TEST REPORT

Applicant Name :	Inrico Technologies Co.,Ltd
Address :	A1703, Shenzhen National Engineering Laboratory Building, No. 20 Gaoxin South 7th Road, Shenzhen, China
Report Number :	2504S23848E-RF-00G
FCC ID:	2AIV6-BC680

Test Standard (s)

FCC PART 15.225

Sample Description

Product Type:	4G LTE Smart Terminal
Model No.:	BC680
Trade Mark:	Inrico®
Date Received:	2025-04-09
Date of Test:	2025-05-23 to 2025-06-19
Report Date:	2025-07-30

Test Result:	The EUT complied with the standards above.

Prepared and Checked By:

Matt Liang
EMC Engineer

Approved By:

Bob Liao
EMC Engineer

TABLE OF CONTENTS

DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
Rev.00	2504S23848E-RF-00G	Original Report	2025-07-30

GENERALINFORMATION

Product Description for Equipment under Test (EUT)

Product	4G LTE Smart Terminal
Tested Model	BC680
Voltage Range#	AC 100V-240V 50/60Hz for adapter DC 5.0V from USB Type-C port DC 4.35V from desktop charger DC 3.8V from rechargeable battery
Adapter Information#	Model: HJ-0502000W2-US Input: 100-240 V~ 50/60Hz 0.3A Output: 5.0V ⎓2.0A 10.0W
Desktop Charger Information#	Model: CI-80E Input: 5V ⎓2000mA Output: 4.35V ⎓1000mA

Frequency Range	NFC: 13.56 MHz
Modulation Technique	ASK
Antenna Specification#	Loop Antenna
Sample Serial Number	315P-6 (For CE&RSE Test) (Assigned by ATC, Shenzhen)
Sample/EUT Status	Good condition

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 C63.10-2020, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

Unless otherwise stated there are no any additions to, deviations, or exclusions from the method.

Test Facility

The test site used by Shenzhen Accurate Technology Co., Ltd. to collect test data is located on the Floor 1, KuMaKe Building, Dongzhou Community, Guangming Street, Guangming District, Shenzhen, Guangdong, China.

Accredited by American Association for Laboratory Accreditation (A2LA).The Certificate Number is 4297.01.

Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		5%
RF Frequency		$0.064*10^{-7}$
RF output power, conducted		0.3 dB
Unwanted Emission, conducted		1.2 dB
AC Power Lines Conducted Emissions		2.7 dB
Emissions, Radiated	9kHz - 30MHz	2.1 dB
	30MHz - 1GHz	4.3 dB
Temperature		1℃
Humidity		7%
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.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

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

Note: The device has two charging methods: one is through the adapter, and the other is through the desktop charger. When using the NFC function, charging through the desktop charger is not possible. This report only tests the power supply using the adapter.

EUT Exercise Software

No Exercise Software was used.

Special Accessories

No special accessory.

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Unknown	Magnetic card	Unknown	Unknown

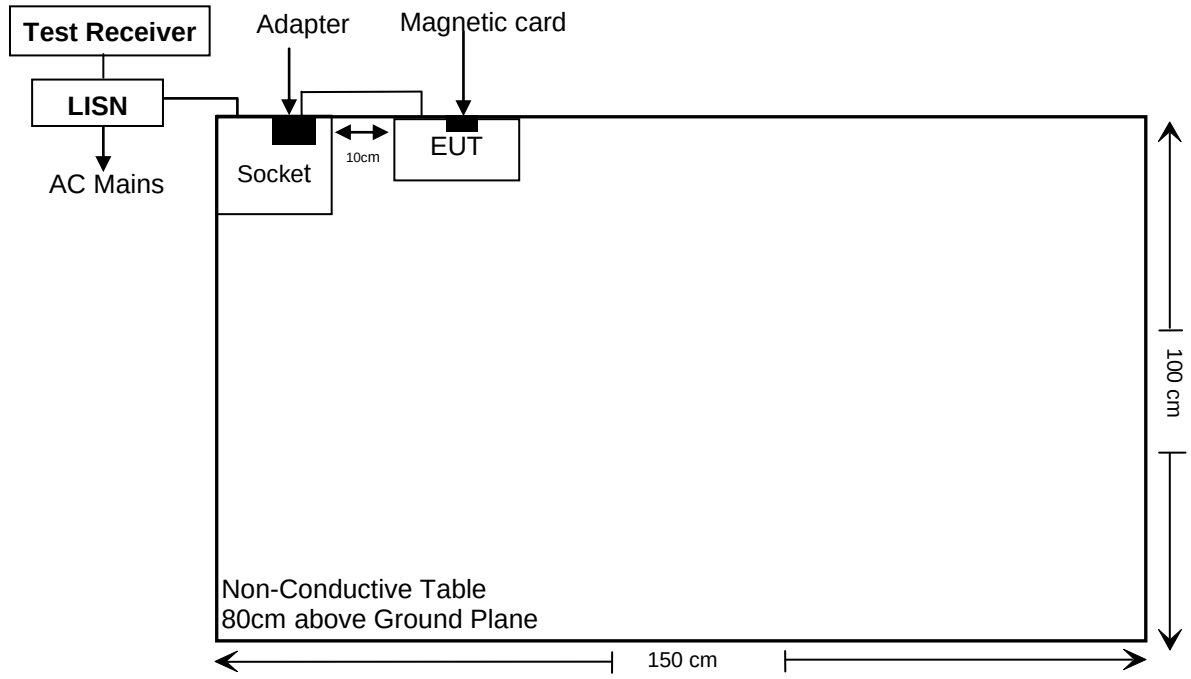
External I/O Cable

Cable Description	Shielding Type	Length (m)	From Port	To
USB Cable	NO	1.18	Adapter	EUT

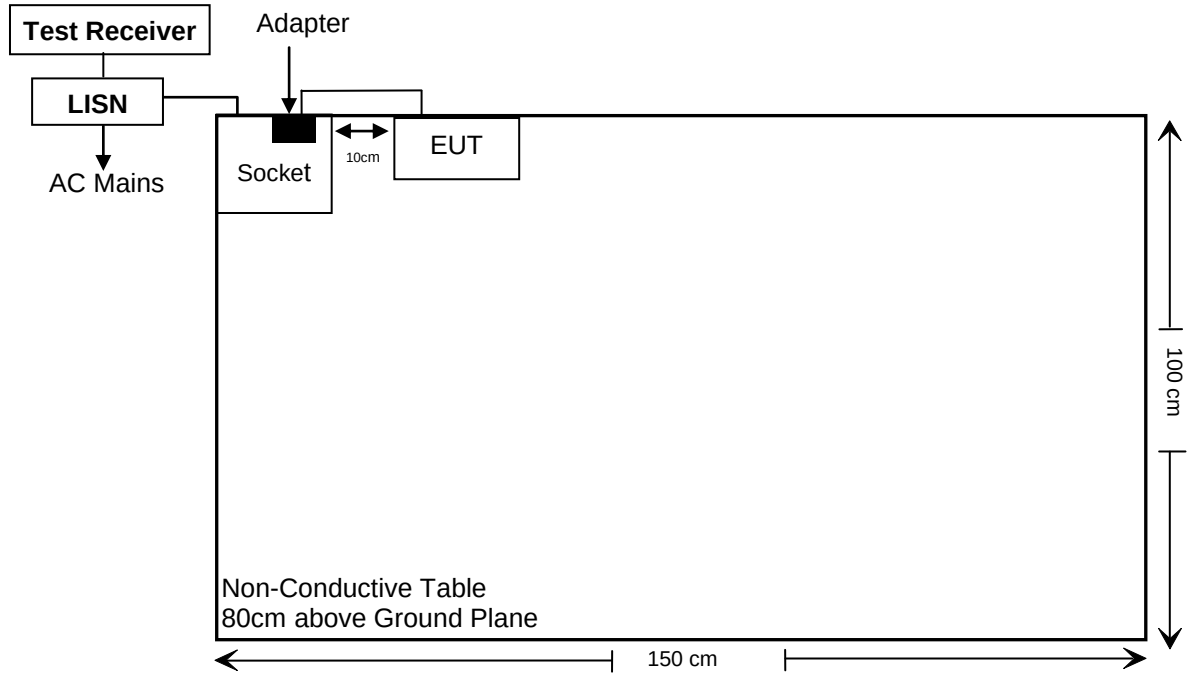
Block Diagram of Test Setup

For Conducted Emission:

