FCC and ISED Canada Testing of the

Welbilt, Inc.
8076208

In accordance with FCC 47 CFR part 15.225 and ISED Canada's Radio Standards Specifications RSS-210

America

Add value.
Inspire trust.

Prepared for: Welbilt, Inc.
2227 Welbilt Blvd
New Port Richey, FL 34655

FCC ID: 2AQ4D-RFIDREADER
IC: 24291-RFIDREADER

COMMERCIAL-IN-CONFIDENCE

Document Number: TP72181248.200 | Version Number: 01

RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Authorized Signatory	Peter Walsh	2022 -October-27	
Testing	Thierry Jean-Charles	2022-October-24	

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD Product Service document control rules.

FCC Accreditation Designation Number US1063 Tampa, FL Test Laboratory	Innovation, Science, and Economic Development Canada Accreditation Site Number 2087A-2 Tampa, FL Test Laboratory

EXECUTIVE SUMMARY
Samples of this product were tested and found to be in compliance with 15.225. and ISED Canada's RSS-210.

A2LA Cert. No. 2955.15

TÜV SÜD America
5610 West Sligh Ave., Suite 100
Tampa, FL 33634

Phone: 813-284-2715
www.tuv-sud-america.com

Contents

1 Report Summary 2

1.1 Report Modification Record 2
1.2 Introduction 2
1.3 Brief Summary of Results 5
1.4 Product Information 6
1.5 Deviations from the Standard 9
1.6 EUT Modification Record 9
1.7 Test Location 11

2 Test Details 12

2.1 Antenna Requirements 12
2.2 Radiated Field Strength of Emissions within the 13.110-14.010 band 13
2.3 Radiated Field Strength of Emissions outside of the 13.110-14.010 band 16
2.4 Power Line Conducted Emissions 22

3 Test Equipment Information 26

3.1 General Test Equipment Used 26

4 Diagram of Test Set-ups 27

5 Measurement Uncertainty 31

6 Accreditation, Disclaimers and Copyright 32

1 Report Summary

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
1	First Issue	2022-October-27

1.2 Introduction

The purpose of this report is to demonstrate compliance with Part 15 Subpart C of the FCC's Code of Federal Regulations Section 15.225 and Innovation Science and Economic Development Canada's Radio Standards Specification RSS-210 for the tests documented herein.

The purpose of the evaluation is to demonstrate compliance of the RFID Limited Module within the host devices. There are no changes to the module per the manufacturer.

Applicant	Welbilt, Inc.
Manufacturer	Frymaster LLC
Applicant's Email Address	Daniel.Kinnamon@welbilt.com
Model Number(s)	8076208 The MHD32SST2T host model was evaluated as the worst case from the MHD32 family per the host manufacturer.
Serial Number(s)	2007932
FCC ID	2AQ4D-RFIDREADER
ISED Certification Number	24291-RFIDREADER
Hardware Version(s)	Rev7
Software Version(s)	0.4.0
Number of Samples Tested	1
Test Specification/Issue/Date	US Code of Federal Regulations (CFR): Title 47, Part 15, Subpart C: Radio Frequency Devices, Intentional Radiators, 2021 Innovation, Science and Economic Development Canada Radio Standards Specification: RSS-210 — Licence-Exempt Radio Apparatus: Category I Equipment, Issue 10, December 2019
Test Plan/Issue/Date	2022-June-22
Order Number	72181248
Date	2022-June-28
Date of Receipt of EUT	2022-June-22
Start of Test	2022-June-29
Finish of Test	2022-October-17
Name of Engineer(s)	Thierry Jean-Charles
Related Document(s)	ANSI C63.10-2013: American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices US Code of Federal Regulations (CFR): Title 47, Part 2, Subpart J: Equipment Authorization Procedures, 2021. Innovation, Science and Economic Development Canada Radio Standards Specification: RSS-GEN - General Requirements for Compliance of Radio Apparatus, Issue 5, Amendment 1, March 2019.

US Code of Federal Regulations (CFR): Title 47, Part 15, Subpart B: Unintentional Radiators, 2021

Innovation, Science and Economic Development Canada ICES-003 — Information Technology Equipment (including digital Apparatus), Issue 7, October 2020

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

FCC OET KDB 996369 D01 Module Equip Auth Guide v02: Transmitter Module Equipment Authorization Guide, October 23, 2015

1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with FCC Part 15.225 and ISED Canada's RSS-210 is shown below.

Table 1.3-1: Test Result Summary

Test Parameter	Test Plan (Yes/No)	Test Result	FCC 47 CFR Rule Part	ISED Canada's RSS	Test Report Page No
Antenna Requirement	Yes	Pass	15.203, 15.204	-------	12
20 dB Bandwidth	No	--------	15.215(c)	-------	
99% Bandwidth	No	--------	-------	RSS-GEN 6.7	
Field strength of Emissions within the Band 13.110-14.010 MHz	Yes	Pass	15.225(a),(b),(c)	RSS-210 Annex B.6(a)	13
Field Strength of Emissions outside of the Band 13.110-14.010 MHz	Yes	Pass	15.209, 15.225(d)	RSS-210 7.2, RSS-210 Annex B.6(a), RSS-GEN 8.9	16
Power Line Conducted Emissions	Yes	Pass	15.207	RSS-GEN 8.8	22
Frequency Tolerance of the Carrier Signal	No	--------	15.225(e)	RSS-210 B.6(b)	

1.4 Product Information

1.4.1 Technical Description

The Equipment Under Test (EUT) was 13.56 MHz RFID reader module which was installed in the Welbilt, Inc. 3-shelf cabinet food warmer.

The test report covers the following host models.

MHD32SST1T - 3 shelf cabinet with touch screen only on front (Single Side)
MHD32SST2T - 3 shelf cabinet with touch screen on front & back (Pass Through)

Testing was performed on the MHD32SST2T model per the equipment manufacturer as representative of the worst case model.

The host device also includes a certified Wi-Fi dongle operating in the 2.4 GHz and 5 GHz bands (FCC ID: VVX808-04XX, IC:10531A-80804XX). The evaluation of the dongle for continued compliance while integrated into the host product was performed separately.

The test report documents compliance of the RFID reader incorporated within the holding cabinet model MHD32SST2T.

Technical Details

Mode of Operation:	RFID 13.56 MHz
Frequency Range:	13.56 MHz
Number of Channels:	1
Channel Separation:	N/A
Data Rate:	N/A
Modulations:	CW
Antenna Type/Gain:	6x Custom Antennas, Not User Accessible
Input Power:	208V / 60Hz (Host)

A full description and detailed product specification details are available from the manufacturer.

