Report on the Testing of the

Landis + Gyr Technology, Inc.
S5-MCM0 & M3429

In accordance with:
FCC 47 CFR part 15.247
ISED RSS-247 Issue 3, August 2023

Prepared for: Landis + Gyr Technology, Inc.
30000 Mill Creek Ave., Suite 100
Alpharetta, GA 30022

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Jean-Charles, Yves-Thierry	**Senior Engineer** **TUV SUD America Inc.**	**Authorized Signatory**	**06-23-2025**

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD America, Inc. document control rules.

FCC Accreditation Designation Number US1233
FCC Test Site Registration Number 967699
Innovation, Science, and Economic Development Canada Lab Code 23932

EXECUTIVE SUMMARY

A sample of this product was tested and found to be compliant with the standards listed above.

A2LA Cert. No. 2955.09

DISCLAIMER AND COPYRIGHT

ACCREDITATION

Our A2LA Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our A2LA Accreditation.

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Contents

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.

Table 1.1-1 – Modification Record

Issue	Description of Change	Date of Issue
0	First Issue	5/13/2025
1	Updated Model name MCMO to MCM0	5/30/2025
2	Antenna gain is updated from 1 dBi to 0 dBi	6/23/2025

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 15.247, and Innovation, Science and Economic Development Canada's Radio Standards Specification RSS-247 for the tests documented herein. The document addresses the implementation of a new Front-End Module (FEM) on the S5-MCM0 module, FCC/IC ID: R7PNG0R1S7/5294A-NG0R1S7, integrated onto the Aclara PCB board, for a Class II Permissive Change. The transmission modes and antenna specifications discussed in this report are applicable to the 900 MHz radio of the S5-MCM0 radio module.

Applicant	Mr. Raghav Goteti
Manufacturer	Landis + Gyr Technology, Inc.
Applicant's Email Address	Raghav.Goteti@landisgyr.com
Model Name & Number(s)	S5-MCM0 & M3429
Product Marketing Name(s)	Aclara
Serial Number(s)	Mesh IP: 9300E89D Mesh: 9300E89B
FCC ID	R7PNG0R1S7
ISED Certification Number	5294A-NG0R1S7
Hardware Version(s)	AB & AE
Software Version(s)	RF Mesh: S5GS3B-21.20 RF Mesh IP: S5SR3B-24.36
Number of Samples Tested	2
Test Specification/Issue/Date	US Code of Federal Regulation (CFR): Title 47, Part 15, Subpart C: Radio Frequency Devices, Intentional Radiators, 2025 ISED Canada Radio Standards Specification: RSS-247 – Digital Transmission Systems (DTSs), Frequency Hopping

	Systems (FHSs) and License-Exempt Local Area Network (LE-LAN) Devices, Issue 3, August 2023.
Order Number	721007330
Date of Receipt of EUT	2/3/2025
Start of Test	3/31/2025
Finish of Test	4/2/2025
Related Document(s)	ANSI C63.10-2013: American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Device. FCC OET KDB 558074 D01 15.247 Meas Guidance v05r02: Guidance for Compliance Measurements on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid System Devices Operating under Section 15.247 of the FCC Rules, April 2, 2019 US Code of Federal Regulations (CFR): Title 47, Part 2, Subpart J: Equipment Authorization Procedures, 2025. ISED Canada Radio Standards Specification: RSS-GEN – General Requirements for Compliance of Radio Apparatus, Issue 5, Amendment 1 (March 2019), Amendment 2 (February 2021)

1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with FCC Part 15.247 and ISED Canada's RSS-247 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	-------	11
Carrier Frequency Separation	No	Not Tested	15.247(a)(1)	RSS-247 5.1(b)	----
Number of Hopping Channels	No	Not Tested	15.247(a)(1)(i)	RSS-247 5.1(c)	----
Channel Dwell Time	No	Not Tested	15.247(a)(1)(i) 15.247(f)	RSS-247 5.1(c) RSS-247 5.3(a)	----
20 dB Bandwidth	No	Not Tested	15.247(a)(1)(i)	RSS-247 5.1(c)	----
99% Bandwidth	No	Not Tested	-------	RSS-GEN 6.7	----
Peak Output Power	No	Not Tested	15.247(b)(2)	RSS-247 5.4(a)	----
Average Output Power	No	Not Tested	15.247(b)(3)	RSS-247 5.4(a)	----
Band-Edge Compliance of RF Conducted Emissions	No	Not Tested	15.247(d)	RSS-247 5.5	----
RF Conducted Spurious Emissions	No	Not Tested	15.247(d)	RSS-247 5.5	----
Radiated Spurious Emissions into Restricted Frequency Bands	Yes	Pass	15.205, 15.209	RSS-GEN 8.9, 8.10	12
Power Spectral Density	No	Not Tested	15.247(e)	RSS-247 5.2(b)	----
Duty Cycle	No	--------			----

1.4 Product Information

1.4.1 Technical Description

The Module (S5-MCM0) is SUB GHz radio. It operates 902 -928 MHz radio frequency.