With Magnetic card

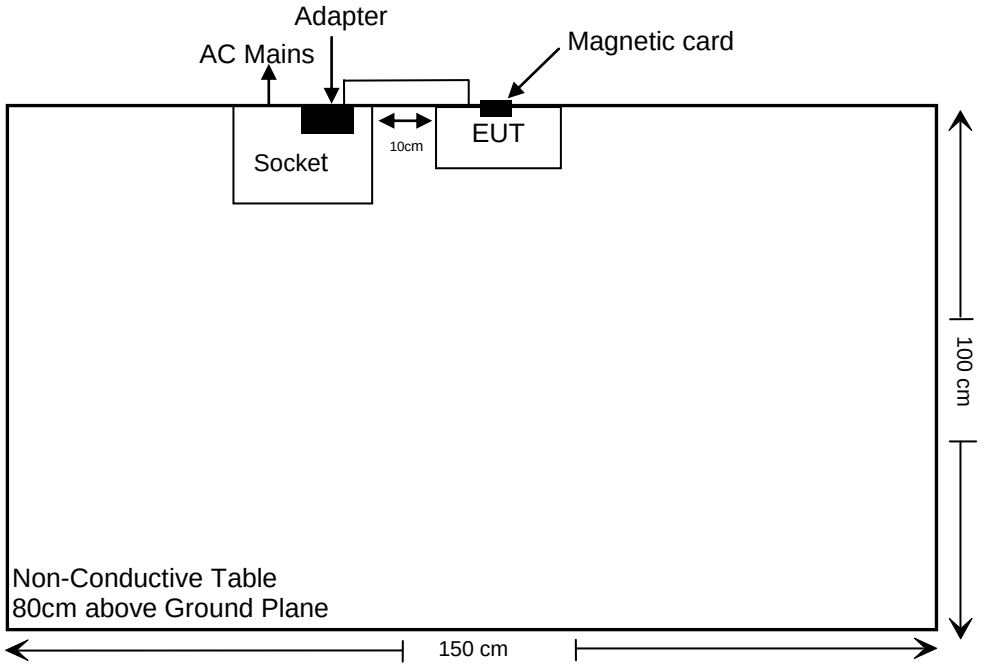


Without Magnetic card

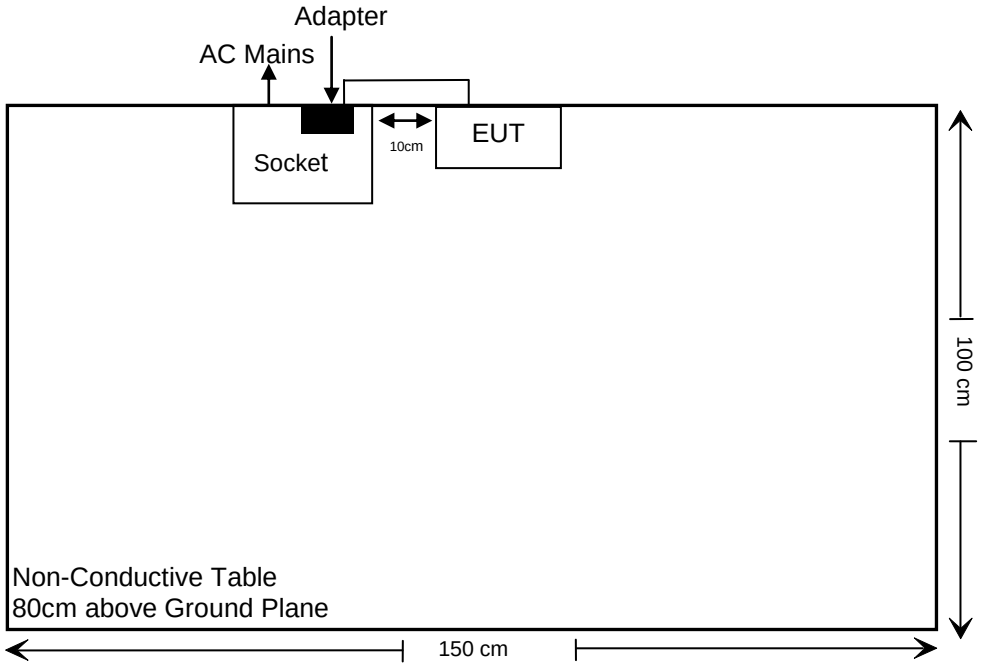


For Radiated Emission Below 1GHz:

With Magnetic card



Without Magnetic card



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§2.1093	RF Exposure	Compliance
§15.203	Antenna Requirement	Compliance
§15.207	AC Line Conducted Emission	Compliance
§15.225 §15.209§15.205	Radiated Emission Test	Compliance
§15.225(e)	Frequency Stability	Compliance
§15.215(c)	20dB Emission Bandwidth	Compliance

Note: For Radiated Spurious Emissions, after pre-scan in the X, Y and Z axes of orientation, the worst case as setup photos was recorded.

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted Emissions Test					
Rohde & Schwarz	EMI Test Receiver	ESCI	100784	2024/11/08	2025/11/07
Rohde & Schwarz	L.I.S.N.	ENV216	101314	2024/11/08	2025/11/07
Anritsu Corp	50 Coaxial Switch	MP59B	6100237248	2024/10/08	2025/10/07
Rohde & Schwarz	Pulse Limiter	ESH3-Z2	100312	2024/10/08	2025/10/07
Unknown	RF Coaxial Cable	No.17	N0350	2024/10/08	2025/10/07
Test Software: e3 191218 (V9)					
Radiated Spurious Emission Test(Below 1GHz)/ 20dB Emission Bandwidth					
Rohde& Schwarz	Test Receiver	ESR	102725	2024/11/08	2025/11/07
SONOMA INSTRUMENT	Amplifier	310 N	186131	2025/03/26	2026/03/25
Unknown	RF Coaxial Cable	No.12	N040	2024/10/08	2025/10/07
Unknown	RF Coaxial Cable	No.13	N300	2024/10/08	2025/10/07
Unknown	RF Coaxial Cable	No.14	N800	2024/10/08	2025/10/07
BACL	LOOP ANTENNA	1313-1A	3110711	2024/01/16	2027/01/15
Schwarzbeck	Bilog Antenna	VULB9163	9163-323	2024/08/08	2027/08/07
Unknown	RF Coaxial Cable	No.16	N200	2024/10/08	2025/10/07
Agilent	Signal Generator	N5183A	MY47420360	2024/09/02	2025/09/01
Rohde & Schwarz	Vector Signal Generator	SMBV100A	260434	2024/10/08	2025/10/07
Test Software:e3 191218 (V9)					
Frequency Stability					
Rohde & Schwarz	Spectrum Analyzer	FSV-40	101948	2024/10/08	2025/10/07
UNI-T	DC Power Supply	UTP1306S	2109D0903324	2025/03/26	2026/03/25
BACL	Temp. & Humid. Chamber	BTH-150-40	30192	2024/10/08	2025/10/07
BACL	LOOP ANTENNA	1313-1A	3110711	2024/01/16	2027/01/15

*** Statement of Traceability:** Shenzhen Accurate Technology Co., Ltd. attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

RF EXPOSURE

Applicable Standard

According to KDB447498 D01 General RF Exposure Guidance v06: 4.3. General SAR test exclusion guidance

c) For frequencies below 100 MHz, the following may be considered for SAR test exclusion (also illustrated in Appendix C):
1) For test separation distances > 50 mm and < 200 mm, the power threshold at the corresponding test separation distance at 100 MHz in step b) is multiplied by [1 + log(100/f(MHz))]
2) For test separation distances ≤ 50 mm, the power threshold determined by the equation in c) 1) for 50 mm and 100 MHz is multiplied by ½.
3) SAR measurement procedures are not established below 100 MHz.

Measurement Result

For NFC, the power of EUT: E Field@3m is 67.21dBuV/m = -27.99dBm (0.002mW)
Note: E[dBμV/m] = EIRP[dBm] + 95.2 for d = 3 m.

SAR test exclusion threshold for NFC(13.56MHz) separation distance < 50mm

= [474*(1 + log(100/f(MHz)))]/2

= 443mW

>0.002mW

Result: Compliance.

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 one internal antenna arrangement for NFC, which was permanently attached, fulfill the requirement of this section. Please refer to the EUT photos.

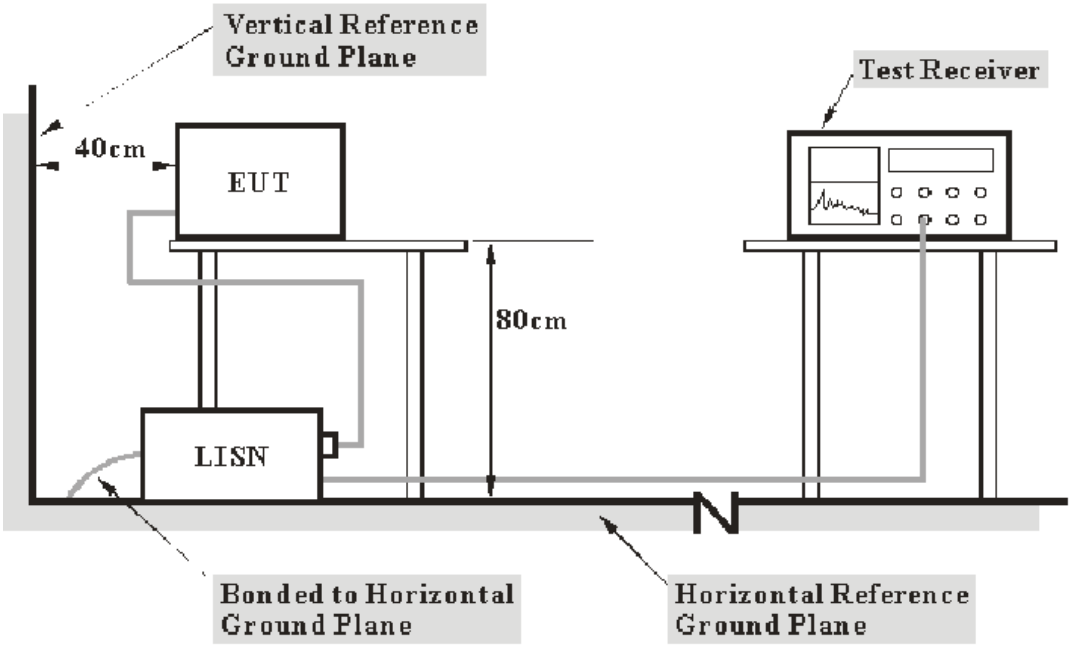
Result: Compliance.

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 C63.10-2020 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
150kHz – 30MHz	9 kHz

Test Procedure

During the conducted emission test, the adapter of Host was connected to the outlet of the LISN.

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.

Calculation

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

Factor = LISN VDF + Cable Loss + 10dB Attenuation(Limiter)

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:

Over Limit = Level - Limit
Level = Read Level + Factor

Test Data

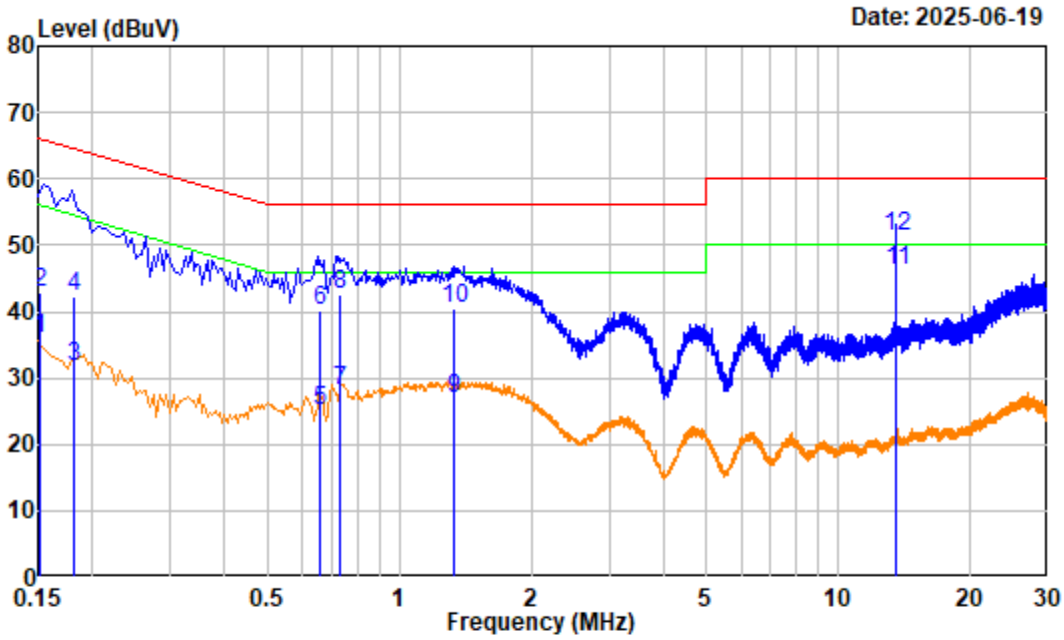
Environmental Conditions

Temperature:	24.5 to 24.9 ℃
Relative Humidity:	43 to 46 %
ATM Pressure:	101.3 kPa
Test Engineer:	Jason Fan
Test Date:	2025-06-17 to 2025-06-19
EUT Operation Mode:	NFC Transmitting

Test Result: Compliance, please refer to the below data.

