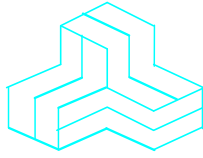


ENGINEERING TEST REPORT



IXM ROSTO FR2
Model: IXM081
FCC ID: S38-ROENXP

Applicant:

Invoxium Access Inc.
111 Gordon Baker Road, Suite 300
Toronto, Ontario
Canada M2H 3R1

In Accordance With

Federal Communications Commission (FCC)
Part 15, Subpart C
Unlicensed Low Power Transmitter Operating in the Band 13.110-14.010 MHz

UltraTech's File No.: 25INVX169_FCC15C225

This Test report is Issued under the Authority of
Tri M. Luu
Vice President of Engineering
UltraTech Group of Labs

Date: April 7, 2026

Report Prepared by: Dan Huynh

Tested by: Angus Au

Issued Date: April 7, 2026

Test Date(s):
September 17 - November 18, 2025

- *The results in this Test Report apply only to the sample(s) tested, and the sample tested is randomly selected.*
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UltraTech

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Website: www.ultratech-labs.com, Email: vic@ultratech-labs.com, Email: tri@ultratech-labs.com



Lab Code: 0685



APEC TEL CA0001



1309



CA 0001/2049



AT-1945



SL2-IN-E-1119R



Korea KCC-RRR
CA0001

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EXHIBIT 1. INTRODUCTION

1.1. SCOPE

Reference:	FCC Part 15, Subpart C, Sec. 15.225 - Operation within the band 13.110 - 14.010 MHz
Title:	Code of Federal Regulations (CFR), Title 47 Telecommunication, Part 15, Subpart C Intentional Radiators
Purpose of Test:	Equipment Certification for FCC Part 15C.
Test Procedures:	ANSI C63.4 and ANSI C63.10
Environmental Classification:	Commercial, industrial or business environment

1.2. RELATED SUBMITTAL(S)/GRANT(S)

None.

1.3. NORMATIVE REFERENCES

Publication	Year	Title
FCC 47 CFR 15	2025	Code of Federal Regulations (CFR), Title 47 – Telecommunication, Part 15 – Radio Frequency Devices
ANSI C63.4	2014	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 KHz to 40 GHz
ANSI C63.10	2020	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

EXHIBIT 2. PERFORMANCE ASSESSMENT

2.1. CLIENT INFORMATION

Applicant	
Name:	Invoxium Access Inc.
Address:	111 Gordon Baker Road, Suite 300 Toronto, Ontario Canada M2H 3R1

Manufacturer	
Name:	Mara Technologies Inc.
Address:	5680 14th Avenue Markham, Ontario Canada L3S 3K8

2.2. EQUIPMENT UNDER TEST (EUT) INFORMATION

The following information (with the exception of the Date of Receipt) has been supplied by the applicant.

Brand Name:	Invoxium Access Inc.
Product Name:	IXM ROSTO FR2
Model Name or Number:	IXM081
Serial Number:	Test sample
Type of Equipment:	Part 15 Low Power Communication Device Transmitter
Input Power Supply Type:	12VDC/2A, 24VDC/1A DC external power supply / Power over Ethernet (PoE)
Primary User Functions of EUT:	Access Control

2.3. EUT'S TECHNICAL SPECIFICATIONS

Transmitter	
Intended Operating Environment:	Commercial, light industry & heavy industry
Power Supply Requirement:	5V, 3.3V DC
Field Strength:	53.84 dBμV/m at 10 m
Operating Frequency Range:	13.56 MHz
RF Output Impedance:	50 Ω
Modulation Type:	ASK
Antenna Connector Type:	Integral, PCB Loop Antenna

The EUT contained an integrated certified u-blox AG WLAN/Bluetooth host-based multiradio module (FCC ID: XPYMAYAW166). The module test data were leveraged in this filing.

2.4. LIST OF EUT'S PORTS

Port Number	EUT's Port Description	Number of Identical Ports	Connector Type	Cable Type (Shielded/Non-shielded)
1	Vin+, Vin-	1	Header	Non-Shielded, <3m
2	Wiegand Input (2 Lines)	1	Header	Non-Shielded >3m
3	Wiegand Output (2 Lines)	1	Header	Non-Shielded, > 3m
4	RS-485 (3 lines)	1	Header	Non-Shielded, > 3m
5	RS-232 (Tx, Rx)	1	Header	Non-Shielded, Service Port
6	USB 2.0 OTG	1	USB uAB	Service Port
7	Gigabit Ethernet	1	RJ-45	Non-Shielded, > 3m
8	Form C Relay, 3 lines	1	Header	Non-Shielded
9	General Purpose Output	2	Header	Non-Shielded
10	General Purpose Input	2	Header	Non-Shielded
11	General Purpose I/O for Door control	4	Header	Non-Shielded
12	GND for different interfaces	4	Header	Non-Shielded
13	EGND	1	Header	Non-Shielded
14	DS_OUT	1	Header	Non-Shielded
15	Access Control Panel LED	2	Header	Non-Shielded

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April 7, 2026

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2.5. ANCILLARY EQUIPMENT

The EUT was tested while connected to the following representative configuration of ancillary equipment necessary to exercise the ports during tests:

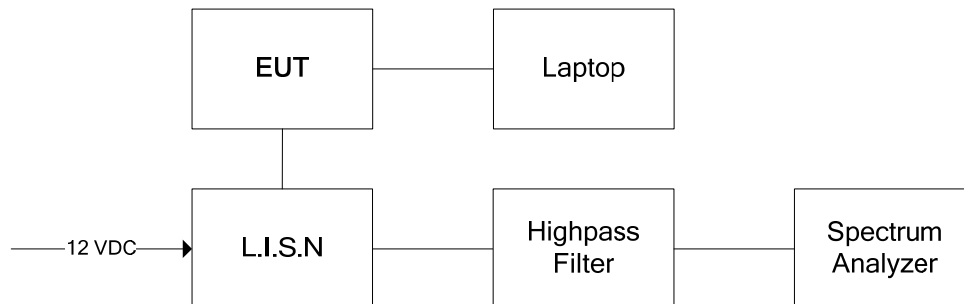
1) Cisco Power Injector, M/N: POE16U-1AF

NOTE: Invixium neither sells or recommends used of power injector.