Table 1.4.1-1 – Wireless Technical Information

Detail	Description
FCC ID	R7PNG0R1S7
ISED Certification Number	5294A-NG0R1S7
Module Model Name(s) / Number(s)	S5-MCM0 & M3429
PMN(s)	Aclara
Frequency Range	902 – 928 MHz
Modulation Format	2-FSK, 2-GFSK
*Antenna Type / Description:	Planar Inverted-F Antenna (PIFA) / 0 dBi

Note: "*" – Declared by the client.
A full description and detailed product specification details are available from the manufacturer.

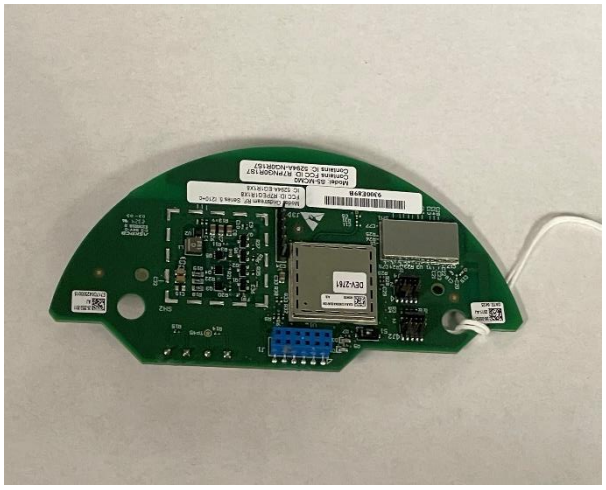

Figure 1.4.1-1: Front End of the Radiated EUT Module

Figure 1.4.1-2: Rear End of the Radiated EUT Module

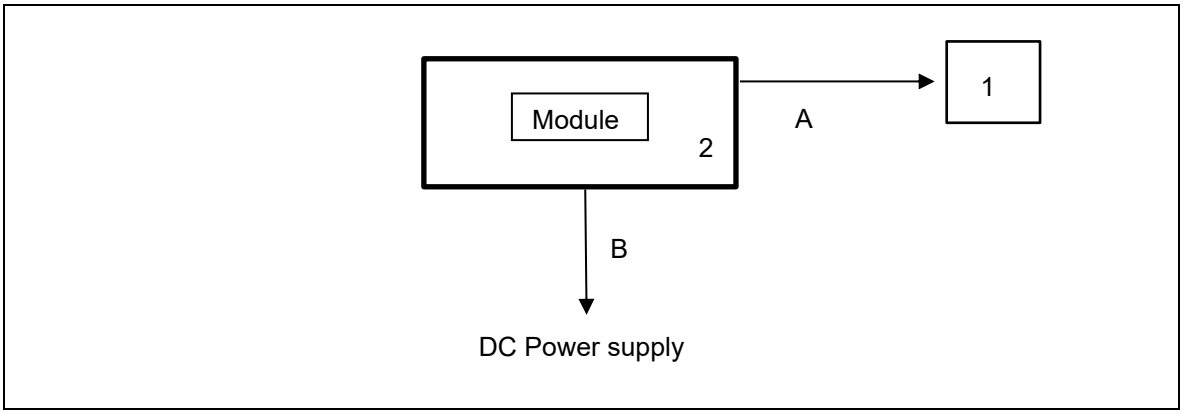

Figure 1.4.1-3 –Radiated Test Setup Block Diagram

Table 1.4.1-2 – Cable Descriptions

Item	Cable/Port	Description
A	USB Serial cable	Programming cable connected to laptop
B	DC Power Supply Cable	Power Supply DC power supply

Table 1.4.1-3 – Support Equipment Descriptions

Item	Make/Model	Description
1	Thinkpad	Laptop for configuration
2	Landis & Gyr	Evaluation Board

1.4.2 Modes of Operation

The Landis + Gyr S5-MCM0 radio is an electricity metering module which includes a 900 MHz ISM transmitter.

This test report documents the compliance of the 900 MHz Frequency Hopping Spread Spectrum transceiver mode of operation. This model provides distinct proprietary modes of operation using FHSS classifications as outlined below. S5-MCM0 module on Aclara PCB board went through with FEM changes, so only limited testing was evaluated and documented.

Mode of Operation	Frequency Range (MHz)	Number of Channels	Channel Separation (kHz)	Stack / Mode	Data Rates (kbps) / Coding Schemes	Classification
1	902.3 – 927.8	86	300	RF Mesh Wideband (FSK)	9.6, 19.2, 38.4	FHSS
2	902.3 – 927.5	85	300	RF Mesh Wideband (FSK)	115.2	FHSS
3	904 – 927.8	239	100	RF Mesh Narrow band (FSK)	9.6, 19.2, 38.4	FHSS
4	902.4 – 927.6	64	400	RF Mesh IP (FSK)	10.0, 20.0, 50.0, 150.0, 200.0	FHSS

1.4.3 Monitoring of Performance

For radiated emissions, the EUT was evaluated in three orthogonal orientations. The worst-case orientation was Y-position. See test setup photos for more information. The EUT was programmed to generate a continuously modulated signal on each channel evaluated.