With Magnetic Card

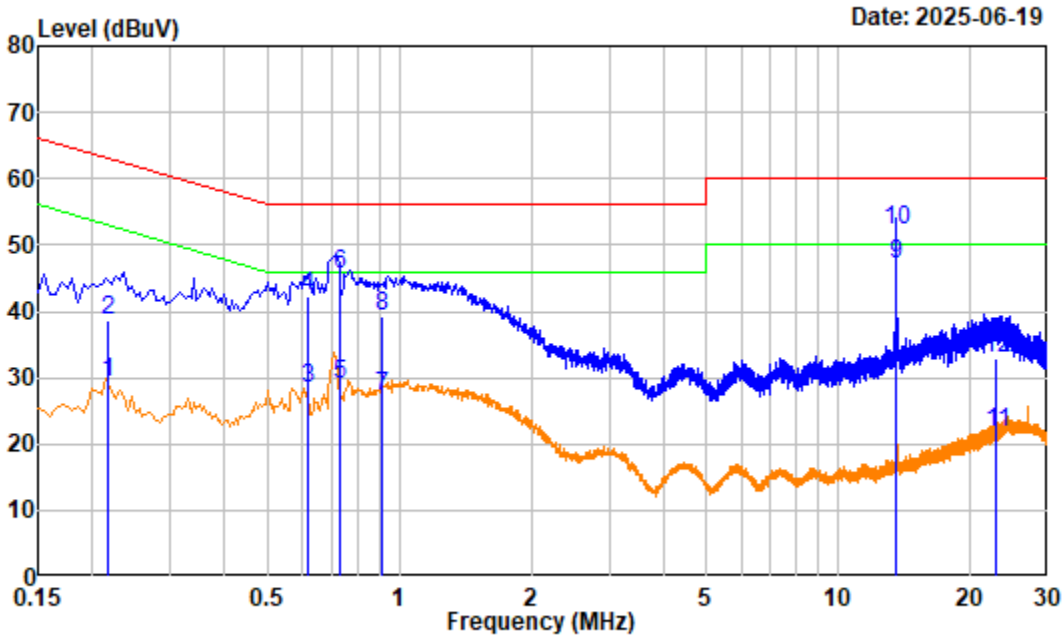
AC 120V/60Hz, Line:



Site : Shielding Room
Condition : Line
Project No. : 2504S23848E-RF Tester:Jason Fan
Test Mode : NFC With Card
Note : Adapter
Receiver Setting: IF B/W 9kHz PK/AV

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.151	20.13	15.64	35.77	55.94	-20.17	Average
2	0.151	20.13	22.72	42.85	65.94	-23.09	QP
3	0.181	20.25	11.55	31.80	54.45	-22.65	Average
4	0.181	20.25	22.05	42.30	64.45	-22.15	QP
5	0.658	20.44	4.66	25.10	46.00	-20.90	Average
6	0.658	20.44	19.57	40.01	56.00	-15.99	QP
7	0.730	20.53	7.53	28.06	46.00	-17.94	Average
8	0.730	20.53	21.98	42.51	56.00	-13.49	QP
9	1.335	20.71	6.12	26.83	46.00	-19.17	Average
10	1.335	20.71	19.81	40.52	56.00	-15.48	QP
11	13.559	19.82	26.26	46.08	50.00	-3.92	Average
12	13.559	19.82	31.50	51.32	60.00	-8.68	QP

AC 120V/60Hz, Neutral:

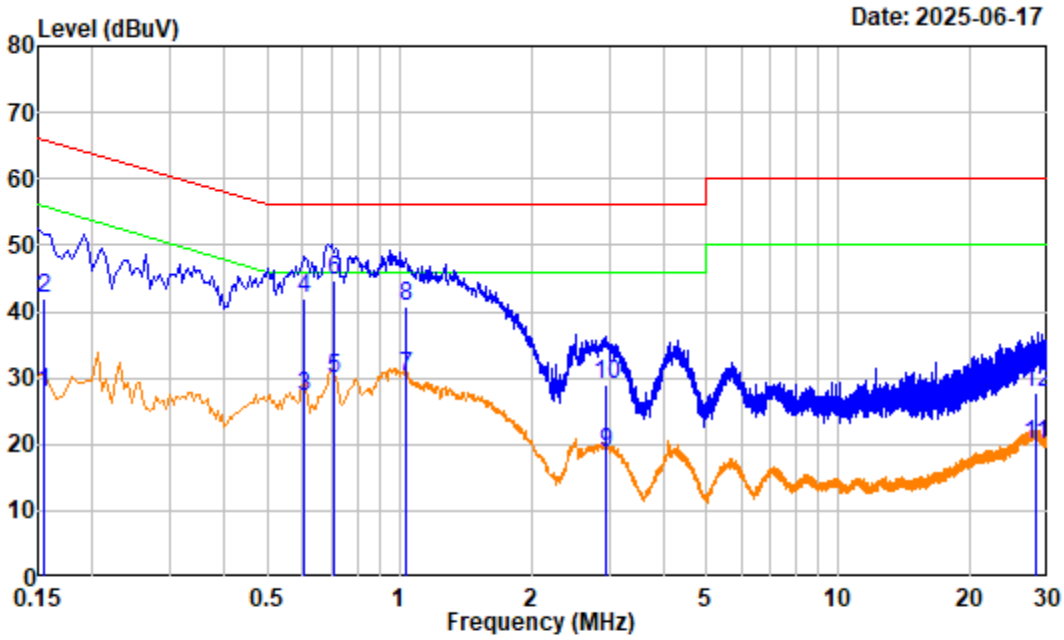


Site : Shielding Room
Condition : neutral
Project No. : 2504S23848E-RF Tester:Jason Fan
Test Mode : NFC With Card
Note : Adapter
Receiver Setting: IF B/W 9kHz PK/AV

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.216	19.78	9.42	29.20	52.98	-23.78	Average
2	0.216	19.78	18.94	38.72	62.98	-24.26	QP
3	0.621	20.60	7.81	28.41	46.00	-17.59	Average
4	0.621	20.60	21.58	42.18	56.00	-13.82	QP
5	0.732	20.71	8.29	29.00	46.00	-17.00	Average
6	0.732	20.71	24.75	45.46	56.00	-10.54	QP
7	0.913	20.71	6.54	27.25	46.00	-18.75	Average
8	0.913	20.71	18.67	39.38	56.00	-16.62	QP
9	13.560	20.04	27.11	47.15	50.00	-2.85	Average
10	13.560	20.04	32.16	52.20	60.00	-7.80	QP
11	22.890	20.38	1.34	21.72	50.00	-28.28	Average
12	22.890	20.38	12.52	32.90	60.00	-27.10	QP

Without Magnetic Card

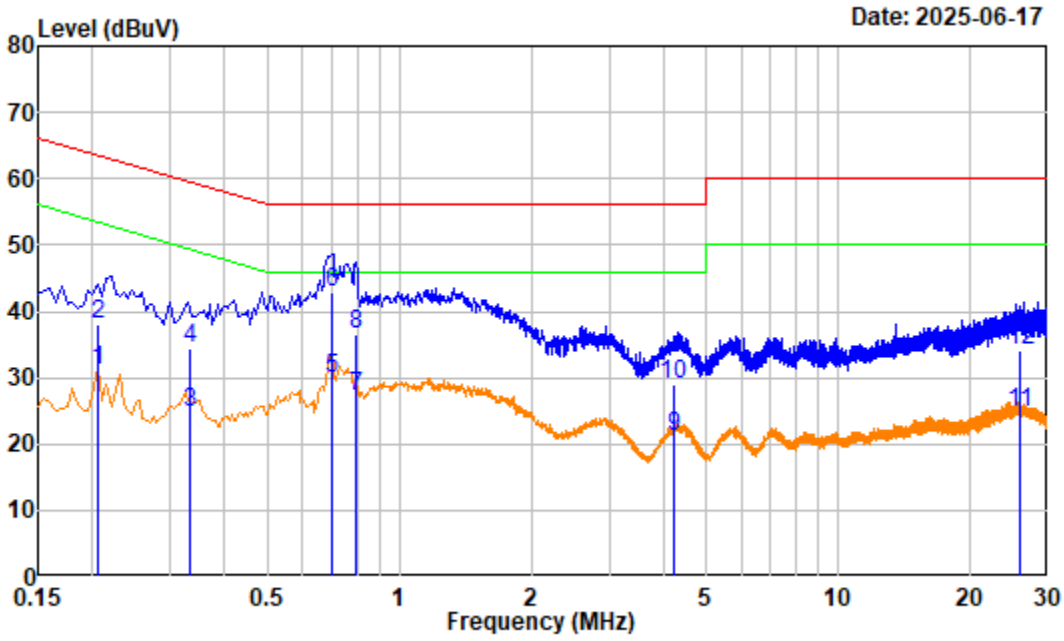
AC 120V/60Hz, Line:



Site : Shielding Room
Condition : Line
Project No. : 2504S23848E-RF Tester:Jason Fan
Test Mode : NFC Without Card
Note : Adapter
Receiver Setting: IF B/W 9kHz PK/AV