Table 1.4.1-1 – Cable Descriptions

Cable/Port	Description
Power cord	2.08 m, Not Shielded, Welbilt Holding Cabinet to AC Mains

Table 1.4.1-2 – Support Equipment Descriptions

Make/Model	Description
Welbilt / MHD32SST2T	Host device consisting of 3-shelf cabinet with touch screen on front & back (Pass Through), S/N: 2003ED0003
LM Technologies / 808-04xx	LM808 Wi-Fi 802.11ac/b/g/n USB Adapter

Declaration of Build Status

EQUIPMENT DESCRIPTION	
Model Name/Number	RFIDREADER
Part Number	8076208
Hardware Version	
Software Version	0.4.0
FCC ID (if applicable)	
ISED ID (if applicable)	
Technical Description (Please provide a brief description of the intended use of the equipment)	RFID reader for tray tracking

UN-INTENTIONAL RADIATOR	
Highest frequency generated or used in the device or on which the device operates or tunes	13.56MHz
Lowest frequency generated or used in the device or on which the device operates or tunes	13.56MHz
Class A Digital Device (Use in commercial, industrial or business environment) ☒ Class B Digital Device (Use in residential environment only)	

Power Source			
AC	Single Phase	Three Phase	Nominal Voltage
	☒	☐	208-240VAC
External DC	Nominal Voltage	Maximum Current	
Battery	Nominal Voltage	Battery Operating End Point Voltage	

EXTREME CONDITIONS					
Maximum temperature	+40	°C	Minimum temperature	-0	°C

Ancillaries
Please list all ancillaries which will be used with the device.

I hereby declare that the information supplied is correct and complete.

Name: Daniel Kinnamon

Position held: Senior Software Engineer Date: 10/19/22

1.4.2 Modes of Operation

The RFID radio was not configurable as per the host manufacturer. The RFID was in continuous transmit mode as in normal operation. The heater on the host device was turned on.

1.4.3 Monitoring of Performance

The EUT was evaluated for radiated and power line emissions while installed within the host device.

1.4.4 Performance Criteria

The EUT was evaluated for the following parameters.

Table 1.4.4 -1: Performance Criteria

Parameter	Requirement
Antenna Requirement	FCC: Section 15.203. 15.204
Radiated Field Strength of Emissions within the 13.110-14.010 band	FCC: Section 15.225 (a),(b),(c); ISED Canada: RSS-210 Annex B.6 (a)
Radiated Field Strength of Emissions outside of the 13.110-14.010 band	FCC: Section 15.209, 15.225; ISED Canada: RSS-210 7.2, RSS-210 Annex B.6 (a), RSS-GEN 8.9
Power Line Conducted Emissions	FCC: Section 15.207; ISED Canada: RSS-GEN 8.8

1.5 Deviations from the Standard

The evaluation was performed without any deviations from the test standards.

1.6 EUT Modification Record

The table below details modifications made to the EUT during the test program. The modifications incorporated during each test are recorded on the appropriate test pages.

Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
Ferrite	Fair-Rite 0431164181 on AC input (1 turn) for compliance of the radiated emissions within the host device.	Thierry Jean-Charles	7/28/2022

The equipment was tested with the modifications aforementioned.

Figure 1.6-1 – Modifications to the Device under Test

1.7 Test Location

TÜV SÜD Product Service conducted the following tests at our Tampa FL Test Laboratory.

Test Name	Name of Engineer(s)	Accreditation
AC Powered Operating		
Antenna Requirement	Thierry Jean-Charles	A2LA
Radiated Field Strength of Emissions within the 13.110-14.010 band	Thierry Jean-Charles	A2LA
Radiated Field Strength of Emissions outside of the 13.110-14.010 band	Thierry Jean-Charles	A2LA
Power Line Conducted Emissions	Thierry Jean-Charles	A2LA

Office Address:

TÜV SÜD America, Inc.
5610 W. Sligh Ave, Suite 100
Tampa, FL 33634
USA

2 Test Details

2.1 Antenna Requirements

2.1.1 Specification Reference

FCC: Section 15.203, 15.204

2.1.2 Equipment Under Test and Modification State

SN: 2007932

2.1.3 Date of Test

7/28/2022

2.1.4 Test Method

N/A

2.1.5 Environmental Conditions

Ambient Temperature	N/A
Relative Humidity	N/A
Atmospheric Pressure	N/A

2.1.6 Test Results

Limit Clause FCC Sections: 15.203, 15,204

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 EUT uses 6 RFID antennas which are integral to the oven. The RFID radio and antennas are using unique connectors which are not removable by the end-user. The EUT meets the requirements of FCC Section 15.203.

2.1.7 Test Location and Test Equipment Used

This test was carried out in TÜV SÜD America, Inc., 5610 W. Sligh Ave, Suite 100, Tampa, FL 33634, USA.

As this was a visual inspection, no test equipment was used.

2.2 Radiated Field Strength of Emissions within the 13.110-14.010 band

2.2.1 Specification Reference

FCC Sections: 15.225(a),(b),(c);
ISED Canada: RSS-210 Annex B.6(a)

2.2.2 Equipment Under Test and Modification State

SN: 2007932

2.2.3 Date of Test

6/29/2022

2.2.4 Test Method

Radiated emissions tests were made over the frequency range of 13.110 to 14.010 MHz. the receive antenna height was set to 1 m and the EUT was rotated through 360 degrees. The resolution bandwidth was set to 9 kHz and a Quasi-Peak detector was used.

2.2.5 Environmental Conditions

Ambient Temperature	21.7 °C
Relative Humidity	50 %
Atmospheric Pressure	1021 mbar

2.2.6 Test Results

AC Powered Operating

Limit Clause FCC Sections 15.225 (a),(b),(c), ISED Canada: RSS-210 Annex B.6 (a)

Frequency (MHz)	Field Strength (microvolts/meter)	Field Strength (dBuV/m)	Measurement Distance (meters)
13.110 – 13.410	106	40.5	30
13.410 – 13.553	334	50.5	30
13.553 – 13.567	15,848	84	30
13.567 – 13.710	334	50.5	30
13.710 – 14.010	106*	40.5	30

Radiated measurements were performed at a distance closer than 30m as required, according to Part 15.209. Therefore, a correction factor was applied to account for propagation loss at the specified distance. The propagation loss was determined by using the square of an inverse linear distance

extrapolation factor (40dB/decade) according to 15.31. A sample calculation of the distance correction factor is shown below for limits expressed at a 30m measurement distance.

Distance correction factor (30m Specified Test Distance) = 40*Log (Test Distance/30)
= 40*Log (3/30)
= - 40 dB

Table 2.2.6-1: Radiated Field Strength of Emissions within the 13.110-14.010 band

Frequency (MHz)	Level (dBuV)		Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/avg			pk	Qpk/avg	pk	Qpk/avg	pk	Qpk/avg
Fundamental Frequency										
13.56	---------	18.04	V	15.10	---------	33.14	--------	124	---------	90.9

Notes:

- The measurements were performed at ta test distance of 3m. The limits are corrected using a distance correction factor of 40 dB per decade as described above.
- The results are reported for the worst case receive loop antenna orientation.
- All other emissions were attenuated below the noise floor of the measurement equipment.