The worst-case mode for all parameters measured is listed below:

Mode	Classification	20dB/99% Bandwidth	Number of Hopping Channels	Carrier Frequency Separation	Peak Output Power	Average Output Power	RF Conducted Spurious Emissions	Band-Edge RF Conducted Emissions	RSE into Restricted Frequency Bands	Power Spectral Density
		Data Rate (kbps)								
1	FHSS	*	*	*	***	NA	***	***	9.6	NA
2	FHSS	**	***	**	***	NA	**	***	**	NA
3	FHSS	**	**	**	**	NA	**	***	**	NA
4	FHSS	*	*	*	***	NA	***	***	10.0	NA

* Addressed in original filing
** Addressed by mode 1
*** Addressed and measured in Axei PCB board test, refer to report 721007330.1P0

Power setting during test: Mode of operation 1 & 4: Power Setting - 270

1.5 Deviations from the Standard

No deviations from the applicable test standard were made during testing.

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
0	Initial State		

The equipment was tested as provided without any modifications.

1.7 Test Location

TÜV SÜD conducted the following tests at our Alpharetta, GA test laboratory.

Test Name	Name of Engineer(s)	Accreditation
Antenna Requirement	Bhagyashree Chaudhary	A2LA
Radiated Spurious Emissions into Restricted Frequency Bands	Bhagyashree Chaudhary	A2LA

Office address:
TÜV SÜD America
5945 Cabot Parkway, Suite 100
Alpharetta, GA 30005, USA

2 Test Details

2.1 Antenna Requirement

2.1.1 Specification Reference

FCC Section: 15.203, 15.204

2.1.2 Equipment Under Test and Modification State

As shown in §1.4 with modification state “0”, as noted in §1.6.

2.1.3 Date of Observation

3/31/2025

2.1.4 Test Method

N/A

2.1.5 Environmental Conditions

N/A

2.1.6 Observation

The EUT utilizes Planar Inverted-F antenna (PIFA) with peak gain 0 dBi for S5-MCM0 which is mounted on the bottom side of the printed circuit board, therefore satisfying the requirements of Section 15.203.

2.2 Radiated Spurious Emissions into Restricted Frequency Bands

2.2.1 Specification Reference

FCC Sections: 15.205, 15.209.
ISED Canada: RSS – Gen 8.9/8.10

2.2.2 Equipment Under Test and Modification State

As shown in §1.4 with modification state “0”, as noted in §1.6.

2.2.3 Date of Test

03/21/2025 to 04/02/2025

2.2.4 Test Method

Radiated emissions tests were made over the frequency range of 9 kHz to 10 GHz, 10 times the highest fundamental frequency of 900 MHz. Each emission found to be in a restricted band as defined by section 15.205, including any emission at the operational band-edge, was compared to the radiated emission limits as defined in Section 15.209.

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 150 kHz, quasi-peak measurements were made using a resolution bandwidth RBW of 300 Hz and a video bandwidth VBW of 1 kHz and frequencies between 150 kHz and 30MHz, quasi-peak measurements were made using a resolution bandwidth RBW of 10 kHz and a video bandwidth VBW of 30 kHz. For frequencies between 30 MHz and 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 and average measurements were made with RBW of 1 MHz and VBW of 3 MHz.

2.2.5 Environmental Conditions

The EUT was evaluated within the temperature, humidity and pressure range of the EUT as specified by the standard. The laboratory shall have an ambient temperature range of 15°C to 35°C, relative humidity range of 30% to 60% and atmospheric pressure range of 86 kPa to 106 kPa.

Ambient Temperature	21 °C
Relative Humidity	47 %
Atmospheric Pressure	980.2 mbar

2.2.6 Test Results

Test Summary: EUT was set to transmit mode as per sections 1.4.2 / 1.4.3.

Test Results: Pass

See data below for detailed results.

Table 2.2.6-1: Radiated Spurious Emissions Tabulated Data – Mode 1 – 9.6 kbps

Frequency (MHz)	Level (dBuV)		Antenna Polarity	Antenna Height	Turntable Position	Correction Factors	Duty Cycle CF	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg	(H/V)	(cm)	(o)	(dB)		pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
902.3 MHz													
2706.9	48.70	44.00	H	116	322	-1.88	-6.27	46.82	42.12	74.0	54.0	27.2	18.2
2706.9	51.00	46.90	V	100	266	-1.88	-6.27	49.12	45.02	74.0	54.0	24.9	15.3
3609.2	47.3	41.8	H	200	324	-0.21	-6.27	47.09	41.59	74.0	54.0	26.9	18.7
3609.2	46.5	40.1	V	112	254	-0.21	-6.27	46.29	39.89	74.0	54.0	27.7	20.4
915 MHz													
2744.825	47.2	40.3	H	143	230	-1.71	-6.27	45.49	38.59	74.0	54.0	28.5	21.7
2744.825	50.3	47.5	V	107	272	-1.71	-6.27	48.59	45.79	74.0	54.0	25.4	14.5
3659.85	46.6	40.9	H	206	327	-0.21	-6.27	46.39	40.69	74.0	54.0	27.6	19.6
3659.85	46.9	40.9	V	145	254	-0.21	-6.27	46.69	40.69	74.0	54.0	27.3	19.6
927.8 MHz													
2783.075	49.5	44.7	H	210	161	-1.57	-6.27	47.93	43.13	74.0	54.0	26.1	17.1
2783.075	50.4	46.8	V	145	266	-1.57	-6.27	48.83	45.23	74.0	54.0	25.2	15.0
3711.275	45.7	38.3	H	254	335	0.49	-6.27	46.19	38.79	74.0	54.0	27.8	21.5
3711.275	45.2	36.4	V	100	253	0.49	-6.27	45.69	36.89	74.0	54.0	28.3	23.4