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.155	20.14	7.74	27.88	55.74	-27.86	Average
2	0.155	20.14	21.95	42.09	65.74	-23.65	QP
3	0.608	20.34	6.98	27.32	46.00	-18.68	Average
4	0.608	20.34	21.70	42.04	56.00	-13.96	QP
5	0.708	20.52	9.23	29.75	46.00	-16.25	Average
6	0.708	20.52	24.26	44.78	56.00	-11.22	QP
7	1.031	20.71	9.36	30.07	46.00	-15.93	Average
8	1.031	20.71	20.18	40.89	56.00	-15.11	QP
9	2.945	20.71	-2.13	18.58	46.00	-27.42	Average
10	2.945	20.71	8.26	28.97	56.00	-27.03	QP
11	28.139	19.91	0.05	19.96	50.00	-30.04	Average
12	28.139	19.91	7.95	27.86	60.00	-32.14	QP

AC 120V/60Hz, Neutral:



Site : Shielding Room
Condition : neutral
Project No. : 2504S23848E-RF Tester:Jason Fan
Test Mode : NFC Without Card
Note : Adapter
Receiver Setting: IF B/W 9kHz PK/AV

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.206	19.74	11.24	30.98	53.37	-22.39	Average
2	0.206	19.74	18.17	37.91	63.37	-25.46	QP
3	0.332	20.11	4.69	24.80	49.39	-24.59	Average
4	0.332	20.11	14.24	34.35	59.39	-25.04	QP
5	0.700	20.71	9.30	30.01	46.00	-15.99	Average
6	0.700	20.71	22.20	42.91	56.00	-13.09	QP
7	0.794	20.71	6.42	27.13	46.00	-18.87	Average
8	0.794	20.71	15.77	36.48	56.00	-19.52	QP
9	4.199	20.56	0.46	21.02	46.00	-24.98	Average
10	4.199	20.56	8.57	29.13	56.00	-26.87	QP
11	25.940	20.31	4.48	24.79	50.00	-25.21	Average
12	25.940	20.31	13.75	34.06	60.00	-25.94	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.

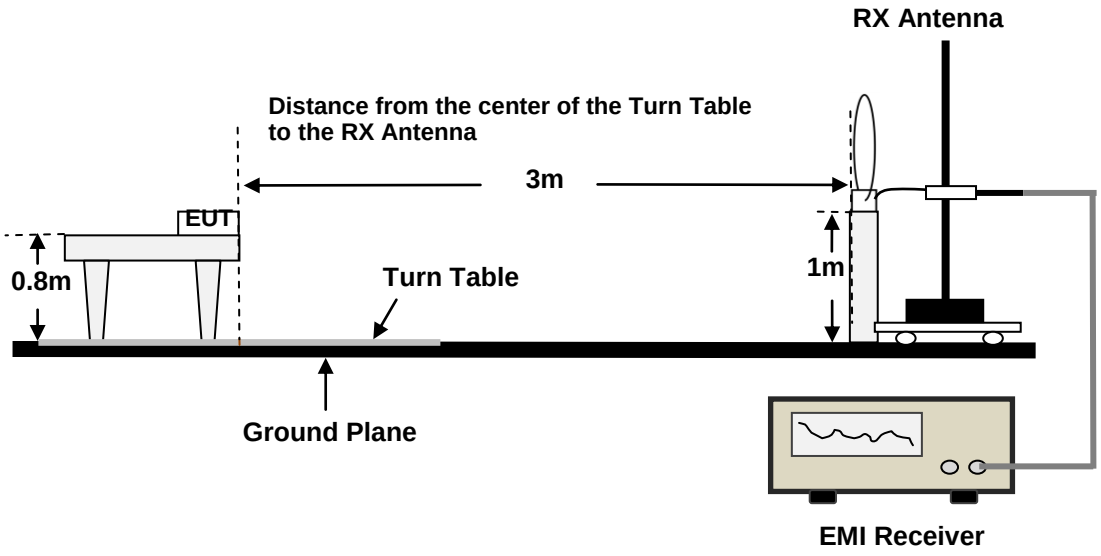
(b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

(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.

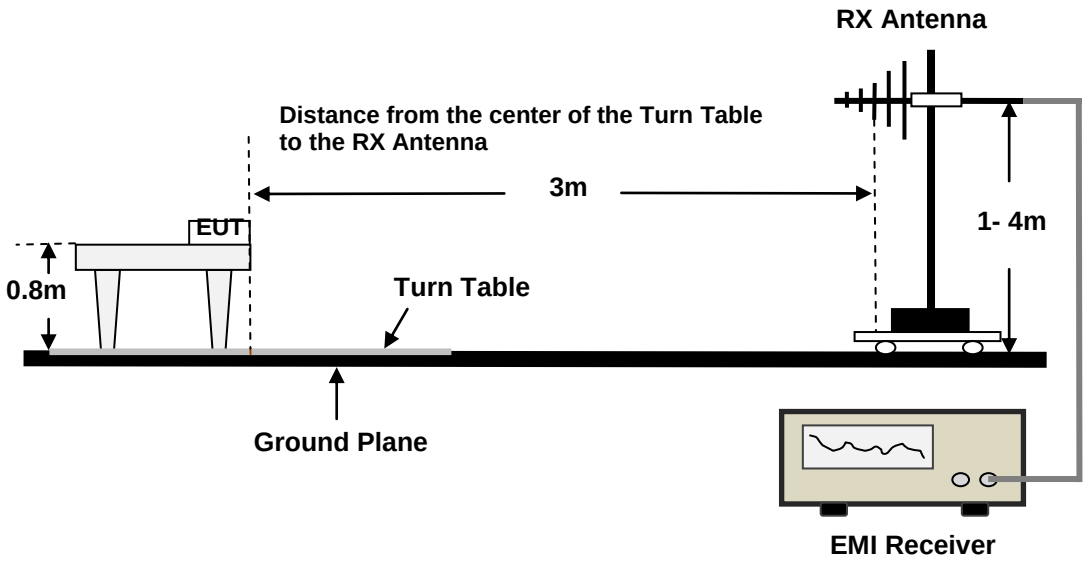
(d) The field strength of any emissions appearing outside of the 13.110–14.010 MHz band shall not exceed the general radiated emission limits in §15.209.

EUT Setup

9kHz - 30MHz:



30MHz - 1GHz:



The radiated emission tests were performed in the 3-meter chamber a test site, using the setup accordance with the ANSI C63.10-2020. The specification used was the FCC Part Subpart C limits.

EMI Test Receiver Setup

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

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

Frequency Range	Measurement	RBW	Video B/W	IF B/W	Detector
9kHz - 150kHz	PK	0.3kHz	1kHz	/	PK
	QP/AV	/	/	200Hz	QP/AV
150kHz - 30MHz	PK	10kHz	30kHz	/	PK
	QP/AV	/	/	9kHz	QP/AV
30MHz - 1000MHz	PK	100kHz	300kHz	/	PK
	QP	/	/	120kHz	QP

Calculation

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

Factor = Antenna Factor + Cable Loss - Amplifier Gain

The "**Over Limit/Margin**" 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:

Over Limit/Margin = Level / Corrected Amplitude – Limit
Level / Corrected Amplitude = Read Level + Factor

Test Data

9kHz-1GHz

Environmental Conditions

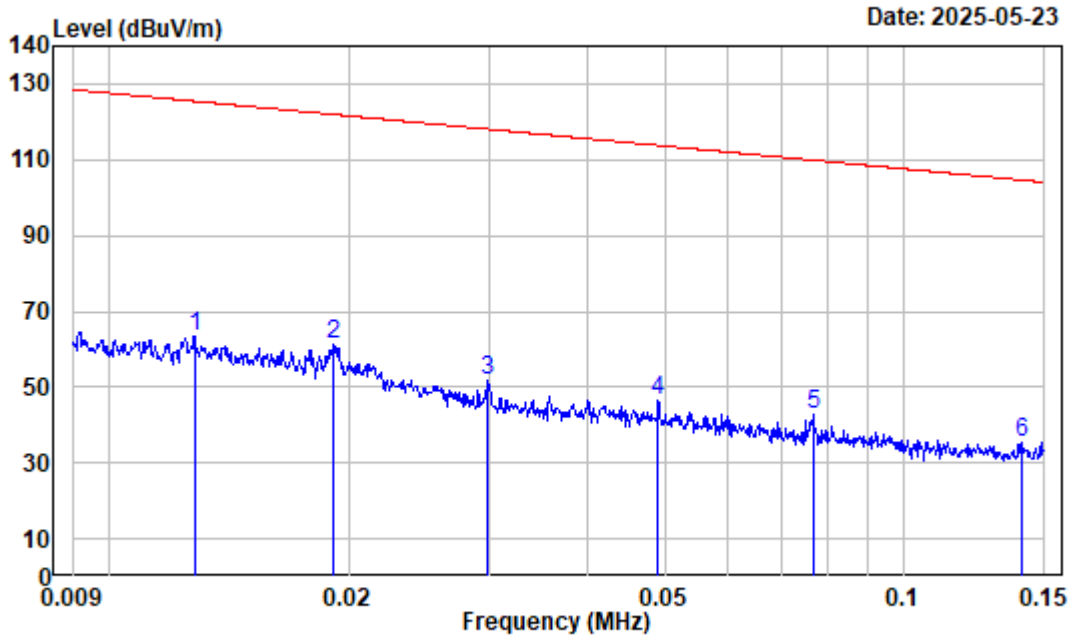
Temperature:	23.4 ℃
Relative Humidity:	55 %
ATM Pressure:	100.2 kPa
Test Engineer:	Roger Ling
Test Date:	2025-05-23
EUT Operation Mode:	NFC Transmitting

Test Result: Compliance, please refer to the below data.

Note: For 9kHz~30MHz, the Loop Antenna were tested in parallel, perpendicular, and ground-parallel. The worst orientation was parallel and the data was recorded in report.