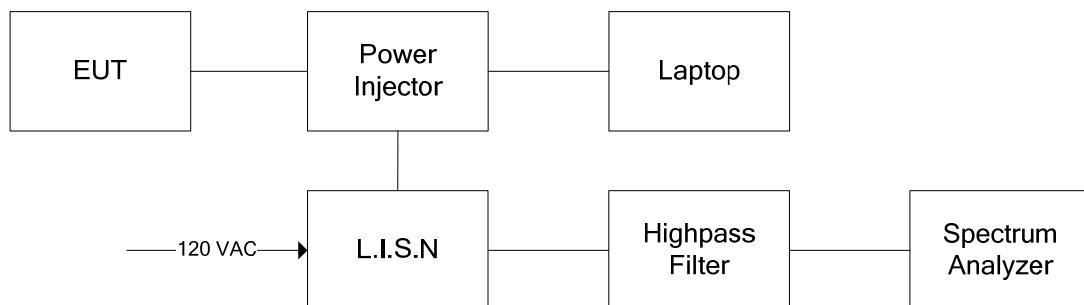
2.6. GENERAL TEST SETUP

2.6.1. Conducted Emissions

EUT Powered by External DC Power Supply

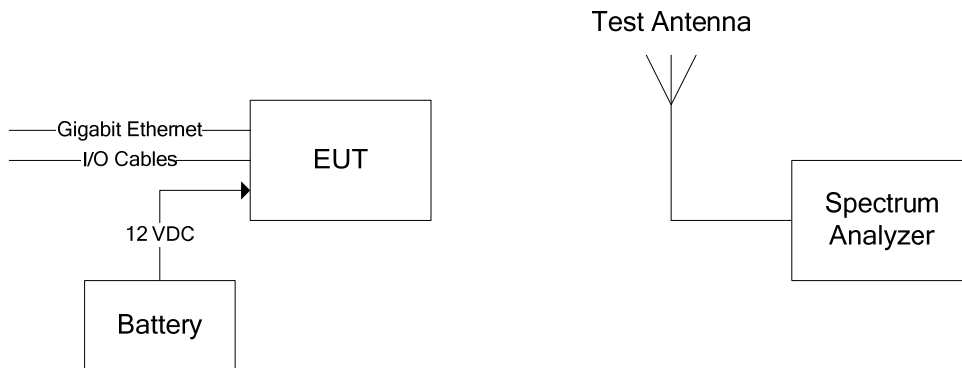


EUT Powered by PoE Adapter

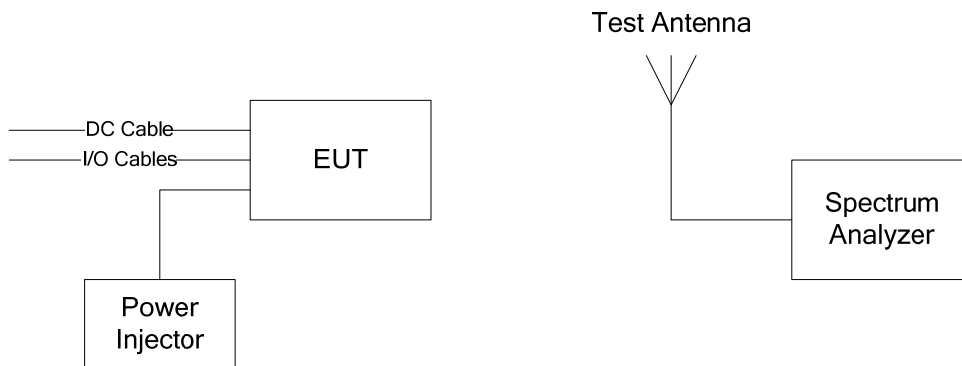


2.6.2. Radiated Emissions

EUT Powered by External DC Power Supply



EUT Powered by Power Injector Power over Ethernet



2.6.3. Frequency Stability Test Setup

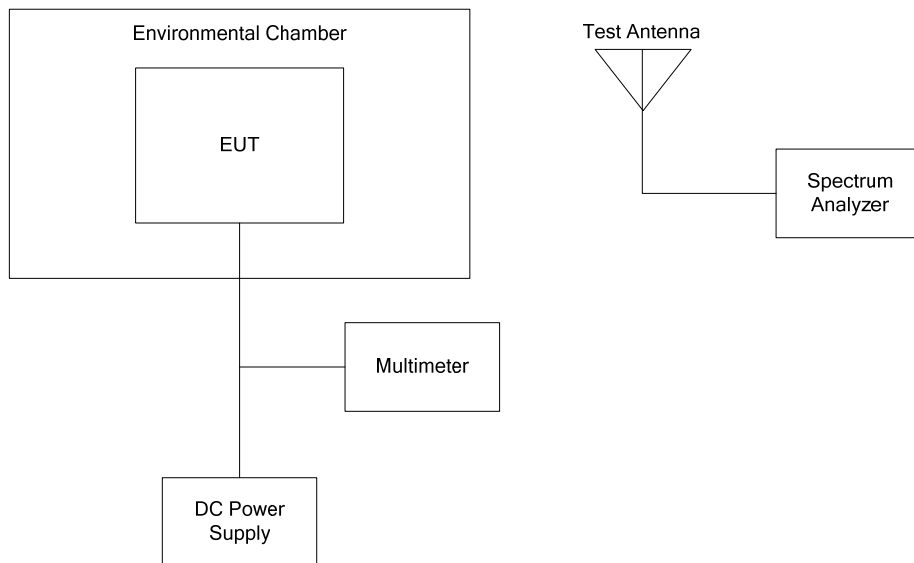


EXHIBIT 3. EUT OPERATING CONDITIONS AND CONFIGURATIONS DURING TESTS

3.1. CLIMATE TEST CONDITIONS

The climate conditions of the test environment are as follows:

Temperature:	21 to 23 °C
Humidity:	45 to 58%
Pressure:	102 kPa
Power input source:	12-24V DC / Power over Ethernet (PoE)

3.2. OPEPERATIONAL TEST CONDITIONS & ARRANGEMENT FOR TESTS

Operating Modes:	The EUT was configured for continuous transmission for the duration of testing.
Special Test Software:	N/A
Special Hardware Used:	N/A
Transmitter Test Antenna:	The EUT was tested with the antenna fitted in a manner typical of normal intended use as integral antenna equipment.

Transmitter Test Signals:	
Frequency Band(s):	13.56 MHz
Test Frequency(ies):	13.56 MHz
Transmitter Wanted Output Test Signals:	
▪ RF Power Output (measured maximum output power):	53.84 dBμV/m at 10 m
▪ Normal Test Modulation:	ASK
▪ Modulating signal source:	Internal

EXHIBIT 4. SUMMARY OF TEST RESULTS

4.1. TEST LAB AND LOCATION

Company Name:	Ultratech Engineering labs Inc.	
Address:	3000 Bristol Circle, Oakville, Ontario, Canada, L6H 6G4 Tel.: (905) 829-1570 Fax.: (905) 829-8050 Website: www.ultratech-labs.com ,	
Test Site/Company Number:	FCC	ISED
	MRA: APEC TEL Designation no. CA0001 FRN: 0003781366	Company No.: 2049A CAB Identifier: CA0001

4.2. APPLICABILITY & SUMMARY OF EMC EMISSION TEST RESULTS

FCC Regulations	Test Requirements	Compliance (Yes/No)
15.203	Antenna Requirement	Yes*
15.207(a)	Class B - Power Line Conducted Emissions	Yes
15.215(c)	Emission Bandwidth	Yes
15.225(a) – (d)	Field Strength of Emissions Inside and Outside the Permitted Band 13.110 - 14.010 MHz	Yes
15.225(e)	Frequency Stability	Yes

* The EUT complies with the requirement; it employs integral antenna.

4.3. MODIFICATIONS INCORPORATED IN THE EUT FOR COMPLIANCE PURPOSES

Wurth Ferrite 2 1/2 loops on V+ and V- Part Number: 742 716 33 S (Box A9)



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April 7, 2026

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EXHIBIT 5. TEST DATA

5.1. POWER LINE CONDUCTED EMISSIONS [§15.207(a)]

5.1.1. Limit(s)

The equipment shall meet the limits of the following table:

