

Radio Testing of the

Nivelco Process Control Co.
PiloTREK W-200
Model: W24

In accordance with FCC Part 15 Subpart C
§15.256 and ISED RSS-211

Nivelco Process Control Co.
H-1043 Budapest,
Dugonics u. 11.
HUNGARY

COMMERCIAL-IN-CONFIDENCE

Date: January 2026

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RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Authorized Signatory	Ferdinand S. Custodio	01/14/2026	

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EXECUTIVE SUMMARY

A sample of this product was tested and found to be in compliance with FCC Part 15 Subpart C §15.256 and ISED RSS-211.



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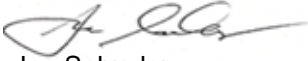
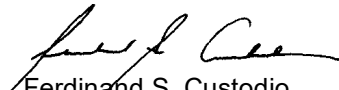
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REPORT ON	Radio Testing of the Nivelco Process Control Co. Model: W24
TEST REPORT NUMBER	721010545
TEST REPORT DATE	January 2026
PREPARED FOR	Nivelco Process Control Co. H-1043 Budapest, Dugonics u. 11. HUNGARY
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APPROVED BY	 Ferdinand S. Custodio Name Authorized Signatory Title: Senior EMC Test Engineer / Wireless Team Lead
DATED	January 14, 2026



Revision History

721010545 Nivelco Process Control Co. Model W24					
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01/14/2026	—	Initial Release			Ferdinand S. Custodio

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SECTION 1

REPORT SUMMARY

Radio Testing of the
Nivelco Process Control Co.
Model: W24



1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Nivelco Process Control Co. Industrial non-contact 80 GHz microwave level transmitter PilotREK W-200 Model: W24 to the requirements of FCC Part 15 Subpart C §15.256 and ISSED RSS-211.

Objective	To perform Radio testing to determine the Equipment Under Test's (EUT's) compliance with the test specification, for the series of tests carried out.
Manufacturer	Nivelco Process Control Co.
EUT	Industrial non-contact 80 GHz microwave level transmitter
Model Name	W24
FCC ID	S7W-W200
IC Number	35045-W200
Serial Number(s)	2025/01
Number of Samples Tested	1
Test Specification/Issue/Date	• FCC Part 15 Subpart C §15.256 (October 1, 2024) • ISSED RSS-211 (Issue 1 March 2015) • ISSED RSS-Gen (Issue 5 April 2018)
Start of Test	May 12, 2025
Finish of Test	October 24, 2025
Name of Engineer(s)	Joe Salvador
Related Document(s)	ANSI C63.10-2020. American National Standard of Procedures for Compliance testing of Unlicensed Wireless Devices.



1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC Part 15 Subpart C §15.256 and ISSED RSS-211 with cross-reference to the corresponding ISSED RSS standard are shown below:

Section	§15.256 Spec Clause	RSS-211	Test Description	Result	Comments/Base Standard
2.1	§15.256(f)	Clause 5.1(a)(b)	Transmitter Fundamental Emission Bandwidth	Compliant	N/A
2.2	§15.256(g)(2)(ii)	Clause 5.2(b)	Transmitter Maximum Peak EIRP	Compliant	N/A
2.3	§15.256(g)	Clause 5.2(b)	Transmitter Maximum Average EIRP	Compliant	N/A
2.4	§15.256(f)	RSS-Gen Clause 8.11	Transmitter Frequency Stability	Compliant	N/A
2.5	§15.256(h) and §15.209	RSS-Gen Clause 8.9	Transmitter Unwanted Emissions	Compliant	N/A
2.6	§15.256(i)(B)	Clause 5.2(a)	Antenna Beamwidth	Compliant	N/A
2.7	§15.256(j)	Clause 5.2(c)	Antenna Side Lobe Gain	Compliant	N/A
2.8	§15.207	RSS-Gen Clause 8.8	Transmitter AC Conducted Emissions	Compliant	N/A



1.3 PRODUCT INFORMATION

1.3.1 Technical Description

The Equipment Under Test (EUT) is a Nivelco Process Control Co. PiloTREK W-200 Model: W24 Industrial non-contact 80 GHz microwave level transmitter.