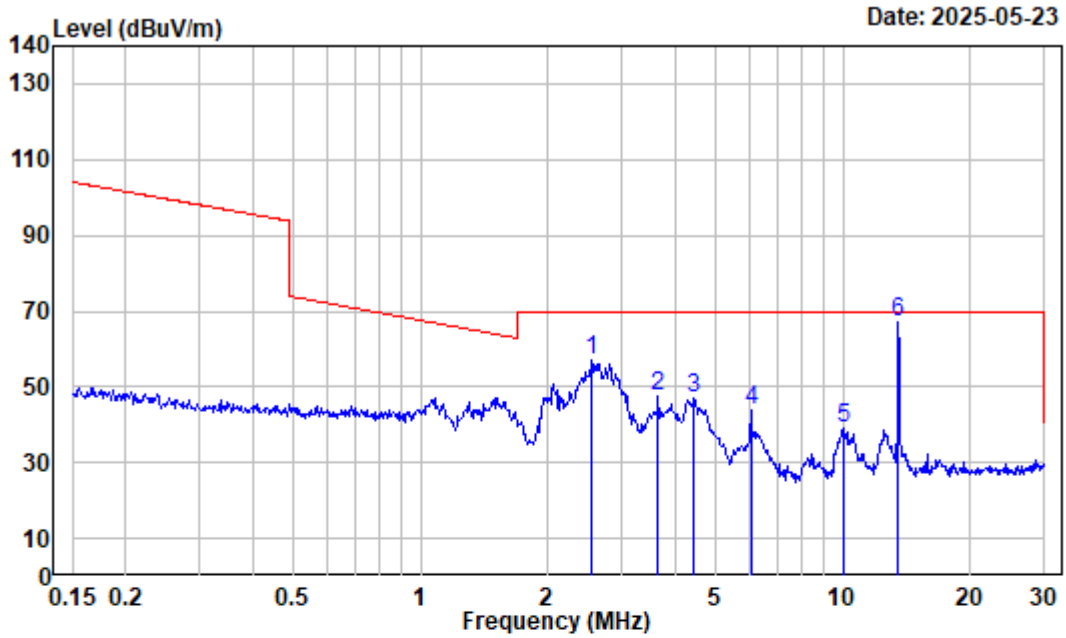
With Magnetic Card

9kHz~30MHz:



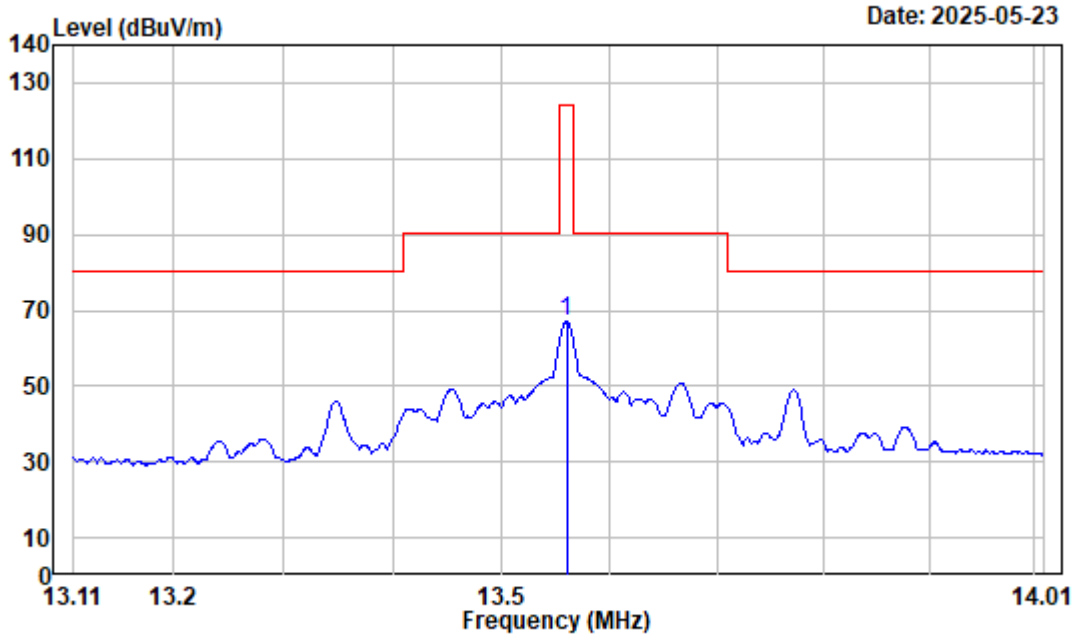
Site : Chamber
Condition : 3m
Project No. : 2504S23848E-RF
Polarization : Parallel Tester: Roger Ling
Test Mode : NFC Transmitting with card
Note : Adapter
Receiver Setting: RBW:300Hz VBW:1kHz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	0.013	34.57	29.06	63.63	125.44	-61.81	Peak
2	0.019	31.77	29.59	61.36	121.97	-60.61	Peak
3	0.030	26.98	24.60	51.58	118.09	-66.51	Peak
4	0.049	23.05	23.68	46.73	113.81	-67.08	Peak
5	0.077	19.01	23.99	43.00	109.90	-66.90	Peak
6	0.141	14.58	20.87	35.45	104.64	-69.19	Peak



Site : Chamber
Condition : 3m
Project No. : 2504S23848E-RF
Polarization : Parallel Tester: Roger Ling
Test Mode : NFC Transmitting with card
Note : Adapter
Receiver Setting: RBW:10kHz VBW:30kHz

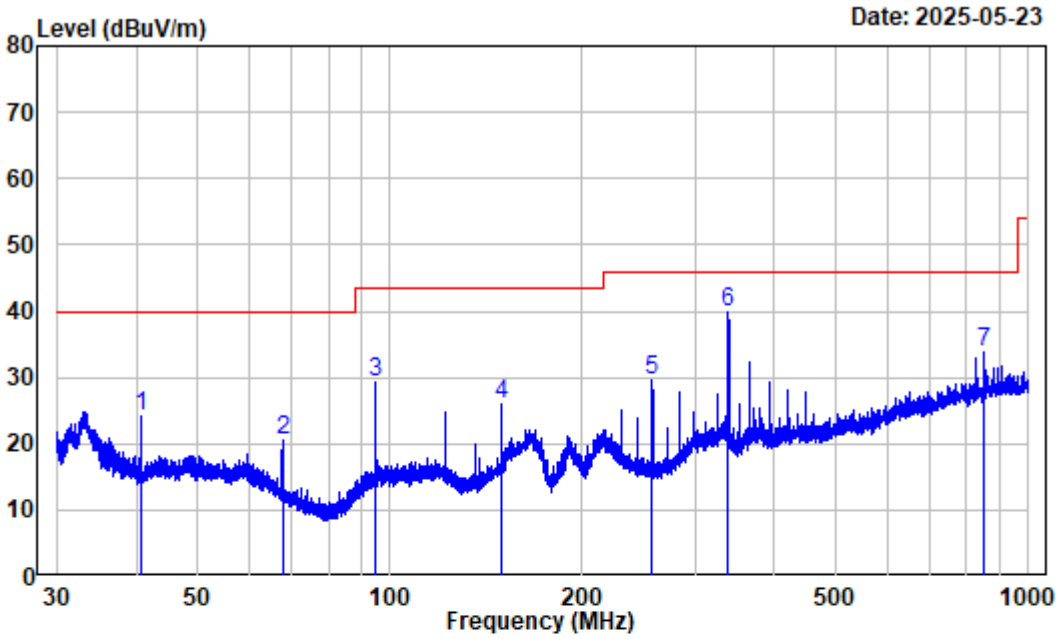
	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	2.554	-5.68	62.82	57.14	69.54	-12.40	Peak
2	3.642	-6.17	53.90	47.73	69.54	-21.81	Peak
3	4.454	-6.31	53.19	46.88	69.54	-22.66	Peak
4	6.056	-6.24	49.88	43.64	69.54	-25.90	Peak
5	10.019	-5.42	44.64	39.22	69.54	-30.32	Peak
6	13.551	-4.49	71.70	67.21	69.54	-2.33	Peak



Site : Chamber
Condition : 3m
Project No. : 2504S23848E-RF
Polarization : Parallel Tester: Roger Ling
Test Mode : NFC Transmitting with Card
Note : Adapter
Receiver Setting: RBW:10kHz VBW:30kHz

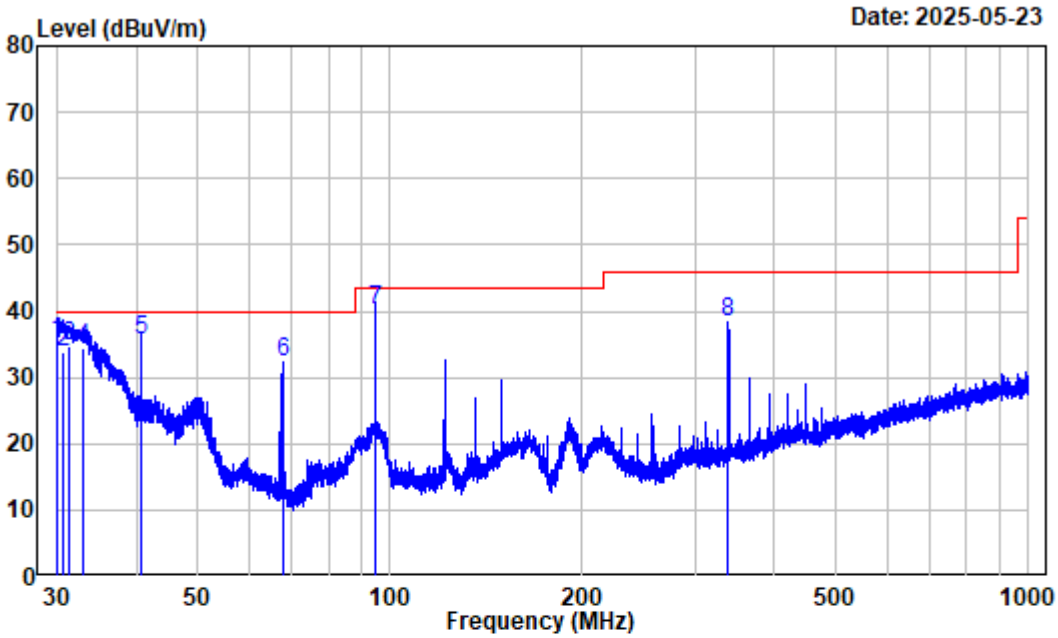
	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	13.560	-4.41	71.62	67.21	124.00	-56.79	Peak