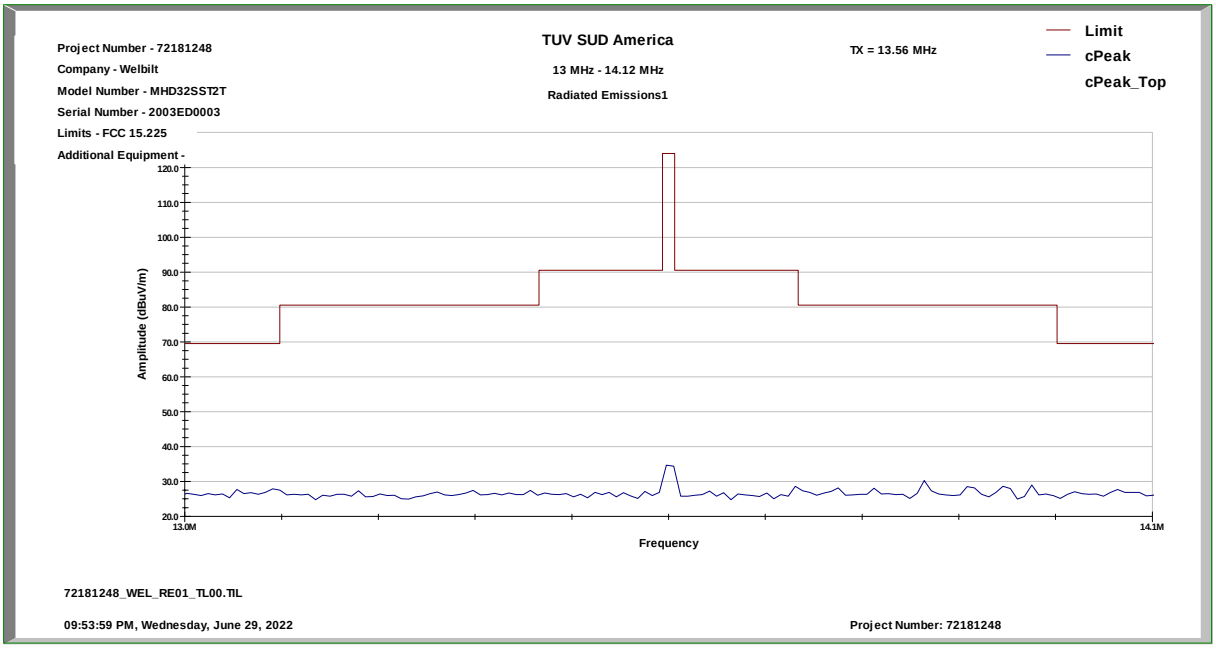

Figure 2.2.6-1: Radiated Field Strength of Emissions within the 13.110-14.010 MHz band

2.2.7 Sample Calculations

$R_C = R_U + CF_T$

Where:

CF_T = Total Correction Factor (AF+CA+AG)-DC (Average Measurements Only)
R_U = Uncorrected Reading
R_C = Corrected Level
AF = Antenna Factor
CA = Cable Attenuation
AG = Amplifier Gain
DC = Duty Cycle Correction Factor

Example Calculation: Quasi-Peak
Corrected Level: 18.04 + 15.1 = 33.14 dBµV/m
Margin: 124 dBµV/m – 33.14 dBµV/m = 90.86 dB

2.2.8 Test Location and Test Equipment Used

This test was carried out in TÜV SÜD America, Inc., 5610 W. Sligh Ave, Suite 100, Tampa, FL 33634, USA.

Instrument	Manufacturer	Type No	TE No	Software / Firmware Revision	Calibration Period (months)	Calibration Due
100Hz-26.5GHz EMC analyzer/HYZ	Agilent	E7405A	BEMC00523	A.14.06	12	01-Feb-2023
Tile Automation Software	ETS Lindgren	TILE4! - Version 4.2.A	BEMC02095	4.2A	N/A	NCR
Loop Antenna	Com Power	AL-130	TEMC00025	N/A	24	14-Oct-2023
EMC Chamber	Panashield	N/A	TEMC00031	N/A	36	28-Jan-2024

TU - Traceability Unscheduled
O/P MON - Traceability Unscheduled
N/A - Not Applicable
NCR – No Calibration Required

2.3 Radiated Field Strength of Emissions outside of the 13.110-14.010 band

2.3.1 Specification Reference

FCC Sections: 15.225(d), 15.209;
ISED Canada: RSS-210 7.2, RSS-210 Annex B.6(a), RSS-GEN 8.9

FCC 47 CFR Part 15B, Clause 15.109;
ISED ICES-003, Clause 3.2.2

2.3.2 Equipment Under Test and Modification State

SN: 2007932

2.3.3 Date of Test

6/29/2022 to 10/5/2022

2.3.4 Test Method

Radiated emissions tests were made over the frequency range of 9 kHz to 1 GHz, 10 times the highest fundamental frequency. Each emission was compared to the radiated emission limits as defined in Section 15.209.

For measurements below 30 MHz, the receive antenna height was set to 1 m and the EUT was rotated through 360 degrees. The resolution bandwidth was set to 200 Hz below 150 kHz and to 9 kHz above 150 kHz.

The EUT was rotated through 360° and the receive antenna height was varied from 1m to 4m so that the maximum radiated emissions level would be detected. For frequencies below 1000 MHz, quasi-peak measurements were made using a resolution bandwidth RBW of 120 kHz and a video bandwidth VBW of 300 kHz. For frequencies above 1000 MHz, peak measurements are made with RBW of 1 MHz and VBW of 3 MHz. Average measurements are performed in the linear scale using VBW of 30 Hz.

2.3.5 Duty Cycle Correction

The EUT was configured to transmit at 100% duty cycle during the evaluation. No Duty Cycle Correction was applied to the average measurements for the corrected average results.

2.3.6 Environmental Conditions

Ambient Temperature	21.7 °C
Relative Humidity	50 %
Atmospheric Pressure	1021 mbar

2.3.7 Test Results

AC Powered Operating

Limit Clause FCC Sections 15.209, 15.225(d), ISED Canada: RSS-210 7.2, RSS-GEN 8.9

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009-0.490	2400/F(kHz)	300
0.4090-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

Radiated measurements were performed at a distance closer than 300 meters and 30m as required, according to Part 15.209. Therefore, a correction factor was applied to account for propagation loss at the specified distance. The propagation loss was determined by using the square of an inverse linear distance extrapolation factor (40dB/decade) according to 15.31. A sample calculation of the distance correction factor is shown below for limits expressed at a 300m measurement distance and a 30m measurement distance.

Distance correction factor (300m Specified Test Distance) = 40*Log (Test Distance/300)
= 40*Log (3/300)
= - 80 dB

Distance correction factor (30m Specified Test Distance) = 40*Log (Test Distance/30)
= 40*Log (3/30)
= - 40 dB

Limit Clause FCC 47 CFR Part 15B, Clause 15.109, ISED ICES-003, Clause 3.2.2

Frequency Range (MHz)	Class A (3 m) Quasi-peak (dBµV/m)
30 – 88	49.5
88 – 216	54.0
216 – 960	56.9
>960	60.0

Table 2.3.7-1: Transmitter Radiated Spurious Emissions

Frequency (MHz)	Level (dBuV)	Antenna Polarity	Correction Factors	Corrected Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
	Qpk/Avg	(H/V)	(dB)	Qpk/Avg	Qpk/Avg	Qpk/Avg
40.68	0.69	V	19.07	19.75	40.0	20.2
54.24	20.54	H	13.41	33.95	40.0	6.1
54.24	25.36	V	13.41	38.77	40.0	1.2
67.8	18.88	H	12.94	31.82	40.0	8.2
67.8	19.31	V	12.94	32.25	40.0	7.7
81.36	10.05	V	14.03	24.08	40.0	15.9
94.92	14.05	V	16.52	30.57	43.5	12.9
108.48	2.78	H	18.63	21.40	43.5	22.1
108.48	9.08	V	18.63	27.71	43.5	15.8
122.04	11.93	H	19.30	31.23	43.5	12.3
122.04	7.13	V	19.30	26.43	43.5	17.1
135.6	12.84	H	18.79	31.63	43.5	11.9
135.6	10.05	V	18.79	28.84	43.5	14.7