1.3.2 EUT General Description

EUT Description	Industrial non-contact 80 GHz microwave level transmitter
Trade Name	PiloTREK W-200
Model Name	W24
Rated Voltage	12 – 36VDC (PiloTREK W-200 Stand-alone)
Mode Verified	80GHz radar
Capability	80GHz radar, Bluetooth
Frequency Range	77-81GHz
Primary Unit (EUT)	☐ Production ☒ Pre-Production ☐ Engineering
PRF	1Hz
Frame Time	1000 ms
Duty Cycle	0.022%
Transmission Mode	SISO (1x1)
Dimensions	Approx. 213 mm x 149 mm x 100 mm (8.4" x 5.9" x 3.9")
Weight	42 kg (4.4 lb)
Antenna Type	1 ½" Antenna
Antenna Manufacturer	NIVELCO
TX Antenna Gain	27.8 dBi (Declared by the Manufacturer)
RX Antenna Gain	27.8 dBi (Declared by the Manufacturer)



1.4 EUT TEST CONFIGURATION

1.4.1 Test Configuration Description

Test Configuration	Description
Default	The PiloTREK W-200 is an FMCW radar that was provided as a plug-and-play unit. Once power is applied, the PiloTREK W-200 radar starts transmitting continuously with 1 FMCW sweep per second. The duration of an FMCW sweep is ~220 μ s (218.4 μ s).

1.4.2 EUT Exercise Software

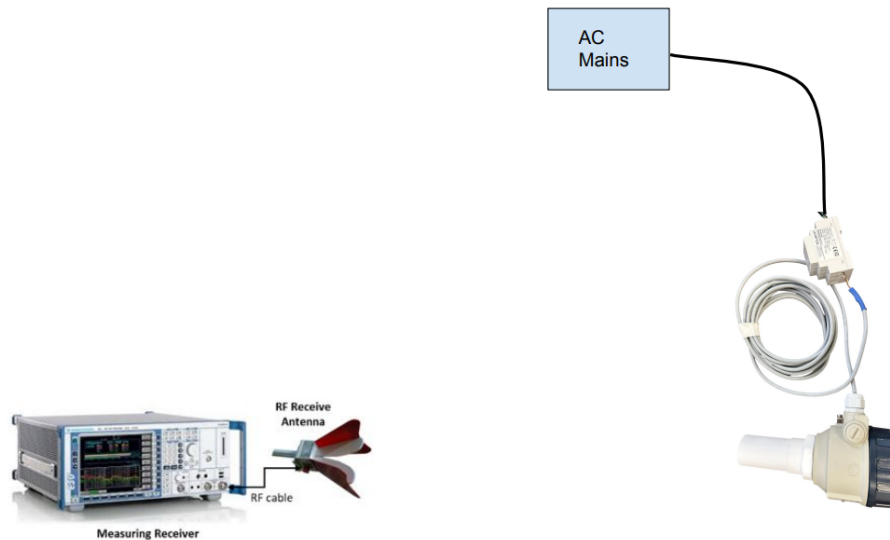
None

1.4.3 Support Equipment and I/O cables

Manufacturer	Equipment/Cable	Description
Nivelco	Harness cable and power switch	NIPOWER PPK-421-1 No:X020285



1.4.4 Simplified Test Configuration Diagram



1.5 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standards or test plan were made during testing.

1.6 MODIFICATION RECORD

Description of Modification	Modification Fitted By	Date Modification Fitted
Serial Number: 2025/01		
None	—	—

The table above details modifications made to the EUT during the test programme. The modifications incorporated during each test (if relevant) are recorded on the appropriate test pages.

1.7 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

For conducted and radiated emissions, the equipment under test (EUT) was configured to measure its highest possible emission level. This level was based on the maximized cable configuration from exploratory testing per ANSI C63.10-2020. The test modes were adapted according to the Operating Instructions provided by the manufacturer/client.



1.8 TEST FACILITY LOCATION

1.8.1 TÜV SÜD America Inc. (Mira Mesa)

10040 Mesa Rim Road, San Diego, CA 92121-2912 (32.901268,-117.177681). Phone: (858) 678 1400 Fax: (858) 546 0364

1.8.2 TÜV SÜD America Inc. (Rancho Bernardo)

16936 Via Del Campo, San Diego, CA 92127-1708 (33.018644,-117.092409). Phone: (858) 678 1400 Fax: (858) 546 0364.

1.9 TEST FACILITY REGISTRATION

1.9.1 FCC – Designation No.: US1146

TÜV SÜD America Inc. (San Diego), is an accredited test facility with the site description report on file and has met all the requirements specified in §2.948 of the FCC rules. The acceptance letter from the FCC is maintained in our files and the Designation is US1146.



1.9.2 Innovation, Science and Economic Development Canada (ISED) Registration No.: 3067A-1 & 22806-1

The 10m Semi-anechoic chamber of TÜV SÜD America Inc. (San Diego Rancho Bernardo) has been registered by Certification and Engineering Bureau of Innovation, Science and Economic Development Canada for radio equipment testing with Registration No. 3067A-1.

The 3m Semi-anechoic chamber of TÜV SÜD America Inc. (San Diego Mira Mesa) has been registered by Certification and Engineering Bureau of Innovation, Science and Economic Development Canada for radio equipment testing with Registration No. 22806-1.