30MHz~1GHz:



Site : Chamber
Condition : 3m HORIZONTAL
Project No. : 2504S23848E-RF Tester: Roger Ling
Test Mode : NFC Transmitting with card
Note : Adapter
Receiver Setting: RBW:100kHz VBW:300kHz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	40.648	-11.06	35.16	24.10	40.00	-15.90	Peak
2	67.764	-13.98	34.63	20.65	40.00	-19.35	Peak
3	94.885	-12.82	41.97	29.15	43.50	-14.35	Peak
4	149.159	-15.34	41.18	25.84	43.50	-17.66	Peak
5	257.648	-10.76	40.46	29.70	46.00	-16.30	Peak
6	338.994	-7.91	47.72	39.81	46.00	-6.19	Peak
7	854.399	0.24	33.53	33.77	46.00	-12.23	Peak

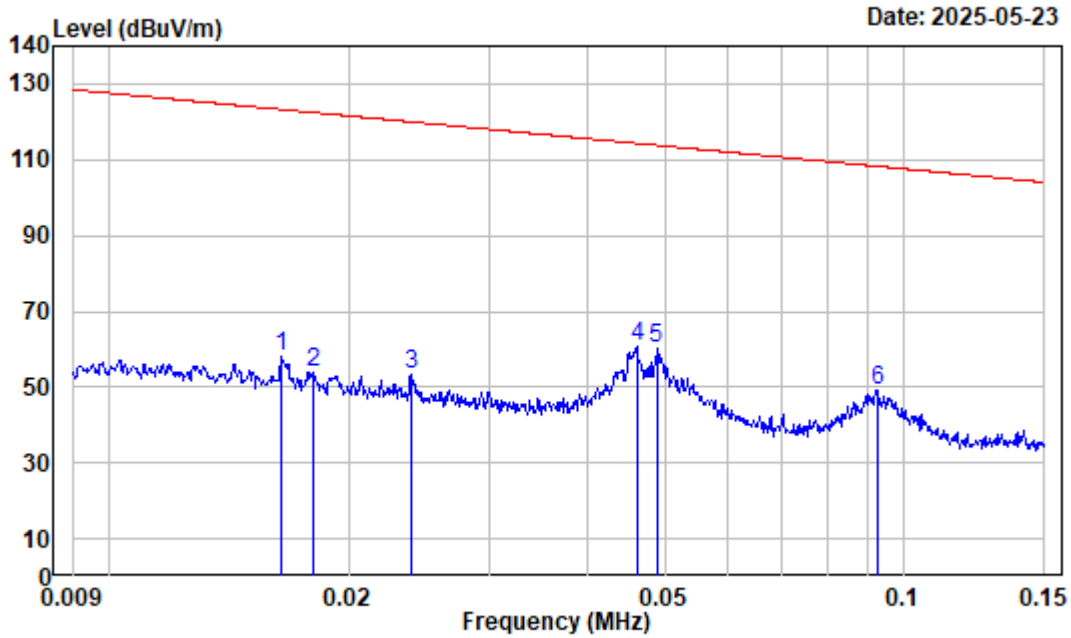


Site : Chamber
Condition : 3m VERTICAL
Project No. : 2504S23848E-RF Tester: Roger Ling
Test Mode : NFC Transmitting with card
Note : Adapter
Receiver Setting: RBW:100kHz VBW:300kHz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	30.092	-12.44	47.80	35.36	40.00	-4.64	QP
2	30.638	-12.54	46.50	33.96	40.00	-6.04	QP
3	31.413	-12.61	47.30	34.69	40.00	-5.31	QP
4	32.965	-12.60	47.00	34.40	40.00	-5.60	QP
5	40.666	-11.05	46.80	35.75	40.00	-4.25	QP
6	67.794	-13.99	46.36	32.37	40.00	-7.63	Peak
7	94.926	-12.81	53.09	40.28	43.50	-3.22	QP
8	338.994	-7.91	46.23	38.32	46.00	-7.68	Peak

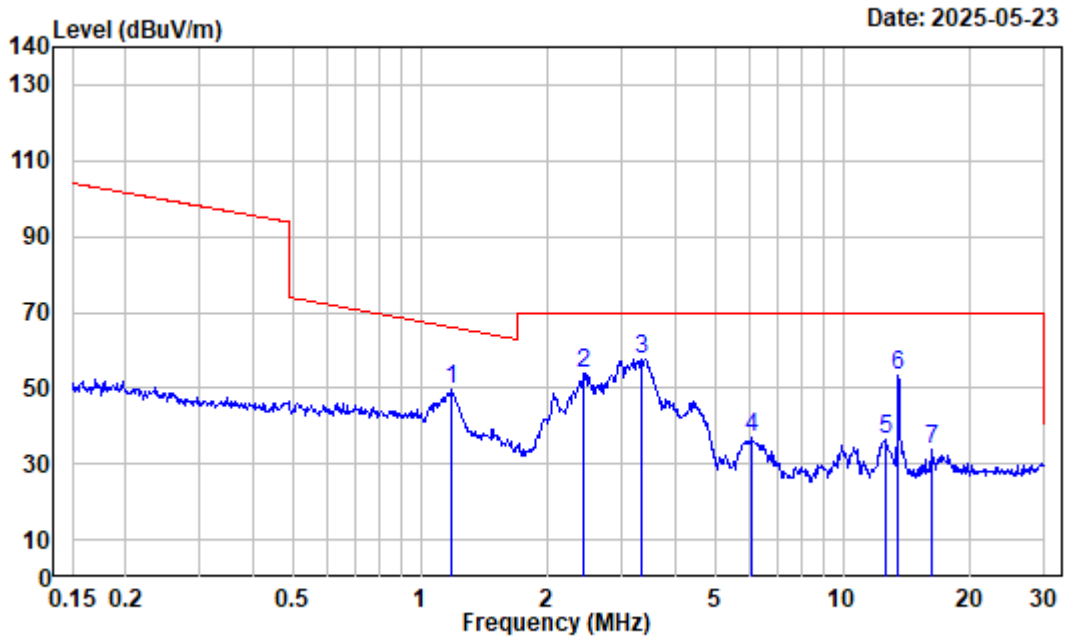
Without Magnetic Card

9kHz~30MHz:



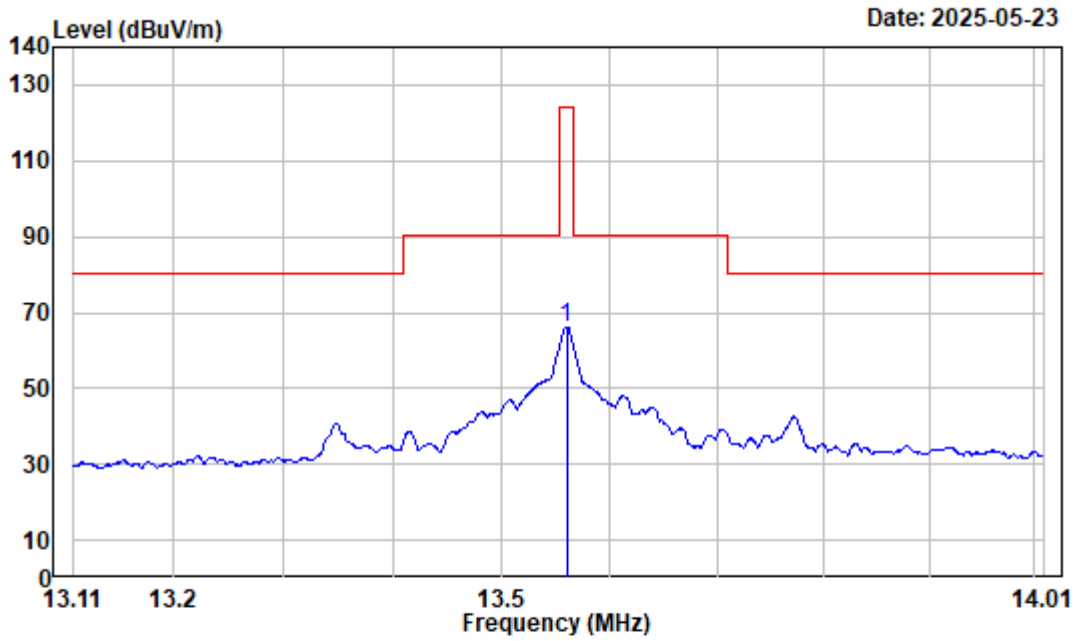
Site : Chamber
Condition : 3m
Project No. : 2504S23848E-RF
Polarization : Parallel Tester: Roger Ling
Test Mode : NFC Transmitting without card
Note : Adapter
Receiver Setting: RBW:300Hz VBW:1kHz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	0.016	32.96	25.31	58.27	123.27	-65.00	Peak
2	0.018	32.27	21.83	54.10	122.48	-68.38	Peak
3	0.024	29.63	23.78	53.41	120.02	-66.61	Peak
4	0.046	23.61	37.02	60.63	114.32	-53.69	Peak
5	0.049	23.05	37.09	60.14	113.83	-53.69	Peak
6	0.092	17.23	32.07	49.30	108.29	-58.99	Peak



Site : Chamber
Condition : 3m
Project No. : 2504S23848E-RF
Polarization : Parallel Tester: Roger Ling
Test Mode : NFC Transmitting without card
Note : Adapter
Receiver Setting: RBW:10kHz VBW:30kHz