Frequency of emission (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

*Decreases linearly with the logarithm of the frequency

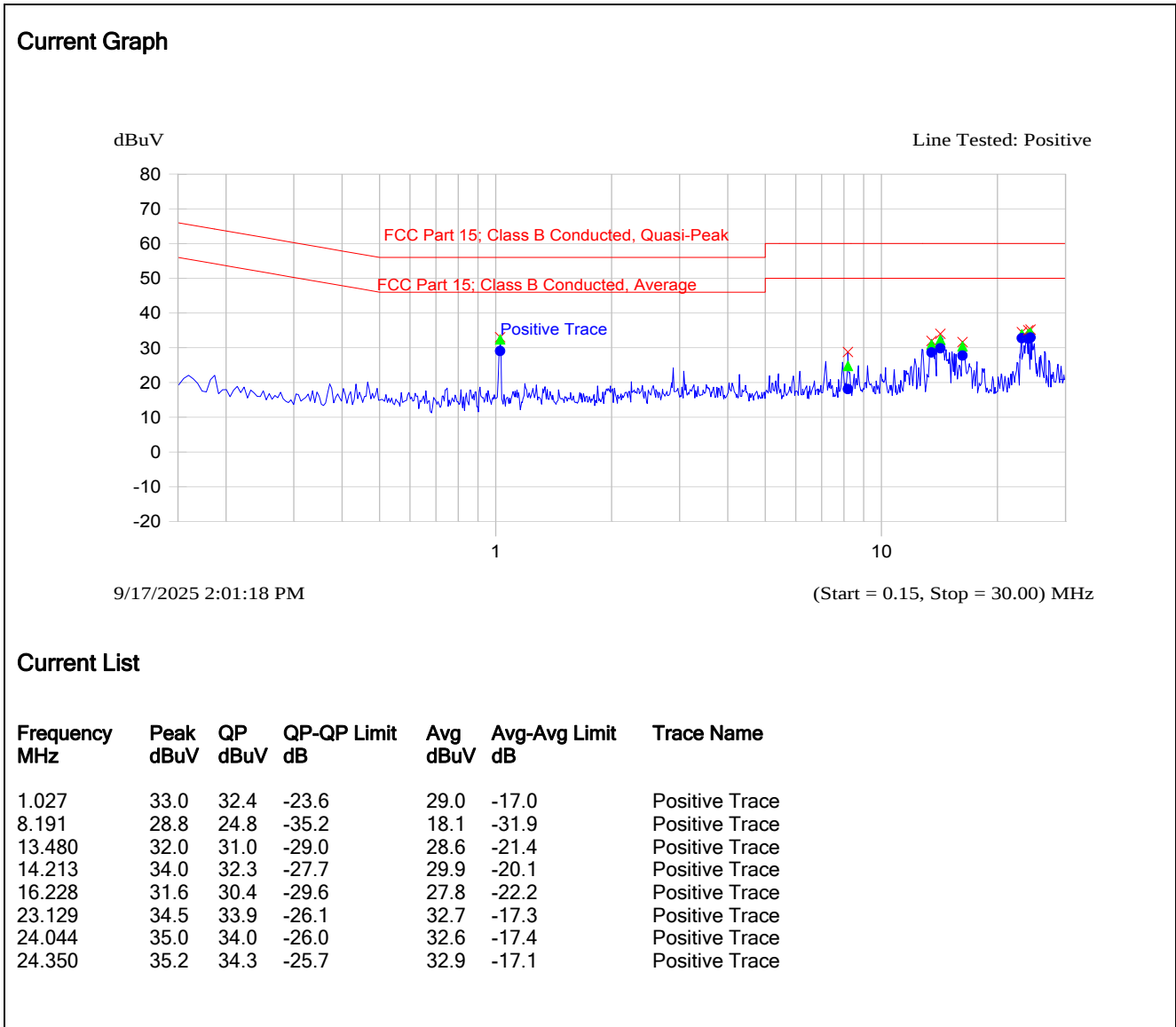
5.1.2. Method of Measurements

ANSI C63.4

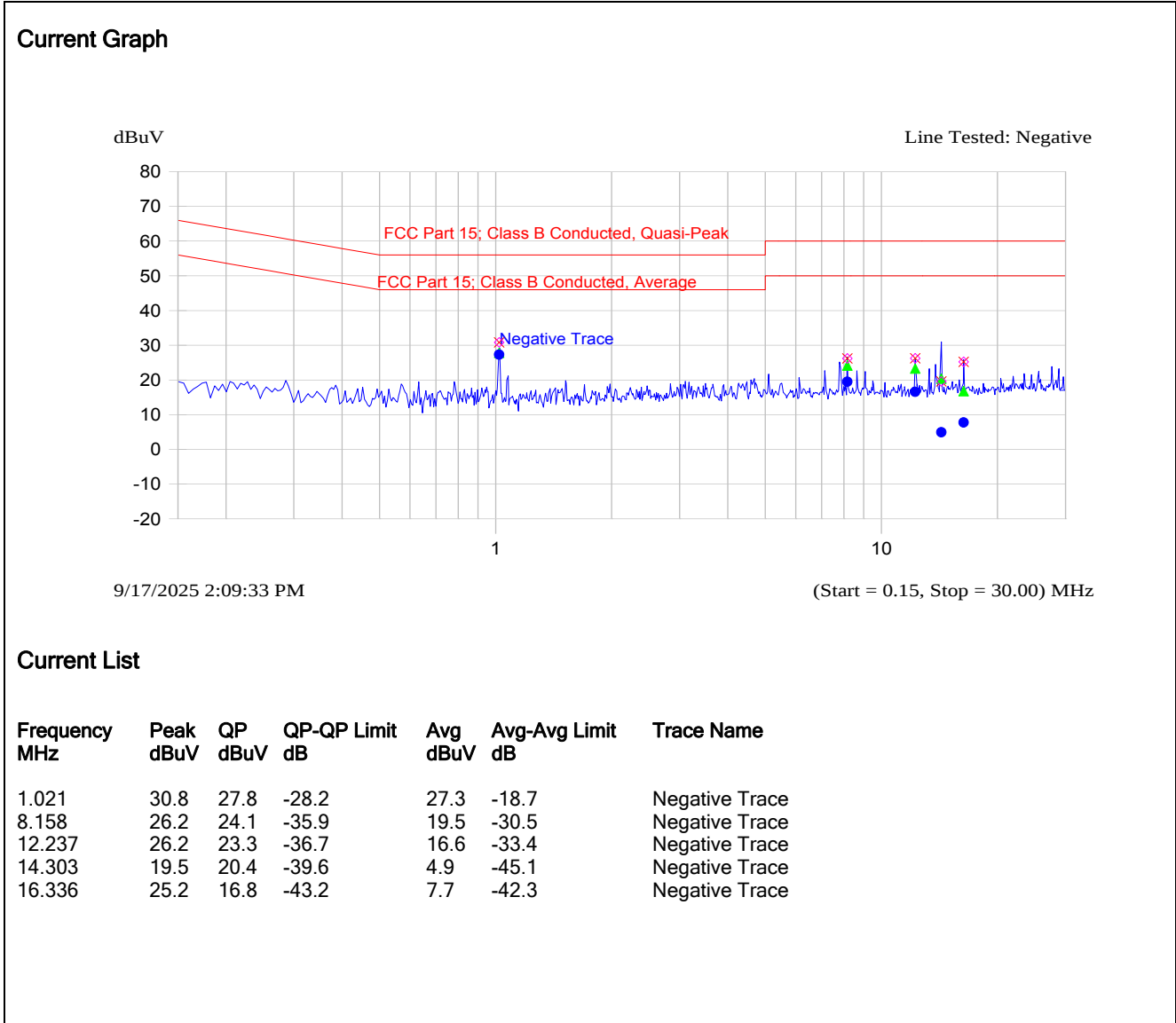
5.1.3. Test Data

Note: The radiated emissions from intentional radiator below 30MHz (13.56 MHz Tx) were shielded by wrapping the EUT with aluminum foil for the purpose of eliminating any radiated coupling onto the device’s AC power cable or LISN during testing.

