.e., the end point. The output frequency was recorded for each voltage.



Test Data

Environmental Conditions

Temperature:	24 °C
Relative Humidity:	55 %
ATM Pressure:	101.0 kPa

The testing was performed by Anson Su on 2024-03-06.

Test Mode: Transmitting

Test Result: Pass

Voltage Supply (V _{DC})	Temperature (°C)	Measured Frequency (MHz)	Frequency Error (%)	Part 15.225 Limit (%)
5V	-20	13.56014	0.0010	±0.01
	-10	13.56025	0.0018	±0.01
	0	13.56009	0.0007	±0.01
	10	13.56028	0.0021	±0.01
	20	13.55987	-0.0010	±0.01
	30	13.55986	-0.0010	±0.01
	40	13.56021	0.0015	±0.01
	50	13.56004	0.0003	±0.01
4.25	20	13.56018	0.0013	±0.01
5.75	20	13.56024	0.0018	±0.01

Note: the extreme voltage was declared by the applicant.

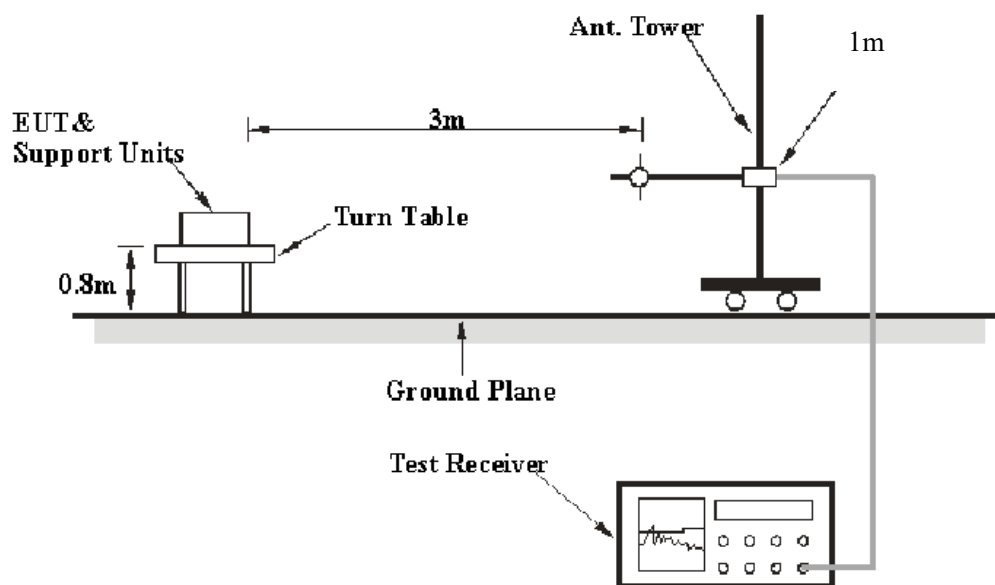
FCC§15.215(c) - 20dBEMISSION BANDWIDTH

Requirement

Per 15.215 (c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

Test Procedure

Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.



Test Data

Environmental Conditions

Temperature:	27 °C
Relative Humidity:	53 %
ATM Pressure:	101.5 kPa

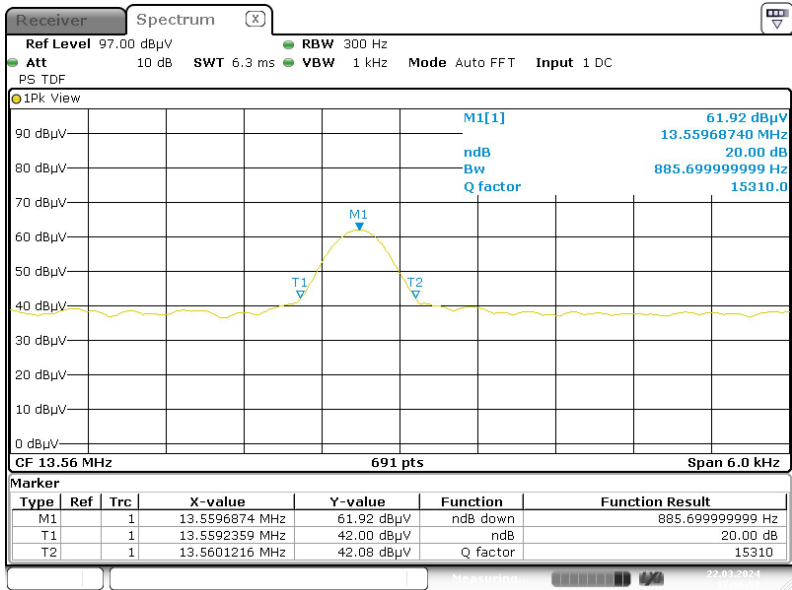
The testing was performed by Anson Su on 2024-03-22.

Test Mode: Transmitting

Test Result: Pass

Test Frequency (MHz)	20dB Bandwidth (Hz)
13.56	885.7

20 dB Emission Bandwidth



ProjectNo.:SZ1240219-08392E-RF Tester:Anson Su
Date: 22.MAR.2024 17:56:53

EUT PHOTOGRAPHS

Please refer to the attachment SZ1240219-08392E-RF External photo and SZ1240219-08392E-RF Internal photo.

TEST SETUP PHOTOGRAPHS

Please refer to the attachment SZ1240219-08392E-RF Test Setup photo.

******* END OF REPORT *******