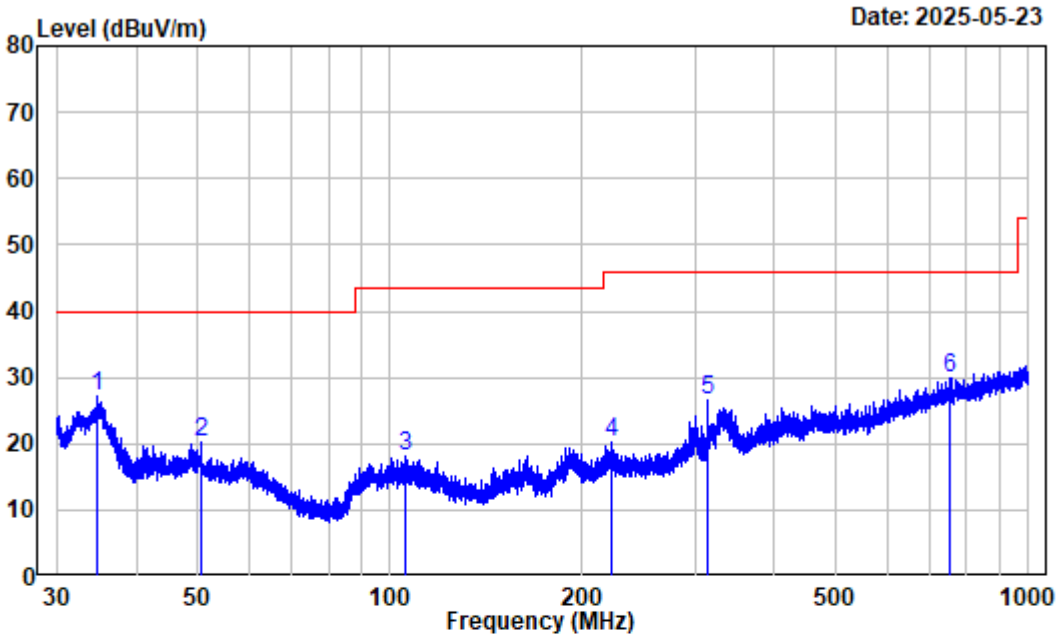
	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	1.178	-2.46	51.95	49.49	66.02	-16.53	Peak
2	2.435	-5.58	59.28	53.70	69.54	-15.84	Peak
3	3.346	-5.99	63.79	57.80	69.54	-11.74	Peak
4	6.056	-6.21	43.09	36.88	69.54	-32.66	Peak
5	12.582	-4.71	40.92	36.21	69.54	-33.33	Peak
6	13.551	-4.41	57.86	53.45	69.54	-16.09	Peak
7	16.226	-3.86	37.43	33.57	69.54	-35.97	Peak



Site : Chamber
Condition : 3m
Project No. : 2504S23848E-RF
Polarization : Parallel Tester: Roger Ling
Test Mode : NFC Transmitting without card
Note : Adapter
Receiver Setting: RBW:10kHz VBW:30kHz

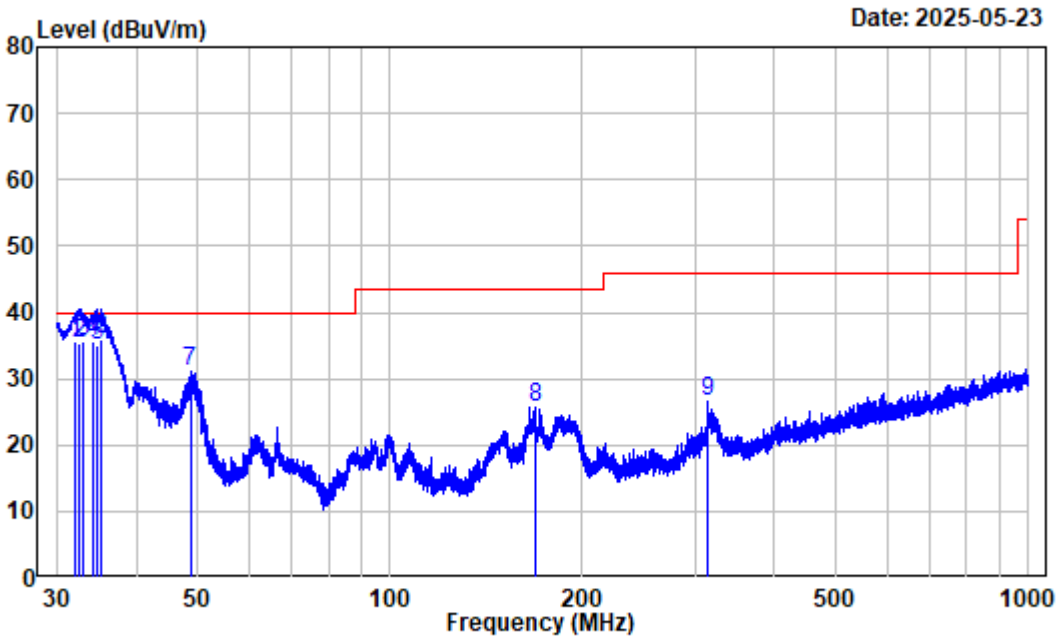
	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	13.560	-4.41	70.65	66.24	124.00	-57.76	Peak

30MHz~1GHz:



Site : Chamber
Condition : 3m HORIZONTAL
Project No. : 2504S23848E-RF Tester: Roger Ling
Test Mode : NFC Transmitting without card
Note : Adapter
Receiver Setting: RBW:100kHz VBW:300kHz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	34.760	-11.62	38.85	27.23	40.00	-12.77	Peak
2	50.453	-9.98	30.33	20.35	40.00	-19.65	Peak
3	105.549	-11.14	29.19	18.05	43.50	-25.45	Peak
4	221.878	-10.54	30.74	20.20	46.00	-25.80	Peak
5	314.928	-8.62	35.28	26.66	46.00	-19.34	Peak
6	754.725	0.06	29.79	29.85	46.00	-16.15	Peak



Site : Chamber
Condition : 3m VERTICAL
Project No. : 2504S23848E-RF Tester: Roger Ling
Test Mode : NFC Transmitting without card
Note : Adapter
Receiver Setting: RBW:100kHz VBW:300kHz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	32.095	-11.97	47.68	35.71	40.00	-4.29	QP
2	32.634	-11.97	47.30	35.33	40.00	-4.67	QP
3	33.139	-11.94	47.71	35.77	40.00	-4.23	QP
4	34.276	-11.72	47.37	35.65	40.00	-4.35	QP
5	34.654	-11.64	46.60	34.96	40.00	-5.04	QP
6	35.298	-11.54	47.50	35.96	40.00	-4.04	QP
7	48.608	-9.83	41.01	31.18	40.00	-8.82	Peak
8	169.228	-13.75	39.54	25.79	43.50	-17.71	Peak
9	314.928	-8.62	35.10	26.48	46.00	-19.52	Peak

FCC§15.225(e)-FREQUENCY STABILITY

Applicable Standard

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, 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

According to ANSI C63.10-2020 Section 6.8

Frequency stability with respect to ambient temperature

a) Supply the EUT with a nominal ac voltage or install a new or fully charged battery in the EUT. If possible, a dummy load shall be connected to the EUT because an antenna near the metallic walls of an environmental test chamber could affect the output frequency of the EUT. If the EUT is equipped with a permanently attached, adjustable-length antenna, then the EUT shall be placed in the center of the chamber with the antenna adjusted to the shortest length possible. Turn ON the EUT and tune it to one of the number of frequencies shown in 5.6.

b) Couple the unlicensed wireless device output to the measuring instrument by connecting an antenna to the measuring instrument with a suitable length of coaxial cable and placing the measuring antenna near the EUT (e.g., 15 cm away), or b connecting a dummy load to the measuring instrument, through an attenuator if necessary.

NOTE—An instrument that has an adequate level of accuracy as specified by the procuring or regulatory agency is the recommended measuring instrument.

c) Adjust the location of the measurement antenna and the controls on the measurement instrument to obtain a suitable signal level (i.e., a level that will not overload the measurement instrument but is strong enough to allow measurement of the operating or fundamental frequency of the EUT).

d) Turn the EUT OFF and place it inside the environmental temperature chamber. For devices that have oscillator heaters, energize only the heater circuit.

e) Set the temperature control on the chamber to the highest specified in the regulatory requirements for the type of device and allow the oscillator heater and the chamber temperature to stabilize.

f) While maintaining a constant temperature inside the environmental chamber, turn the EUT ON and record the operating frequency at startup, and at 2 minutes, 5 minutes, and 10 minutes after the EUT is energized. Four measurements in total are made.

g) Measure the frequency at each of frequencies specified in 5.6.

h) Switch OFF the EUT but do not switch OFF the oscillator heater.

i) Lower the chamber temperature by not more that 10 °C, and allow the temperature inside the chamber to stabilize.

j) Repeat step f) through step i) down to the lowest specified temperature.

Frequency stability when varying supply voltage

Unless otherwise specified, these tests shall be made at ambient room temperature (+15 °C to +25 °C). An antenna shall be connected to the antenna output terminals of the EUT if possible. If the EUT is equipped with or uses an adjustable-length antenna, then it shall be fully extended.

a) Supply the EUT with nominal voltage or install a new or fully charged battery in the EUT. Turn ON the EUT and couple its output to a frequency counter or other frequency-measuring instrument. NOTE—An instrument that has an adequate level of accuracy as specified by the procuring or regulatory agency is the recommended measuring instrument.

b) Tune the EUT to one of the number of frequencies required in 5.6. Adjust the location of the measurement antenna and the controls on the measurement instrument to obtain a suitable signal level (i.e., a level that will not overload the measurement instrument but is strong enough to allow measurement of the operating or fundamental frequency of the EUT).

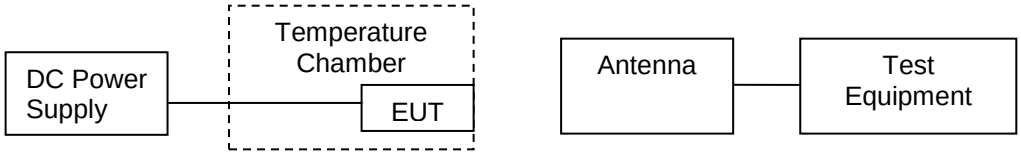
c) Measure the frequency at each of the frequencies specified in 5.6. d) Repeat the above procedure at 85% and 115% of the nominal supply voltage as described in 5.13.

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.

EUT Setup



Test Data

Environmental Conditions

Temperature:	23.4℃
Relative Humidity:	55 %
ATM Pressure:	100.2 kPa

The testing was performed by Roger Ling on 2025-05-23.

EUT operation mode: Transmitting(Radiated Measurement)

Test Result: Compliance. Please refer to the below data.