Plot 5.1.3.1. Power Line Conducted Emissions
Line Voltage: 12 VDC; Line Tested: Positive

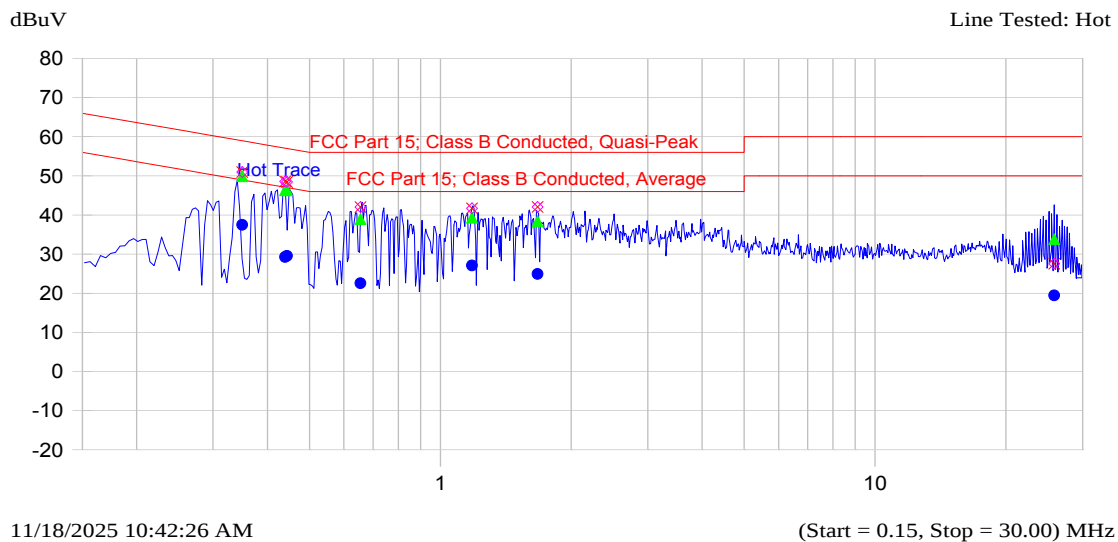


Plot 5.1.3.2. Power Line Conducted Emissions
Line Voltage: 12 VDC; Line Tested: Negative



Plot 5.1.3.3. Power Line Conducted Emissions
PoE, Line Voltage 120 VAC, Line Tested: Hot