Table 2.3.7-2: Host Associated Unintentional Emissions – Class A

Frequency (MHz)	QuasiPeak (dBµV/m)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin (dB)	Limit (dBµV/m)
30.000	24.26	142.0	V	334.0	25.3	25.24	49.50
34.050	23.64	123.0	V	270.0	22.9	25.86	49.50
56.700	33.87	103.0	V	288.0	13.0	15.63	49.50
56.910	33.40	103.0	V	300.0	12.9	16.10	49.50
69.000	28.11	161.0	V	180.0	13.0	21.39	49.50
69.030	27.58	115.0	V	315.0	13.0	21.92	49.50
107.730	32.39	115.0	V	292.0	18.5	21.61	54.00
301.800	34.28	103.0	H	204.0	20.9	22.62	56.90
395.160	33.83	105.0	V	192.0	23.4	23.07	56.90
420.000	37.21	108.0	V	190.0	24.7	19.69	56.90
780.000	35.75	152.0	H	312.0	29.2	21.15	56.90

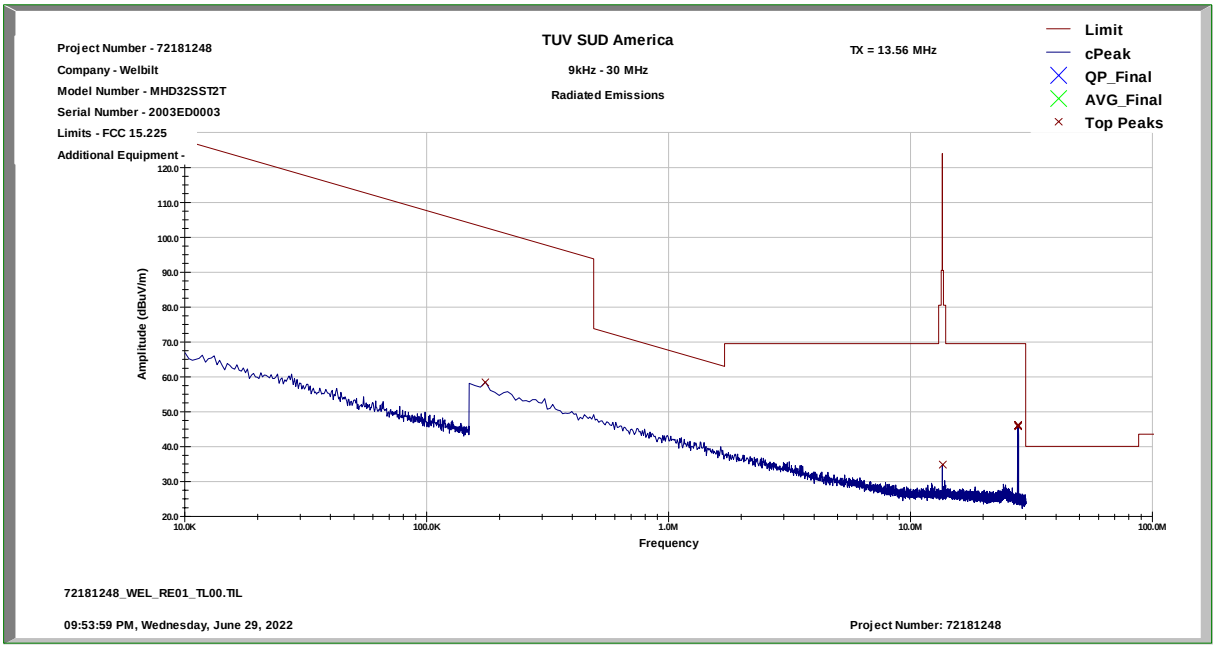

Figure 2.3.7-1: Transmitter Radiated Spurious Emissions below 30 MHz

Notes: The emissions at 28 MHz were from the ambient and were not generated by the equipment under test.