Sample Calculation:

$R_C = R_U + CF_T$

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: Peak

Corrected Level: 48.70 + -1.88 = 46.82 dBµV/m
Margin: 74dBµV/m – 46.82 dBµV/m = 27.2 dB

Example Calculation: Average

Corrected Level: 44.00 + -1.88 = 42.12 dBµV
Margin: 54dBµV – 42.12 dBµV – (-6.27) = 18.15dB

Table 2.2.6-2: Radiated Spurious Emissions Tabulated Data – Mode 4 – 10 kbps

Frequency (MHz)	Level (dBuV)		Antenna Polarity	Antenna Height	Turntable Position	Correction Factors	Duty Cycle CF	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg	(H/V)	(cm)	(o)	(dB)		pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
902.4 MHz													
2707.2	49.60	45.20	H	173	231	-1.884	-7.71	47.72	43.32	74.0	54.0	26.3	18.4
2707.2	53.10	50.20	V	100	260	-1.884	-7.71	51.22	48.32	74.0	54.0	22.8	13.4
3609.6	47.5	41.3	H	222	327	-0.21	-7.71	47.29	41.09	74.0	54.0	26.7	20.6
3609.6	47	40.9	V	103	230	-0.21	-7.71	46.79	40.69	74.0	54.0	27.2	21.0
915.2 MHz													
2745.6	49.60	45.30	H	119	105	-1.71	-7.71	47.89	43.59	74.0	54.0	26.1	18.1
2745.6	51.40	48.40	V	106	252	-1.71	-7.71	49.69	46.69	74.0	54.0	24.3	15.0
3660.8	46.5	40.4	H	179	301	0.10	-7.71	46.60	40.50	74.0	54.0	27.4	21.2
3660.8	46	39.5	V	117	236	0.10	-7.71	46.10	39.60	74.0	54.0	27.9	22.1
927.6 MHz													
2782.8	53.60	51.40	H	168	232	-1.57	-7.71	52.03	49.83	74.0	54.0	22.0	11.9
2782.8	53.00	50.60	V	212	154	-1.57	-7.71	51.43	49.03	74.0	54.0	22.6	12.7
3710.4	45.1	37.3	H	214	312	0.49	-7.71	45.59	37.79	74.0	54.0	28.4	23.9
3710.4	46.9	39.9	V	125	258	0.49	-7.71	47.39	40.39	74.0	54.0	26.6	21.3

Sample Calculation:

$R_C = R_U + CF_T$

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: Peak

Corrected Level: 49.60 + -1.884 = 47.72 dBµV/m
Margin: 74dBµV/m – 47.72 dBµV/m = 26.3 dB

Example Calculation: Average

Corrected Level: 45.20 + -1.88 = 43.32 dBµV
Margin: 54dBµV – 43.32 dBµV – (-7.71) = 18.4dB

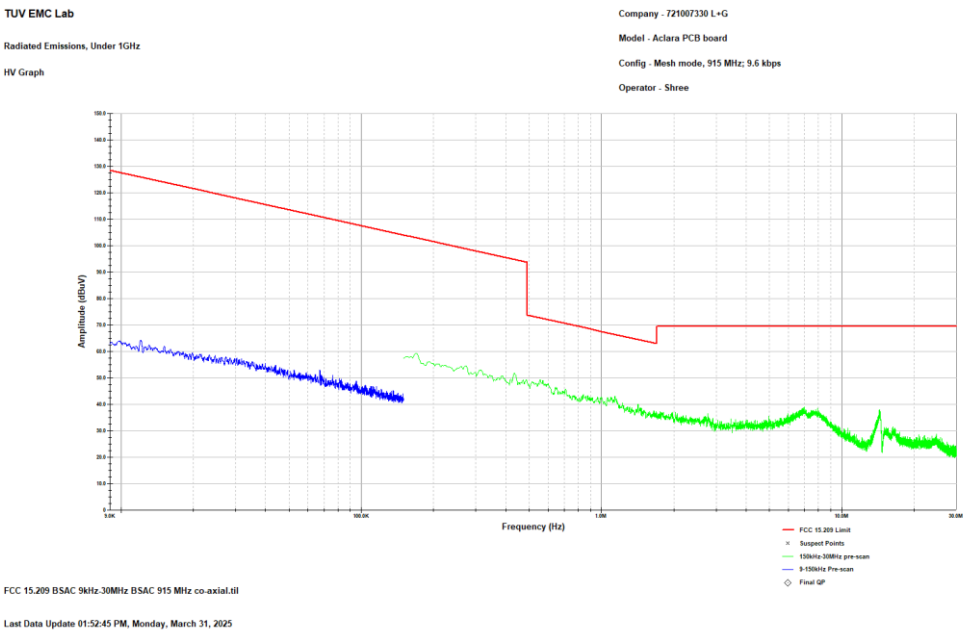

Figure 1: Reference plot for Radiated Spurious Emissions – 9 kHz – 30 MHz – Mode 1 – MCH – 9.6kbps – Coaxial