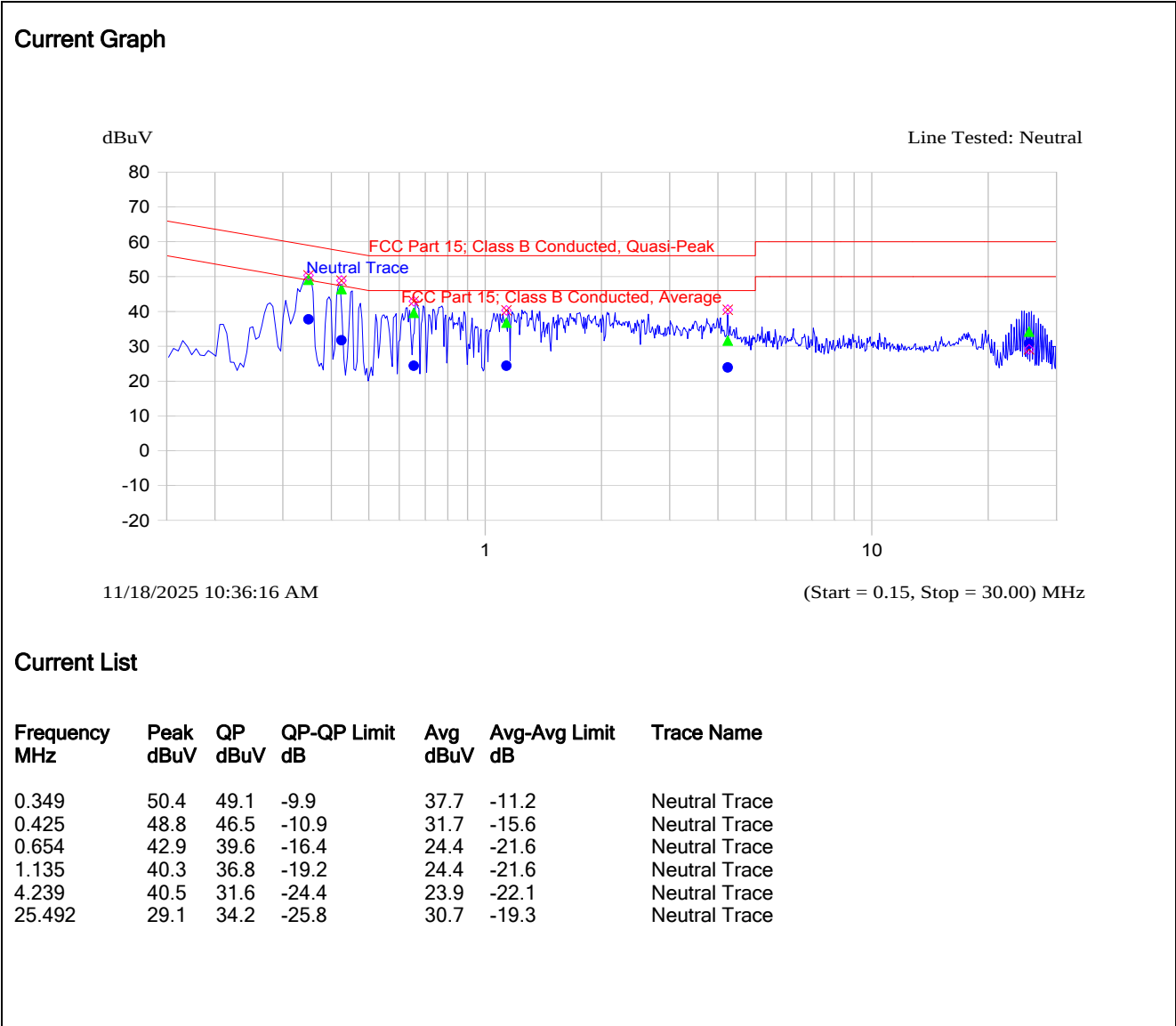
Current Graph



Current List

Frequency MHz	Peak dBuV	QP dBuV	QP-QP Limit dB	Avg dBuV	Avg-Avg Limit dB	Trace Name
0.350	51.0	49.9	-9.1	37.5	-11.5	Hot Trace
0.444	48.4	46.3	-10.7	29.6	-17.4	Hot Trace
0.440	48.6	46.4	-10.7	29.3	-17.8	Hot Trace
0.655	42.0	38.9	-17.1	22.5	-23.5	Hot Trace
1.183	41.7	39.3	-16.7	27.1	-18.9	Hot Trace
1.674	42.1	38.4	-17.6	24.9	-21.1	Hot Trace
25.840	27.5	33.8	-26.2	19.4	-30.6	Hot Trace

Plot 5.1.3.4. Power Line Conducted Emissions
PoE, Line Voltage 120 VAC, Line Tested: Neutral



5.2. EMISSION BANDWIDTH (15.215 (c))

5.2.1. Limit(s)

The 20 dB bandwidth of the emission shall be contained within the band 13.110–14.010 MHz.

5.2.2. Method of Measurements

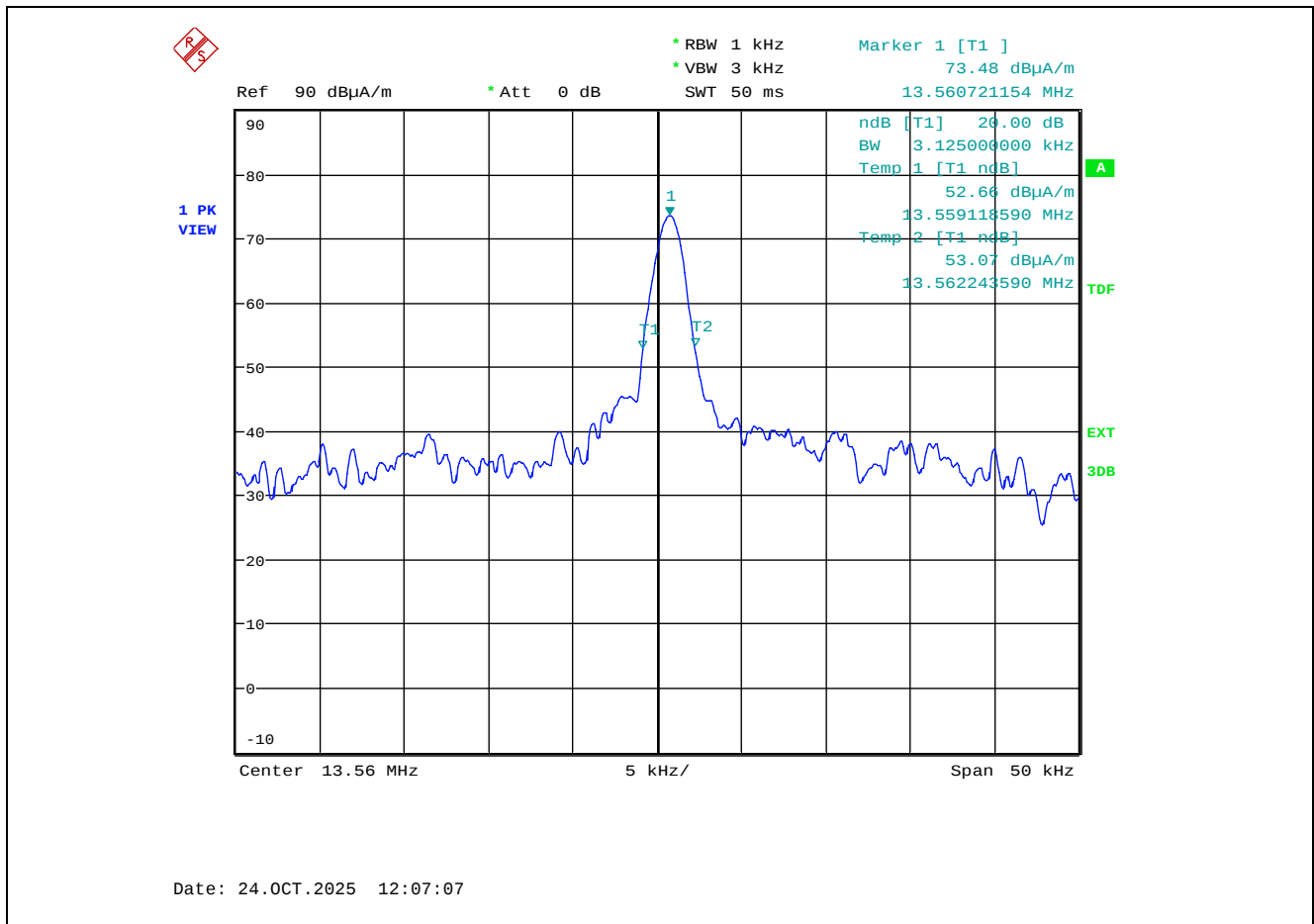
ANSI C63.10.