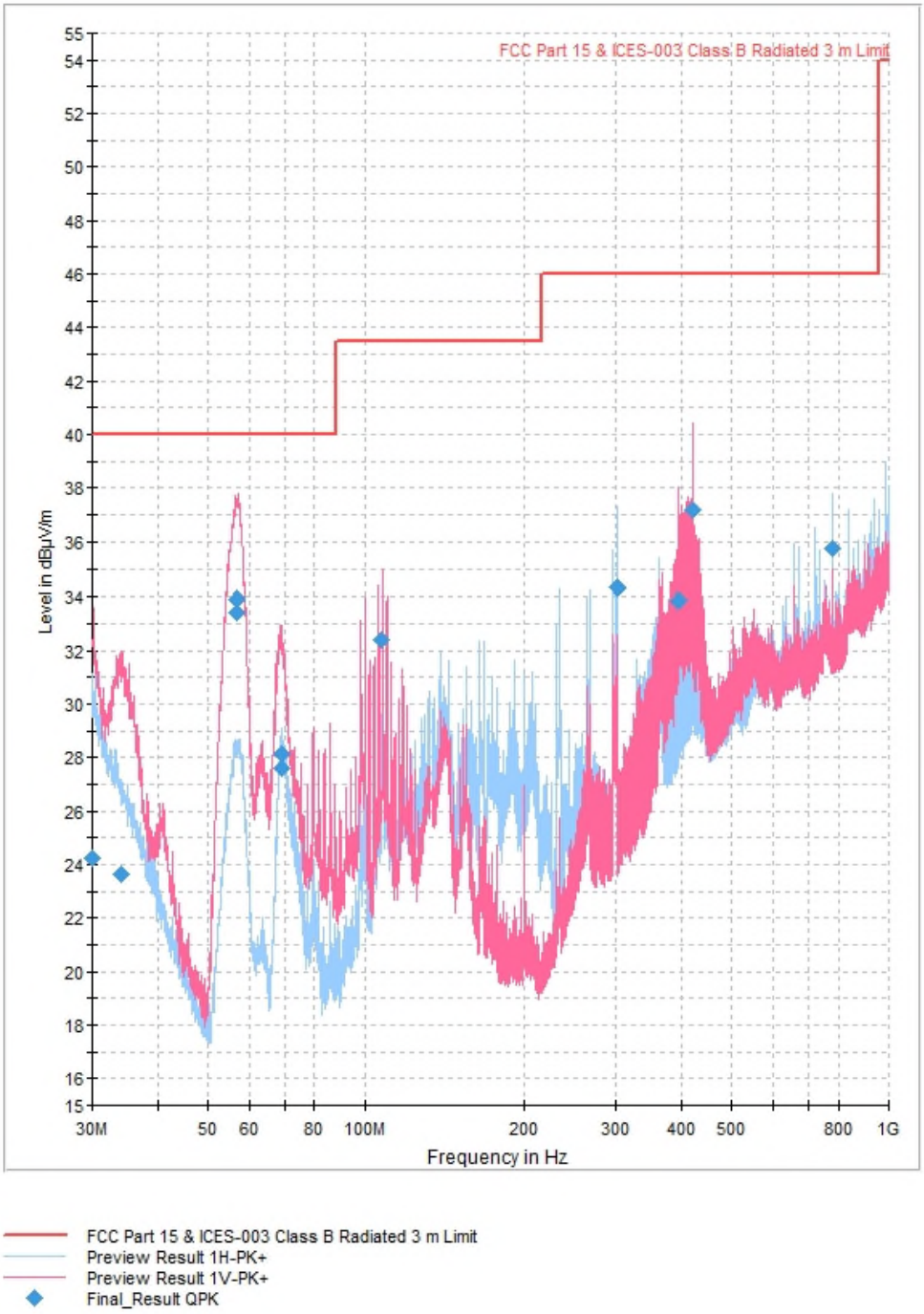

Figure 2.3.7-2: Transmitter Radiated Spurious Emissions above 30 MHz

Note: The host product is a Class A device. The test results are reported using the Class B limits which are the same as the 15.209 limits and more stringent than the Class A limits for convenience.

2.3.8 Sample Calculations

$R_C = R_U + CF_T$

Where:

CF_T = Total Correction Factor (AF+CA+AG)-DC (Average Measurements Only)
R_U = Uncorrected Reading
R_C = Corrected Level
AF = Antenna Factor
CA = Cable Attenuation
AG = Amplifier Gain
DC = Duty Cycle Correction Factor

Example Calculation: Quasi-Peak
Corrected Level: 20.54 + 13.41 = 33.95 dBµV/m
Margin: 40 dBµV/m – 33.95 dBµV/m = 6.05 dB

2.3.9 Test Location and Test Equipment Used

This test was carried out in TÜV SÜD America, Inc., 5610 W. Sligh Ave, Suite 100, Tampa, FL 33634, USA.

Instrument	Manufacturer	Type No	TE No	Software / Firmware Revision	Calibration Period (months)	Calibration Due
100Hz-26.5GHz EMC analyzer/HYZ	Agilent	E7405A	BEMC00523	A.14.06	12	01-Feb-2023
Tile Automation Software	ETS Lindgren	TILE4! - Version 4.2.A	BEMC02095	4.2A	N/A	NCR
BI LOG PERIODIC, ANTENNA	Schaffner	CBL6112B	TEMC00005	N/A	24	01-Nov-2023
Loop Antenna	Com Power	AL-130	TEMC00025	N/A	24	14-Oct-2023
EMC Chamber	Panashield	N/A	TEMC00031	N/A	36	28-Jan-2024
Test Software	Rohde & Schwarz	EMC32	TEMC00184	10.50.00	N/A	NCR
A81-0303 18 GHz Cable Set	Teledyne Storm Products	A81-0303-360/96	TEMC00201	N/A	12	26-Mar-2023

TU - Traceability Unscheduled
O/P MON - Traceability Unscheduled
N/A - Not Applicable
NCR – No Calibration Required

2.4 Power Line Conducted Emissions

2.4.1 Specification Reference

FCC: Section 15.207
ISED Canada; RSS-GEN 8.8

2.4.2 Equipment Under Test and Modification State

S/N: 2007932

2.4.3 Date of Test

8/4/2022

2.4.4 Test Method

ANSI C63.10 section 6.2 was the guiding document for this evaluation. Conducted emissions were performed from 150 kHz to 30 MHz with the spectrum analyzer's resolution bandwidth set to 9 kHz and the video bandwidth set to 30 kHz. The calculation for the conducted emissions is as follows:

Corrected Reading = Analyzer Reading + LISN Loss + Cable Loss
Margin = Applicable Limit - Corrected Reading

2.4.5 Environmental Conditions

Ambient Temperature	21.9 °C
Relative Humidity	52 %
Atmospheric Pressure	1018 mbar

2.4.6 Test Results

Frequency of Emission (MHz)	Conducted Limit (dBµV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

Table 2.4.6-1: Quasi-peak Detector Results on AC Power Port

Frequency (MHz)	QuasiPeak (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	30.48	N	10.2	35.52	66.00
9.541500	28.50	N	11.0	31.50	60.00
13.560000	29.59	N	11.2	30.41	60.00
21.750000	24.61	L1	11.6	35.39	60.00
21.988500	25.34	L1	11.6	34.66	60.00
25.138500	31.29	L1	11.8	28.71	60.00

Table 2.4.6-2: Average Detector Results on AC Power Port

Frequency (MHz)	Average (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
13.560000	22.53	L1	11.1	27.47	50.00
25.539000	24.28	L1	11.8	25.72	50.00