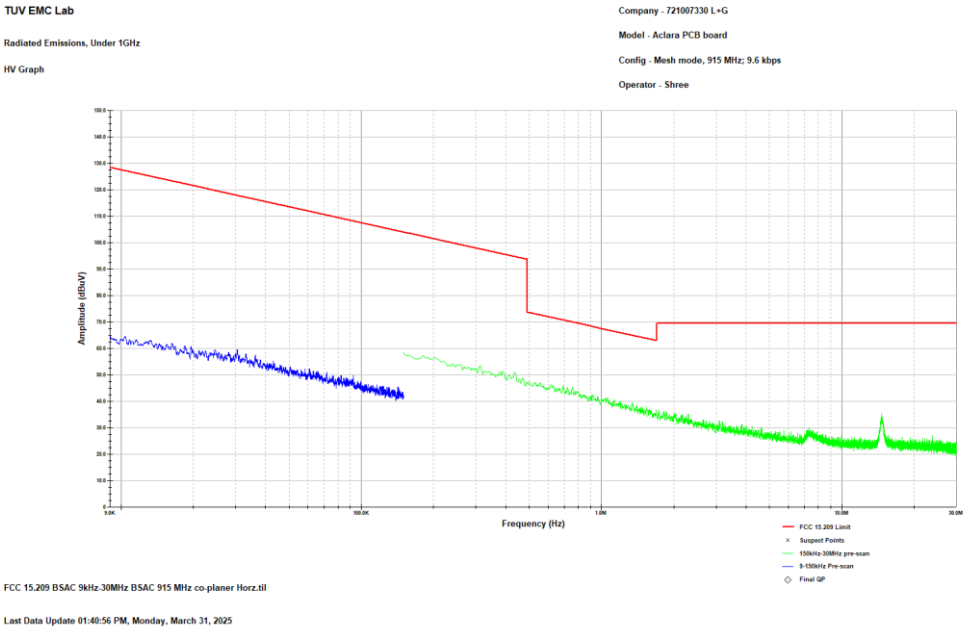

Figure 2: Reference plot for Radiated Spurious Emissions – 9 kHz – 30 MHz – Mode 1 – MCH – 9.6kbps – Co-planar Horizontal

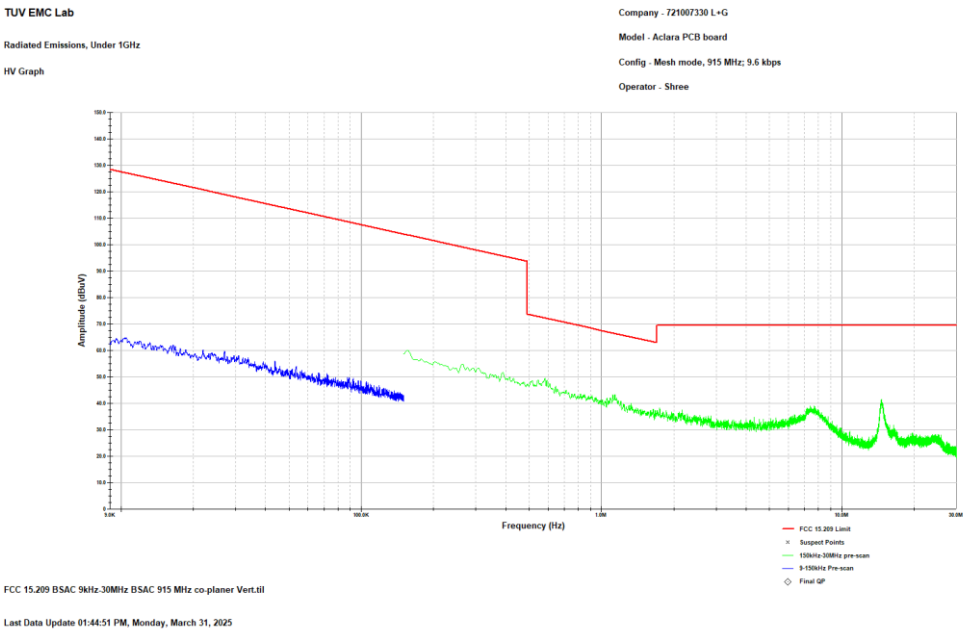

Figure 3: Reference plot for Radiated Spurious Emissions – 9 kHz – 30 MHz – Mode 1 – MCH – 9.6kbps – Co-planar Vertical