5.2.3. Test Data

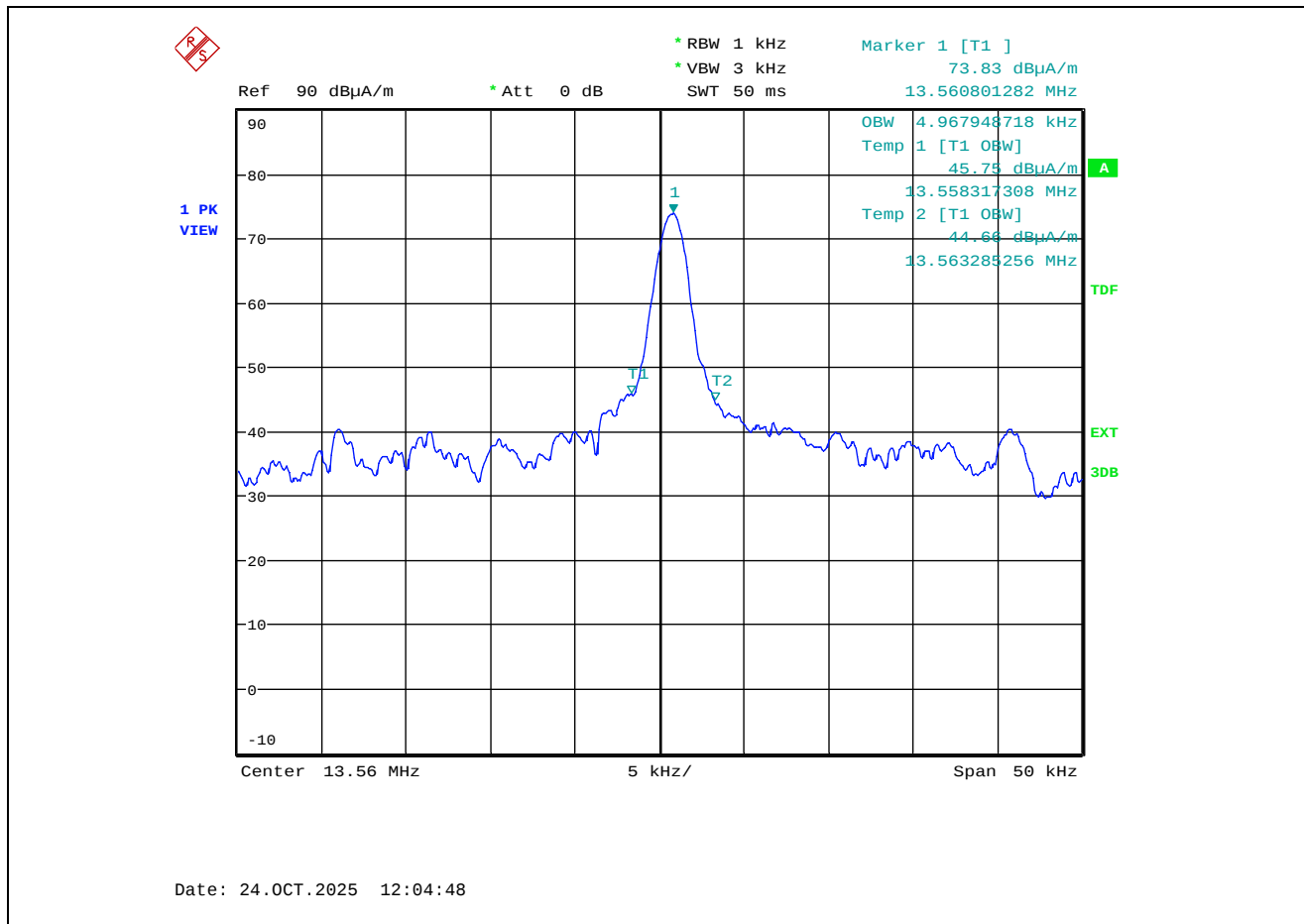
Channel Frequency	20 dB Bandwidth	99 %Occupied Bandwidth
13.56 MHz	3.125 kHz	4.968 kHz

See the following plot for details.

Plot 5.2.3.1. 20 dB Bandwidth, Fc: 13.56 MHz



Plot 5.2.3.2. 99% Occupied Bandwidth, Fc: 13.56 MHz



5.3. FIELD STRENGTH OF EMISSIONS WITHIN & OUTSIDE THE PERMITTED BAND 13.110-14.010 MHz [47 CFR 15.225 (a) to (d)]

5.3.1. Limits

- (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.

47 CFR 15.209(a) – Radiated Emission Limits; general requirements

Frequency (MHz)	Field Strength Limits (microvolts/m)	Distance (Meters)
0.009 - 0.490	2,400 / F (KHz)	300
0.490 - 1.705	24,000 / 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

5.3.2. Method of Measurements

ANSI C63.10 and ANSI C63.4 for measurement methods.

5.3.3. Test Data

Remarks:

- Radiated spurious emissions measurements were performed at a measuring distance of 10 m or 3 m, from 10 kHz – 1 GHz and all spurious emissions that are in excess of 20 dB below the specified limit shall be recorded.
- For frequencies below 30 MHz, the results measured at 10 m distance shall be extrapolated as applicable to compare with limit and measurement distance specified in section 15.209(a), using an extrapolation factor of 40 dB/decade for determining compliance.

5.3.3.1. Field Strength of Emissions Within the Permitted Band at 10 m

Remark(s):

20 dB Bandwidth is 3.125 kHz, $f_L = 13.559 \text{ MHz} > 13.553 \text{ MHz}$, $f_H = 13.562 \text{ MHz} < 13.567 \text{ MHz}$, all emissions within 13.110-14.010 MHz are more than 20dB below the limits.