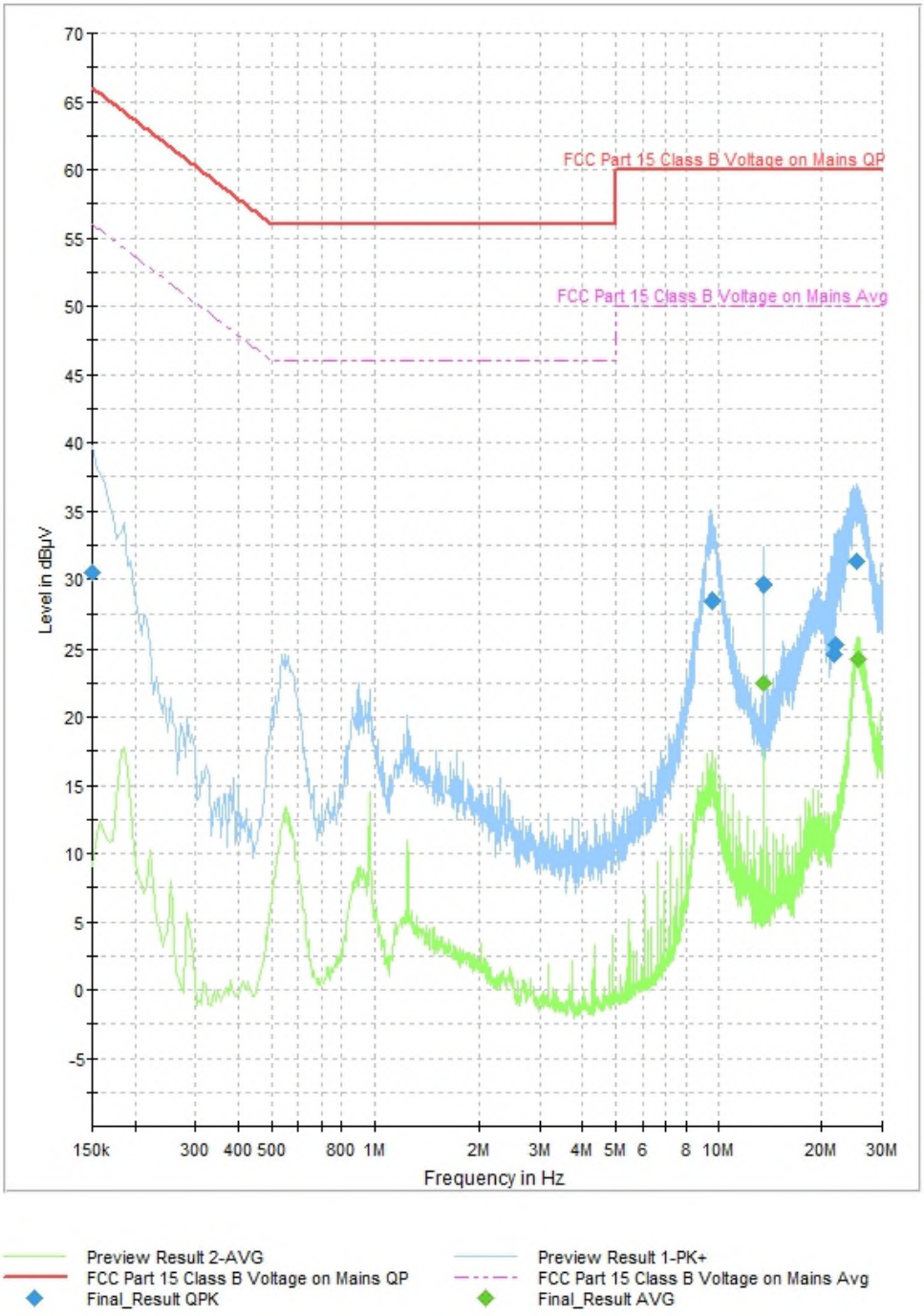

Figure 2.4.6-1: AC Mains Composite Line and Neutral Conducted Emissions Plot

2.4.7 Test Location and Test Equipment Used

This test was carried out in TÜV SÜD America, Inc., 5610 W. Sligh Ave, Suite 100, Tampa, FL 33634, USA.

Instrument	Manufacturer	Type No	TE No	Software / Firmware Revision	Calibration Period (months)	Calibration Due
LISN	Rohde & Schwarz	ESH3-Z5	TEMC00002	N/A	12	07-Feb-2023
EMI Test Receiver	Rohde & Schwarz	ESCS30	TEMC00011	2.3003.0203.36	12	01-Feb-2023
RFI/EMI Shielded Enclosure	UNIVERSAL SHIELDING CORP.	N/A	TEMC00100	N/A	N/A	NCR
Test Software	Rohde & Schwarz	EMC32	TEMC00184	10.50.00	N/A	NCR

TU - Traceability Unscheduled
O/P MON - Traceability Unscheduled
N/A - Not Applicable
NCR – No Calibration Required

3 Test Equipment Information

3.1 General Test Equipment Used

Instrument	Manufacturer	Type No	TE No	Software / Firmware Revision	Calibration Period (months)	Calibration Due
100Hz-26.5GHz EMC analyzer/HYZ	Agilent	E7405A	BEMC00523	A.14.06	12	01-Feb-2023
Tile Automation Software	ETS Lindgren	TILE4! - Version 4.2.A	BEMC02095	4.2A	N/A	NCR
BI LOG PERIODIC, ANTENNA	Schaffner	CBL6112B	TEMC00005	N/A	24	01-Nov-2023
Loop Antenna	Com Power	AL-130	TEMC00025	N/A	24	14-Oct-2023
EMC Chamber	Panashield	N/A	TEMC00031	N/A	36	28-Jan-2024
Test Software	Rohde & Schwarz	EMC32	TEMC00184	10.50.00	N/A	NCR
A81-0303 18 GHz Cable Set	Teledyne Storm Products	A81-0303-360/96	TEMC00201	N/A	12	26-Mar-2023
LISN	Rohde & Schwarz	ESH3-Z5	TEMC00002	N/A	12	07-Feb-2023
EMI Test Receiver	Rohde & Schwarz	ESCS30	TEMC00011	2.3003.0203.36	12	01-Feb-2023
RFI/EMI Shielded Enclosure	UNIVERSAL SHIELDING CORP.	N/A	TEMC00100	N/A	N/A	NCR
Test Software	Rohde & Schwarz	EMC32	TEMC00184	10.50.00	N/A	NCR

TU - Traceability Unscheduled
O/P MON - Traceability Unscheduled
N/A - Not Applicable
NCR – No Calibration Required