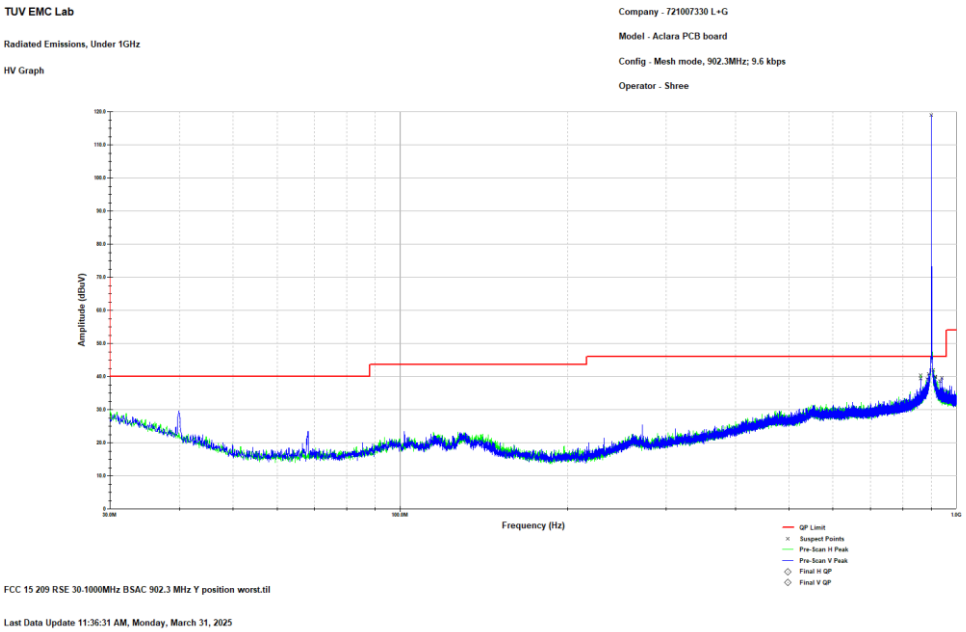

Figure 4: Reference plot for Radiated Spurious Emissions – 30 MHz – 1 GHz – Mode 1– MCH – 9.6kbps

Note: Emission above the limit line was the Fundamental.

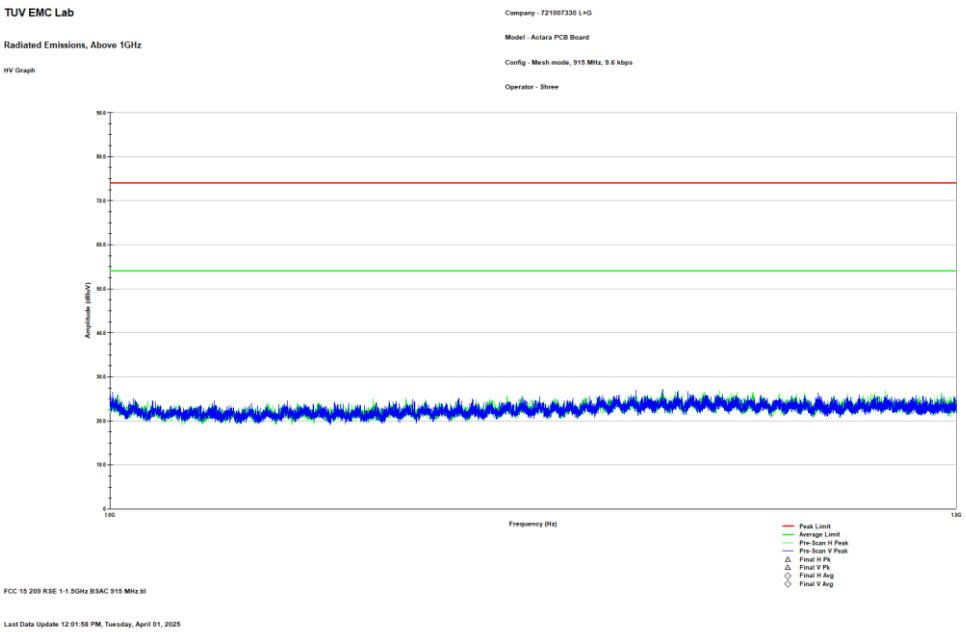

Figure 5: Reference plot for Radiated Spurious Emissions – 1 GHz – 1.5 GHz – Mode 1 – MCH – 9.6kbps

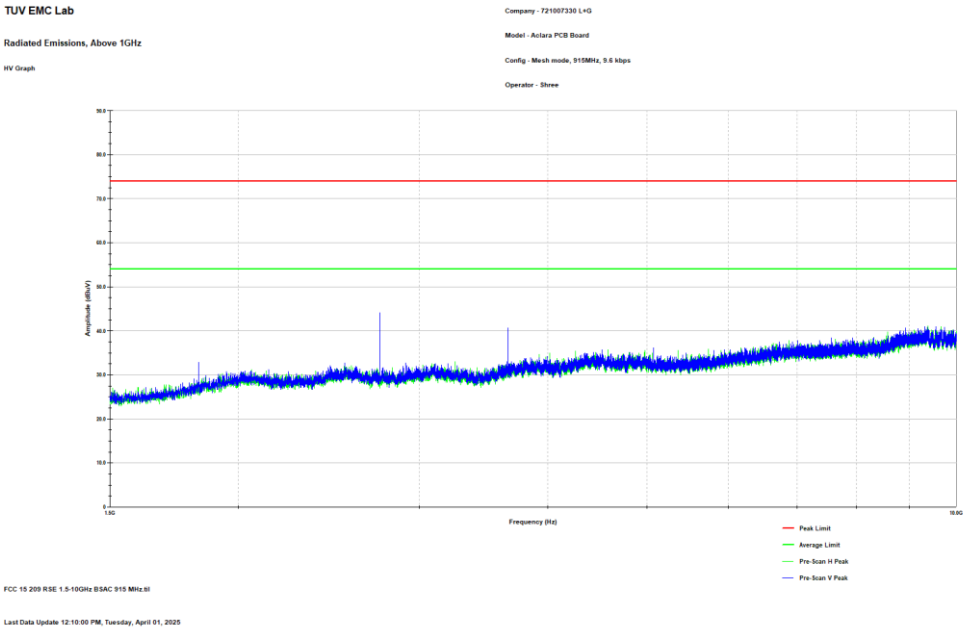

Figure 6: Reference plot for Radiated Spurious Emissions – 1.5 GHz – 10 GHz – Mode 1 – MCH – 9.6kbps

Note: Emissions within restricted bands were evaluated.