With Magnetic card

Test Item	Temperature# (℃)	Voltage# (V_{DC})	Measured frequency (MHz)	Frequency Error (%)	Limit (%)
Frequency Stability vs. Temperature	-20	3.8	13.560986	0.0073	0.01
	-10		13.561002	0.0074	0.01
	0		13.560856	0.0063	0.01
	10		13.560547	0.0040	0.01
	20		13.560668	0.0049	0.01
	25		13.560691	0.0051	0.01
	30		13.560702	0.0052	0.01
	40		13.560924	0.0068	0.01
	50		13.561016	0.0075	0.01
Frequency Stability vs. Voltage	20	3.4	13.561022	0.0075	0.01
	20	4.35	13.561054	0.0078	0.01

Without Magnetic card

Test Item	Temperature# (℃)	Voltage# (V_{DC})	Measured frequency (MHz)	Frequency Error (%)	Limit (%)
Frequency Stability vs. Temperature	-20	3.8	13.561008	0.0074	0.01
	-10		13.561024	0.0076	0.01
	0		13.560956	0.0071	0.01
	10		13.560675	0.0050	0.01
	20		13.560587	0.0043	0.01
	25		13.560556	0.0041	0.01
	30		13.560812	0.0060	0.01
	40		13.560955	0.0070	0.01
	50		13.561037	0.0076	0.01
Frequency Stability vs. Voltage	20	3.4	13.561049	0.0077	0.01
	20	4.35	13.561008	0.0074	0.01

Note: the extreme voltage was declared by the applicant.

FCC§15.215(c)-20DB EMISSION 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

According to ANSI C63.10-2020 Section 6.9.2

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the EMI receiver or spectrum analyzer shall be between two times and five times the OBW.

b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW, unless otherwise specified by the applicable requirement.

c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2 d) Steps a) through c) might require iteration to adjust within the specified tolerances.

e) The dynamic range of the instrument at the selected RBW shall be more than 10 dB below the target

“−xx dB down” requirement; that is, if the requirement calls for measuring the −20 dB OBW, the instrument noise floor at the selected RBW shall be at least 30 dB below the reference value.

f) Set detection mode to peak and trace mode to max hold.

g) Determine the reference value: Set the EUT to transmit an unmodulated carrier or modulated signal, as applicable. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).

h) Determine the “−xx dB down amplitude” using [(reference value) − xx]. Alternatively, this calculation may be made by using the marker-delta function of the instrument.

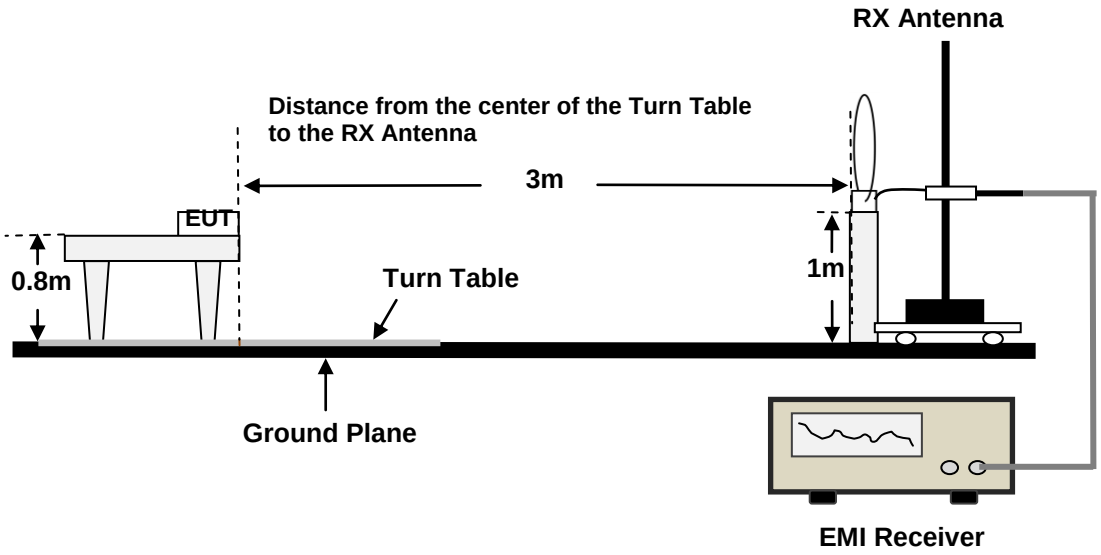
i) If the reference value is determined by an unmodulated carrier, then turn the EUT modulation ON, and either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise, the trace from step g) shall be used for step j).

j) Place two markers, one at the lowest frequency and the other at the highest frequency of the envelope of the spectral display, such that each marker is at or slightly below the “−xx dB down amplitude” determined in step h). If a marker is below this “−xx dB down amplitude” value, then it shall be as close as possible to this value. The occupied bandwidth is the frequency difference between the two markers. Alternatively, set a marker at the lowest frequency of the envelope of the spectral display, such that the marker is at or slightly below the “−xx dB down amplitude” determined in step h). Reset the marker-delta function and move the marker to the other side of the emission until the delta marker amplitude is at the same level as the reference marker amplitude. The marker-delta frequency reading at this point is the specified emission bandwidth.

k) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

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

EUT Setup



Test Data

Environmental Conditions

Temperature:	23.4℃
Relative Humidity:	55 %
ATM Pressure:	100.2 kPa

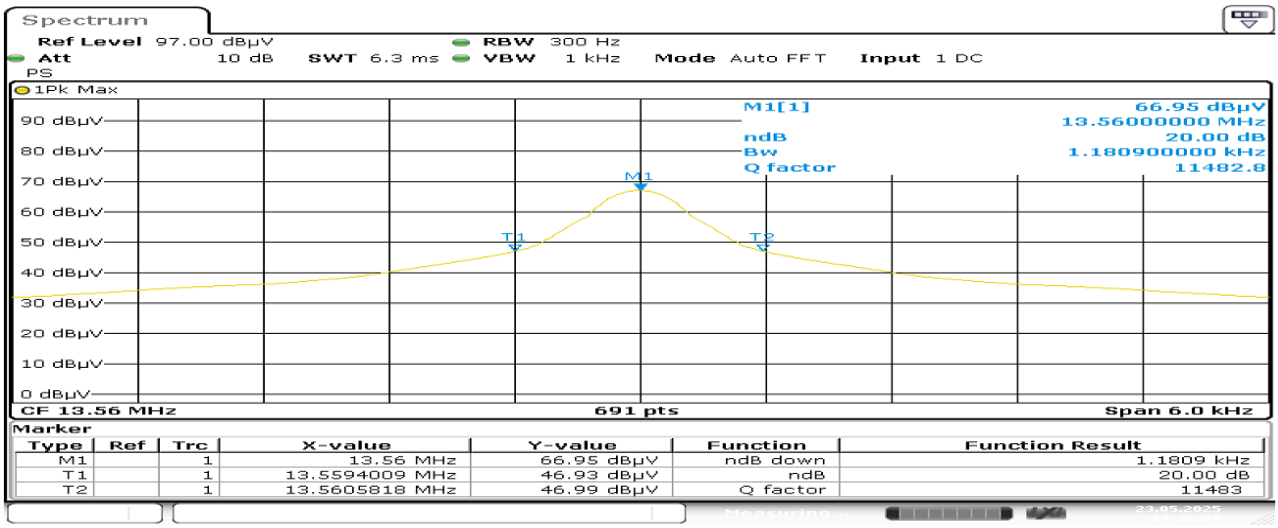
The testing was performed by Roger Ling on 2025-05-23.

EUT operation mode: Transmitting(Radiated Measurement)

Test Result: Compliance. Please refer to the below data.

With Magnetic card

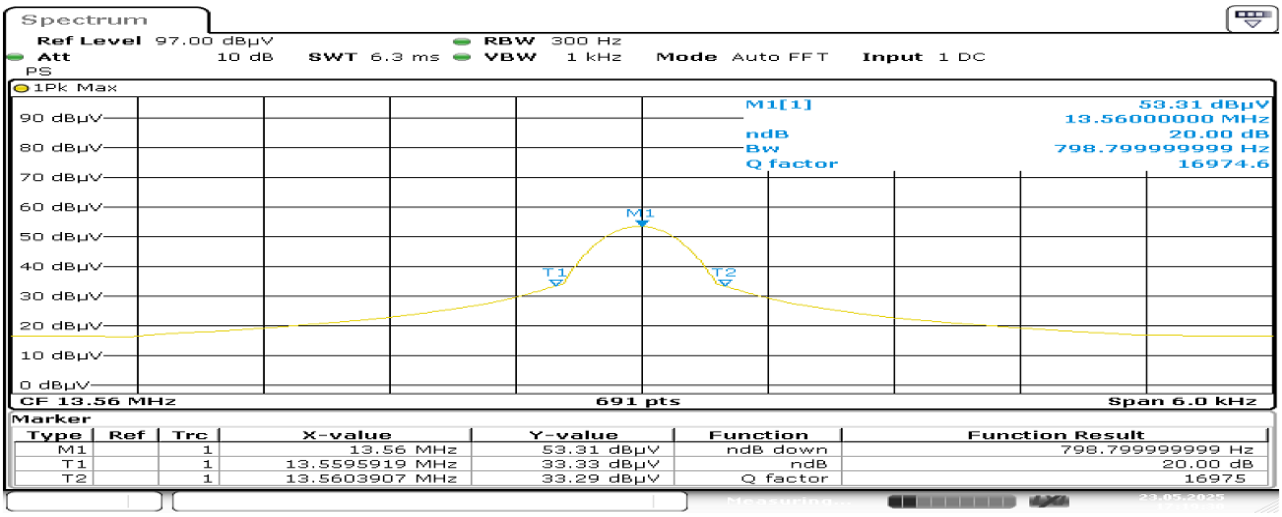
Frequency (MHz)	20 dB Bandwidth (kHz)
13.56	1.1809



ProjectNo.:2504S23848E-RF Tester:Roger Ling
Date: 23.MAY.2025 17:26:54

Without Magnetic card

Frequency (MHz)	20 dB Bandwidth (kHz)
13.56	0.7988



ProjectNo.:2504S23848E-RF Tester:Roger Ling
Date: 23.MAY.2025 17:19:30

EXHIBIT A-EUT PHOTOGRAPHS

Please refer to the Annex: 2504S23848E-RF EUT EXTERNAL PHOTOGRAPHS and 2504S23848E-RF EUT INTERNAL PHOTOGRAPHS.

EXHIBIT B-TEST SETUP PHOTOGRAPHS

Please refer to the Attachment: 2504S23848E-RF-00G TEST SETUP PHOTOGRAPHS.

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