4 Diagram of Test Set-ups

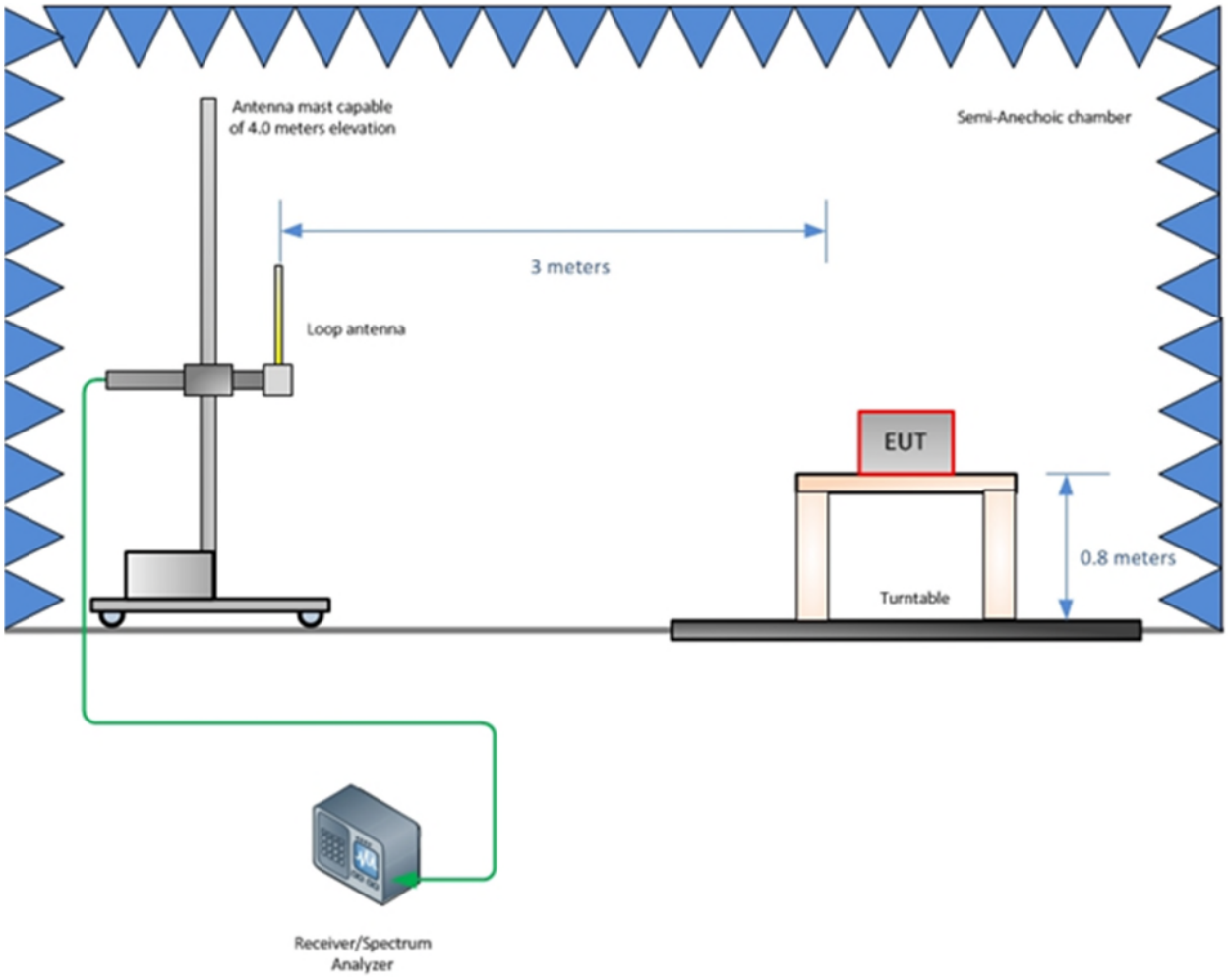

Figure 4-1 - Radiated Emissions Test Setup up to 30 MHz

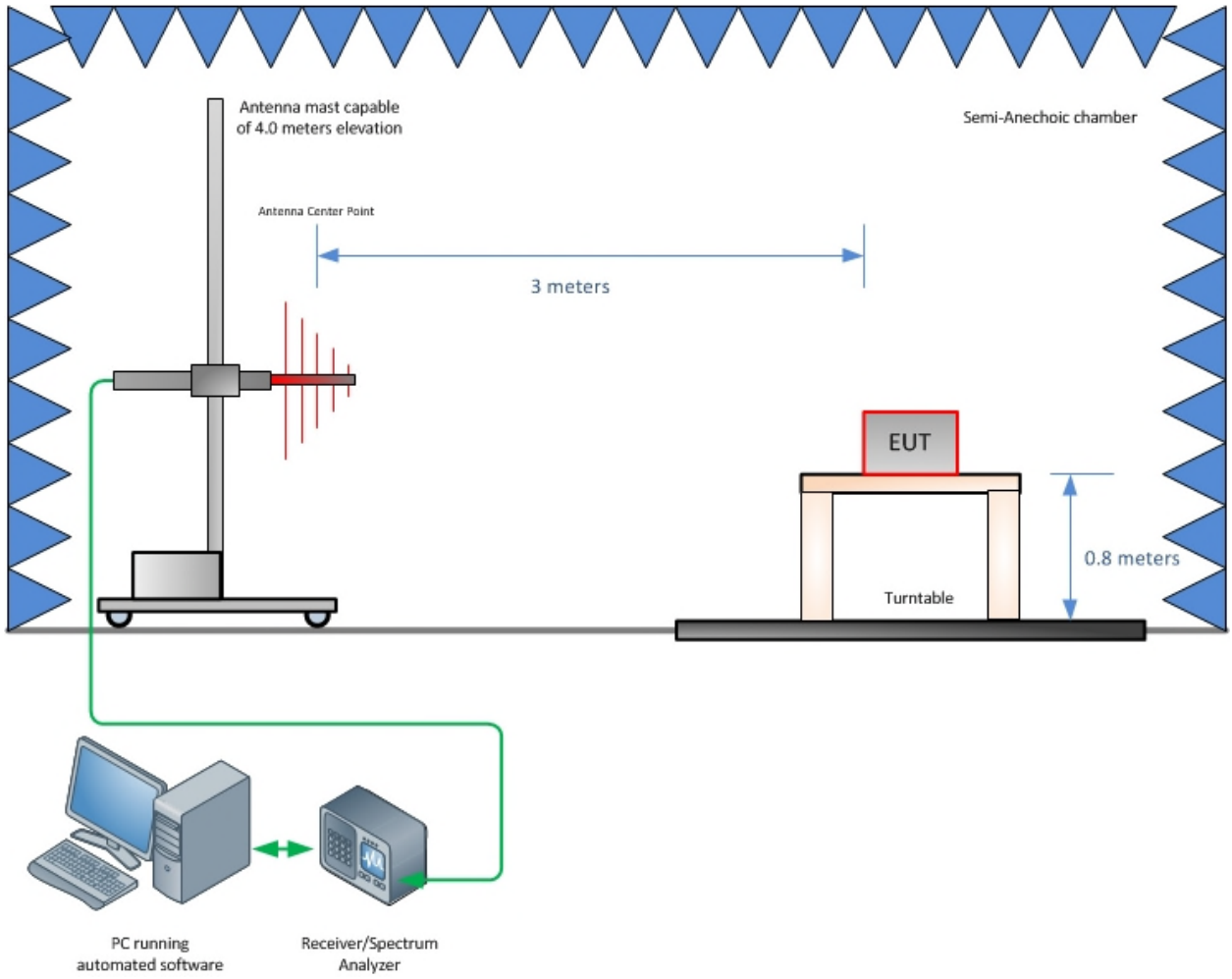

Figure 4-2 - Radiated Emissions Test Setup up to 1 GHz

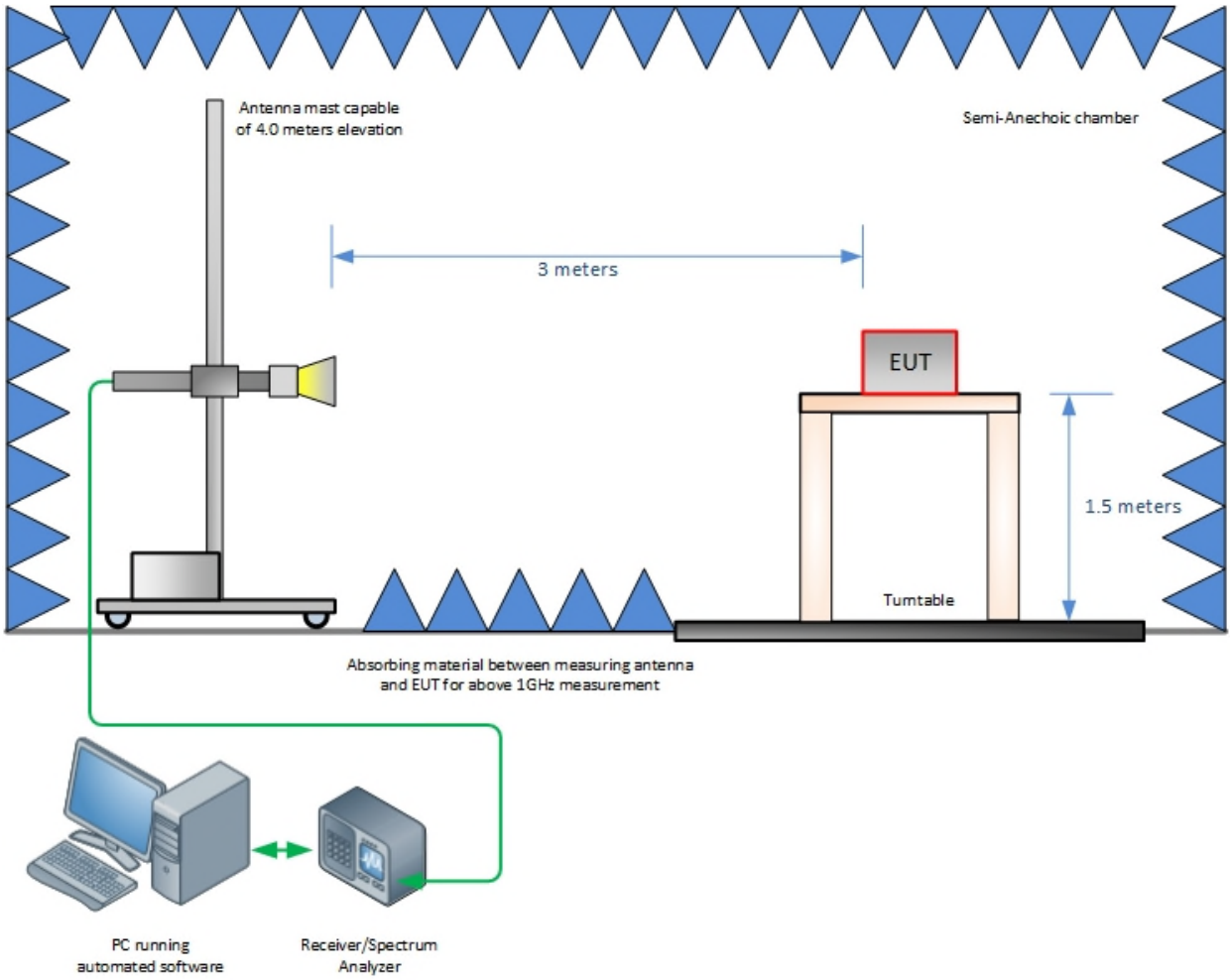

Figure 4-3 - Radiated Emissions Test Setup above 1 GHz

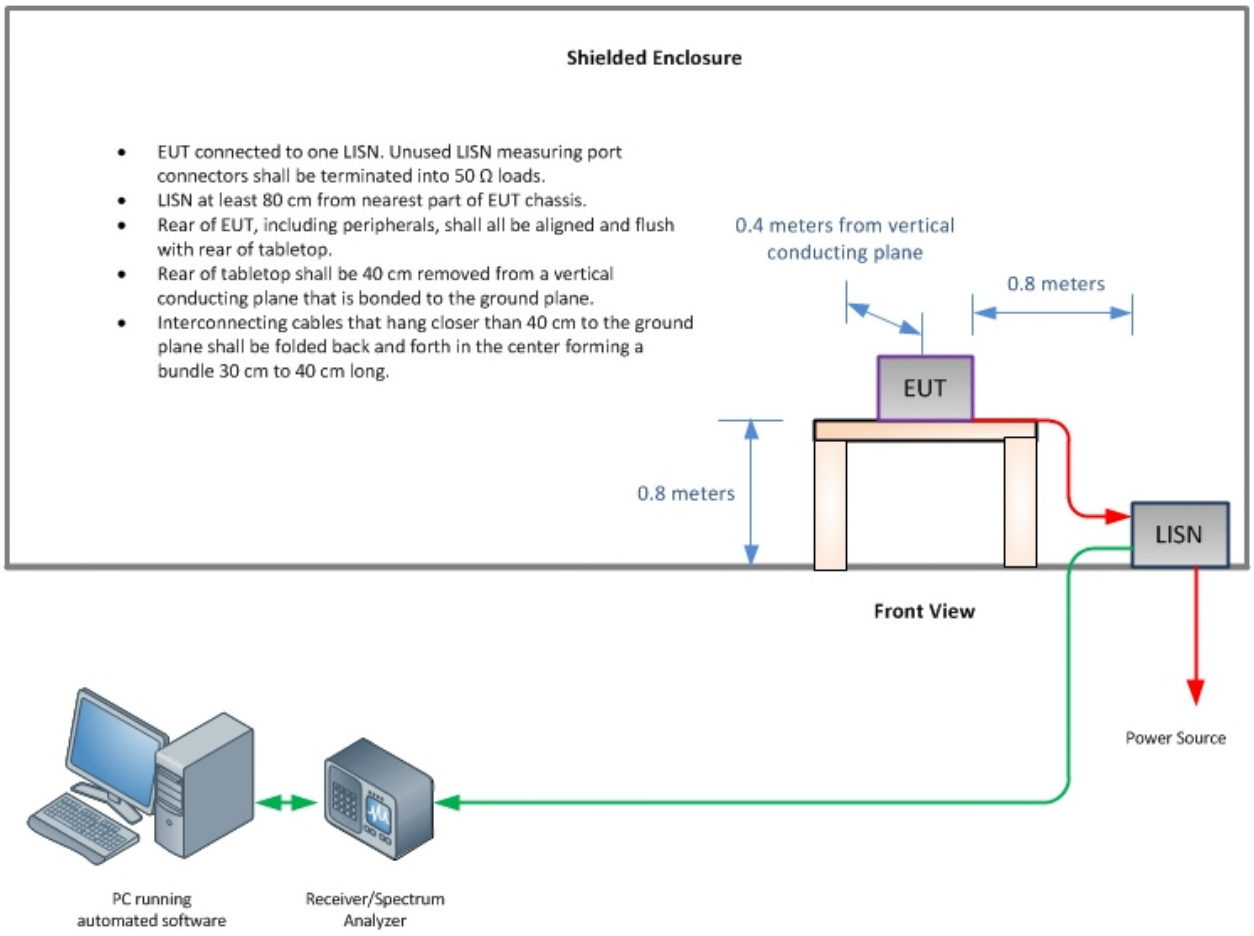

Figure 4-4 – Conducted Emissions Test Setup

5 Measurement Uncertainty

For a 95% confidence level, the measurement uncertainties for defined systems are:

Table 5-1 - Values of U_{cispr} and U_{Lab}

Measurement	U_{cispr}	U_{Lab}
Conducted disturbance (mains port) (9 kHz – 150 kHz) (150 kHz – 30 MHz)	 3.8 dB 3.4 dB	 3.71 dB 3.31 dB
Conducted disturbance (telecom port) (150 kHz – 30 MHz 55 dB LCL) (150 kHz – 30 MHz 65 dB LCL) (150 kHz – 30 MHz 75 dB LCL)	 5.0 dB 5.0 dB 5.0 dB	 4.11 dB 4.50 dB 4.94 dB
Radiated disturbance (electric field strength on an open area test site or alternative test site) (30 MHz – 1 000 MHz) (1 – 6 GHz) (6-18 GHz)	 6.3 dB 5.2 dB 5.5 dB	 5.85 dB 4.48 dB 4.48 dB

Notes:

U_{cispr} resembles a value of measurement uncertainty for a specific test, which was determined by considering uncertainties associated with the quantities listed in CISPR 16-4-2:2011.

6 Accreditation, Disclaimers and Copyright

TÜV SÜD America Inc.'s reports apply only to the specific sample tested under stated test conditions. It is the manufacturer's responsibility to assure the continued compliance of production units of this model. TÜV SÜD America, Inc. shall have no liability for any deductions, inferences or generalizations drawn by the client or others from TÜV SÜD America, Inc.'s issued reports.

This report is the confidential property of the client. As a mutual protection to our clients, the public and TÜV SÜD America, Inc., extracts from the test report shall not be reproduced, except in full without TÜV SÜD America, Inc.'s written approval.

This report must not be used to claim product certification, approval, or endorsement by A2LA, NIST, or any agency of the federal government.