2.3 Test Equipment Used

Table 2.3-1 –Equipment List

Asset ID	Manufacturer	Model	Equipment Type	Serial Number	Last Calibration Date	Calibration Due Date
628	EMCO	6502	Active Loop Antenna 10kHz-30MHz	9407-2877	06/20/2023	06/20/2025
853	Teseq	CBL6112D	BiLog Antenna	51616	7/26/2023	7/26/2025
884	ETS Lindgren (EMCO)	3117	DOUBLE-RIDGED GUIDE ANTENNA	240106	5/16/2023	5/16/2025
AEMC0889	Com Power	PAM 103	Pre-amplifier	18020215	09/30/2024	09/30/2025
338	Hewlett Packard	8449B	High Frequency Pre-Amp	3008A01111	06/18/2024	06/18/2026
882	Rohde & Schwarz	ESW44	ESW44 EMI TEST RECEIVER	101961	6/18/2024	6/18/2025
22	Teledyne Storm Microwave	90-195-456	BSAC Cable	N/A	07/15/2024	07/15/2025
20	Teledyne Storm Microwave	R-90-195-036	BSAC Cable	N/A	07/15/2024	07/15/2025
21	Teledyne Storm Microwave	R-90-195-072	BSAC Cable	N/A	07/15/2024	07/15/2025
337	Microwave Circuits	H1G513G1	Microwave filter	282706	06/03/2024	06/03/2025