EUT Powered by External DC Power Supply						
Frequency (MHz)	Measured Field Strength @ 10 m (dB μ V/m)	Detector Used (Peak/QP)	Antenna Plane (H/V)	Field Strength Extrapolated Value (dB μ V/m)	§ 15.225 Field Strength Limits (dB μ V/m)	Margin (dB)
13.56	53.84	Peak	V	34.76	84.0	-49.2
13.56	46.69	Peak	H	27.61	84.0	-56.4

EUT Powered by PoE Adapter						
Frequency (MHz)	Measured Field Strength @ 10 m (dB μ V/m)	Detector Used (Peak/QP)	Antenna Plane (H/V)	Field Strength Extrapolated Value (dB μ V/m)	§ 15.225 Field Strength Limits (dB μ V/m)	Margin (dB)
13.56	53.70	Peak	V	34.62	84.0	-49.4
13.56	46.18	Peak	H	27.10	84.0	-56.9

5.3.3.2. Field Strength of Emissions Outside the Permitted Band Below 30 MHz at 10 m

EUT Powered by External DC Power Supply / PoE Adapter						
Frequency (MHz)	Measured Field Strength @ 10 m (dB μ V/m)	Detector Used (Peak/QP)	Antenna Plane (H/V)	Field Strength Extrapolated Value (dB μ V/m)	§ 15.209 Field Strength Limits (dB μ V/m)	Margin (dB)
All spurious emissions are more than 20 dB below the specified limit.						

5.3.3.3. Field Strength of Emissions Outside the Permitted Band at or Above 30 MHz at 3 m

EUT Powered by External DC Power Supply					
Frequency (MHz)	Measured Field Strength @ 3 m (dBµV/m)	Detector Used (Peak/QP)	Antenna Plane (H/V)	§ 15.209 Field Strength Limits (dBµV/m)	Margin (dB)
40.68	31.41	QP	V	40.0	-8.6
54.24	31.22	QP	V	40.0	-8.8
67.80	22.08	QP	V	40.0	-17.9

EUT Powered by PoE Adapter					
Frequency (MHz)	Measured Field Strength @ 3 m (dBµV/m)	Detector Used (Peak/QP)	Antenna Plane (H/V)	§ 15.209 Field Strength Limits (dBµV/m)	Margin (dB)
40.68	29.51	QP	V	40.0	-10.5
40.68	29.33	QP	H	40.0	-10.7
54.24	27.68	QP	V	40.0	-12.3
54.24	27.59	QP	H	40.0	-12.4

5.4. FREQUENCY STABILITY [47 CFR 15.225(e)]

5.4.1. Limit(s)

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.

5.4.2. Method of Measurements

ANSI C63.10.

5.4.3. Test Data

Frequency Band:	13.56 MHz
Center Frequency:	13.56 MHz
Frequency Tolerance Limit:	$\pm 0.01\%$ (± 1356 Hz)
Max. Frequency Tolerance Measured:	+833 Hz (61.43 ppm)
Input Voltage Rating:	12-24 VDC on DC input / 48 VDC from POE Adapter

12-24 VDC on DC input			
Ambient Temperature (°C)	Frequency Drift (Hz)		
	Supply Voltage (Nominal) 12 VDC	Supply Voltage (85 % of Nominal) 10.2 VDC	Supply Voltage (115% of Nominal) 27.6 VDC
-20	+801	--	--
-10	+833	--	--
0	+801	--	--
+10	+761	--	--
+20	+705	+737	+737
+30	+711	--	--
+40	+704	--	--
+50	+685	--	--

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48 VDC from POE Adapter			
Ambient Temperature (°C)	Frequency Drift (Hz)		
	Supply Voltage (Nominal) 48 VDC	Supply Voltage (85 % of Nominal) 40.8 VDC	Supply Voltage (115% of Nominal) 55.2 VDC
-20	+801	--	--
-10	+833	--	--
0	+801	--	--
+10	+761	--	--
+20	+712	+699	+698
+30	+705	--	--
+40	+698	--	--
+50	+692	--	--

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EXHIBIT 6. TEST EQUIPMENT LIST

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range	Cal. Due Date
Spectrum Analyzer	Rohde & Schwarz	FSU26	100398	20Hz–26.5 GHz	26 Sep 2027
Loop Antenna	EMCO	6502	9104-2611	0.01 – 30 MHz	13 Jun 2026
Biconilog Antenna	EMCO	3142C	00034792	26 – 3000 MHz	16 Dec 2025
EMI Analyzer	HP	8593EM	3412A00103	9 kHz–26.5 GHz	20 Oct 2026
LISN	Schwarzbeck Mess Elektronik	NSLK 8127	8127276	9 kHz - 30 MHz	13 Dec 2025
High-pass Filter	Rohde & Schwarz	EZ-25	100064	150 kHz - 30 MHz	29 Oct 2026
Environmental Chamber	Envirotronics	SSH32C	11994847-S-11059	-60 to 177° C	25 Aug 2027
Power Supply	BK Precision	1740	1550497	0-60Vdc, 4 A	See Note 1
Multimeter	Fluke	8842A	5021295	---	25 Jul 2027
Note 1: Internal Verification/Calibration check					

ULTRATECH GROUP OF LABS

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EXHIBIT 7. MEASUREMENT UNCERTAINTY

The measurement uncertainties stated were calculated in accordance with the requirements of CISPR 16-4-2 @ IEC:2003 and JCGM 100:2008 (GUM 1995) – Guide to the Expression of Uncertainty in Measurement.

Test Description	Expanded Uncertainty, K=2 for 95% Confidence Level
Power Line Conducted Emissions	± 2.62 dB
Radiated Emissions	± 2.68 dB (10 kHz - 30 MHz)
	± 4.30 dB (30 MHz – 1 GHz)
Frequency Stability/Bandwidth	± 2 Hz

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