N/A – Not Applicable

3 Diagram of Test Set-ups

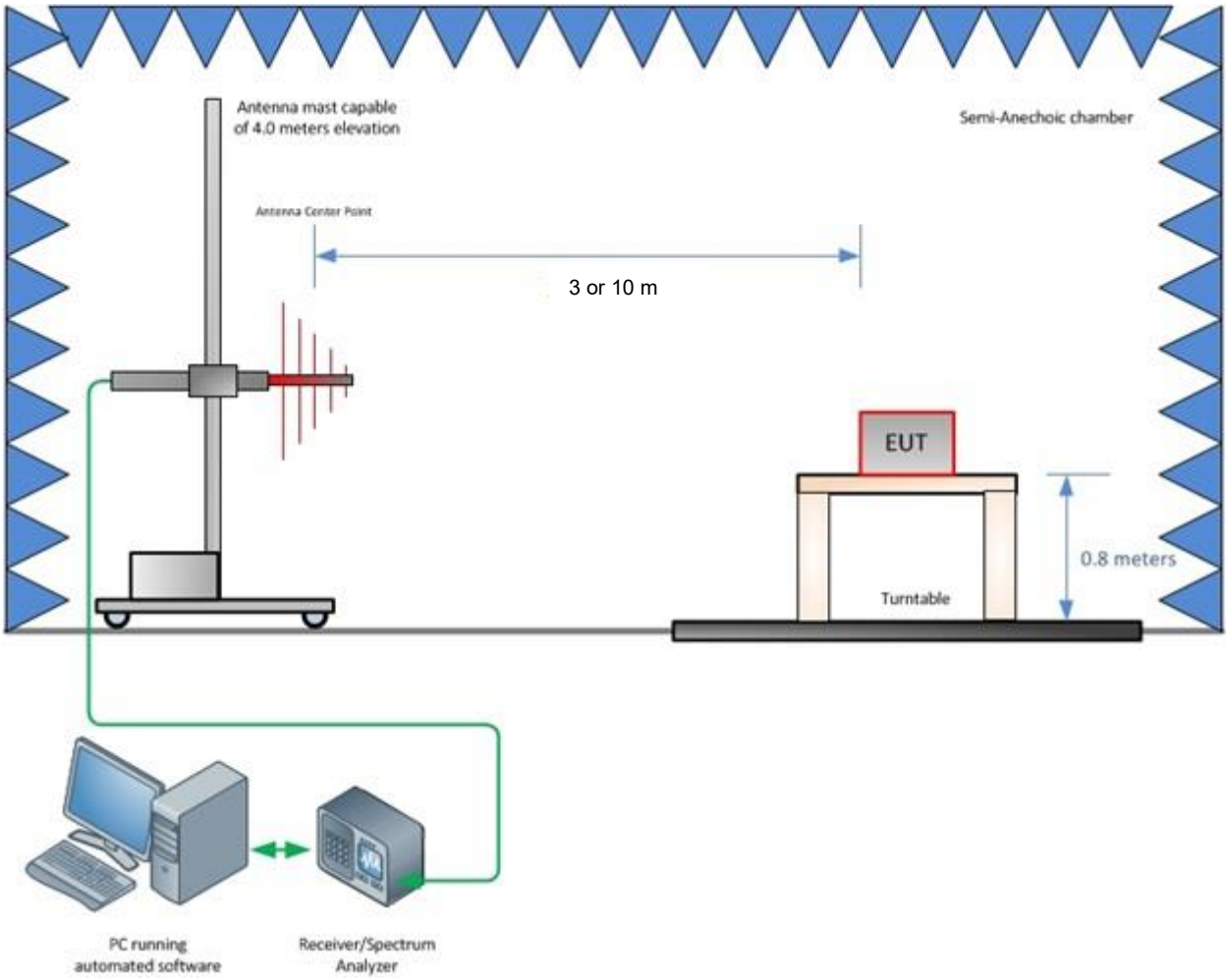

Figure 3-1 – Radiated Emissions Test Setup up to 1 GHz

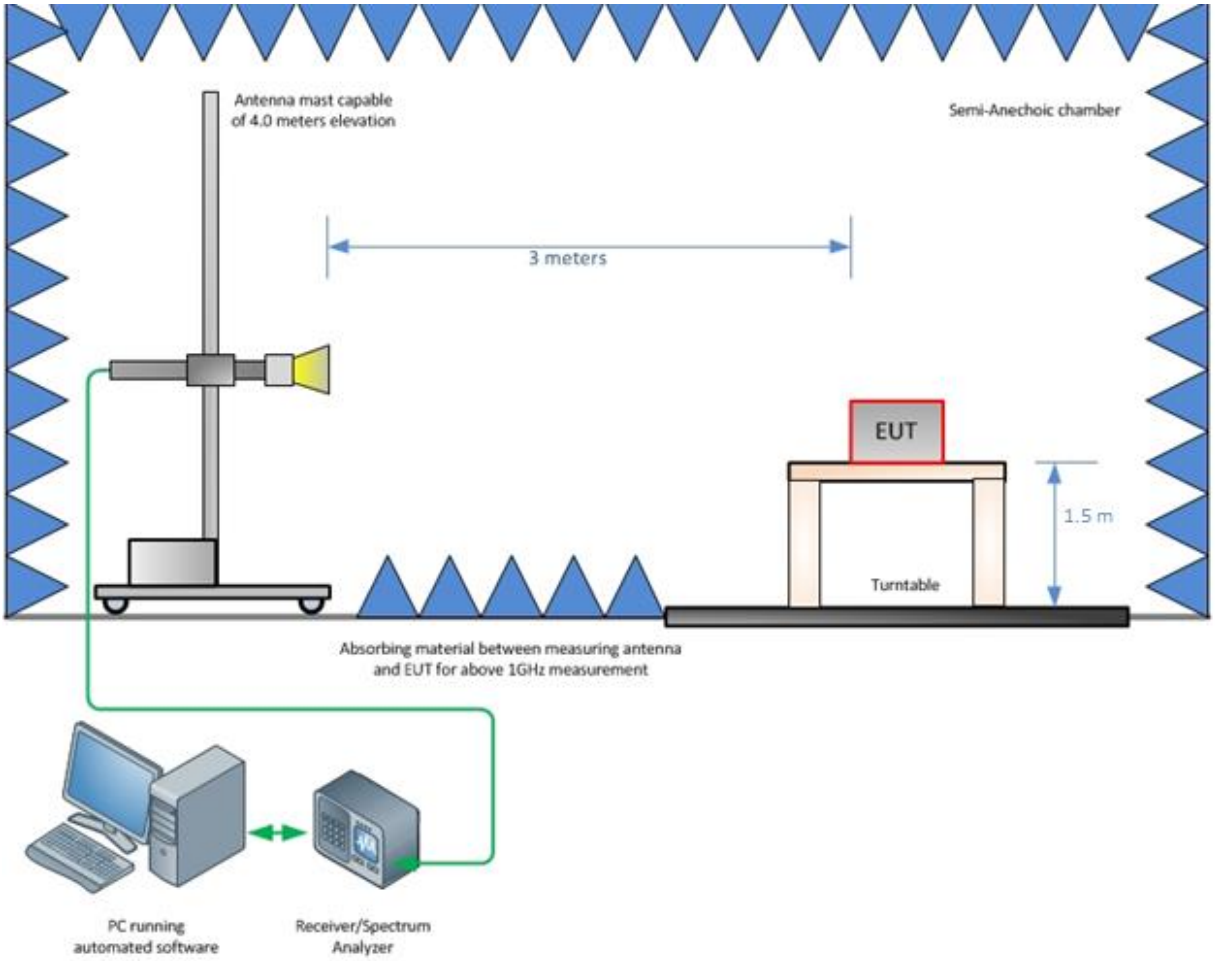

Figure 3-2 – Radiated Emissions Test Setup above 1 GHz

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STATEMENT OF MEASUREMENT UNCERTAINTY

The expanded laboratory measurement uncertainty figures (U_{Lab}) provided below correspond to an expansion factor (coverage factor) k = 1.96 which provide confidence levels of 95%.

Table 4-1: Estimation of Measurement Uncertainty

Parameter	U_{lab}
Occupied Channel Bandwidth	± 0.009 %
RF Conducted Output Power	± 0.349 dB
Power Spectral Density	± 0.372 dB
Antenna Port Conducted Emissions	± 1.264 dB
Radiated Emissions ≤ 1 GHz	± 5.99 dB
Radiated Emissions > 1 GHz	± 4.99 dB
Temperature	± 0.860 °C
Radio Frequency	± 2.832 x 10^{-8}

TEST EQUIPMENT

All measurement instrumentation is traceable to the National Institute of Standards and Technology and is calibrated to meet test method standard requirements and/or manufacturer's specifications.