1.9.3 BSMI – Laboratory Code: SL2-IN-E-028R (US0102)

TÜV Product Service Inc. (San Diego) is a recognized EMC testing laboratory by the BSMI under the MRA (Mutual Recognition Arrangement) with the United States. Accreditation includes CNS 13438 up to 6GHz.

1.9.4 NCC (National Communications Commission - US0102)

TÜV SÜD America Inc. (San Diego) is listed as a Foreign Recognized Telecommunication Equipment Testing Laboratory and is accredited to ISO/IEC 17025 (A2LA Certificate No.2955.13) which under APEC TEL MRA Phase 1 was designated as a Conformity Assessment Body competent to perform testing of equipment subject to the Technical Regulations covered under its scope of accreditation including RTTE01, PLMN01 and PLMN08 for TTE type of testing and LP002 for Low-Power RF Device type of testing.

1.9.5 VCCI – Registration No. A-0412 and A-0413

TÜV SÜD America Inc. (San Diego) is a VCCI registered measurement facility which includes radiated field strength measurement, radiated field strength measurement above 1GHz, mains port interference measurement and telecommunication port interference measurement.

1.9.6 RRA – Identification No. US0102

TÜV SÜD America Inc. (San Diego) is National Radio Research Agency (RRA) recognized laboratory under Phase I of the APEC Tel MRA.

1.9.7 OFCA – U.S. Identification No. US0102

TÜV SÜD America Inc. (San Diego) is recognized by Office of the Communications Authority (OFCA) under Appendix B, Phase I of the APEC Tel MRA.



SECTION 2

TEST DETAILS

Radio Testing of the
Nivelco Process Control Co.
Model: W24

2.1 TRANSMITTER FUNDAMENTAL EMISSION BANDWIDTH

2.1.1 Specification Reference

FCC 47 CFR Part 15, Clause 15.256(f)(1)
RSS-211 Clause 5.1(a)(b)

2.1.2 Standard Applicable

(f) The fundamental bandwidth of an LPR emission is defined as the width of the signal between two points, one below and one above the center frequency, outside of which all emissions are attenuated by at least 10 dB relative to the maximum transmitter output power when measured in an equivalent resolution bandwidth.

(1) The minimum fundamental emission bandwidth shall be 50 MHz for LPR operation under the provisions of this section.

2.1.3 Equipment Under Test and Modification State

Serial No: 2025/01/ Default Test Configuration

2.1.4 Date of Test/Initial of test personnel who performed the test

May 12, 2025 / JS

2.1.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Mira Mesa facility SR5

Ambient Temperature	25.1 °C
Relative Humidity	56.2 %
ATM Pressure	100.3 kPa

2.1.7 Additional Observations

- This is a radiated test.
- Test methodology is per Section 9.10 of ANSI C63.10-2020.

2.1.8 Test Results



10 dB Bandwidth Points		Limit
T1 (FL)	77.00 (GHz)	> 75 GHz
T2 (FH)	83.52 (GHz)	< 85 GHz
Bandwidth	6.52 (GHz)	> 50 MHz
RESULT		PASS

2.2 TRANSMITTER MAXIMUM PEAK EIRP

2.2.1 Specification Reference

FCC 47 CFR Part 15, Clause 15.256(g)(2)(ii)
RSS-211 Clause 5.2(b)

2.2.2 Standard Applicable

(ii) The EIRP in 50 MHz is computed from the maximum power level measured with a peak detector in a 50-MHz bandwidth centered on the frequency at which the maximum average power level is realized and this 50 MHz bandwidth must be contained within the authorized operating bandwidth. For a RBW less than 50 MHz, the peak EIRP limit (in dBm) is reduced by $20 \log(\text{RBW}/50)$ dB where RBW is the resolution bandwidth in megahertz. The RBW shall not be lower than 1 MHz or greater than 50 MHz. The video bandwidth of the measurement instrument shall not be less than the RBW. If the RBW is greater than 3 MHz, the application for certification filed shall contain a detailed description of the test procedure, calibration of the test setup, and the instrumentation employed in the testing.

Frequency Band (GHz)	Average Emission Limit (EIRP in dBm/MHz) as Measured Boresight	Peak Emission Limit (EIRP in dBm Measured in 50 MHz) as Measured Boresight
5.65-8.50	-33	+7
24.05-29.00	-14	+26
75-85	-3	+34

2.2.3 Equipment Under Test and Modification State

N/A

2.2.4 Date of Test/Initial of test personnel who performed the test

2.2.5 Equipment Under Test and Modification State

Serial No: 2025/01/ Default Test Configuration

2.2.6 Date of Test/Initial of test personnel who performed the test

May 20, 2025 / JS

2.2.7 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.2.8 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Mira Mesa facility

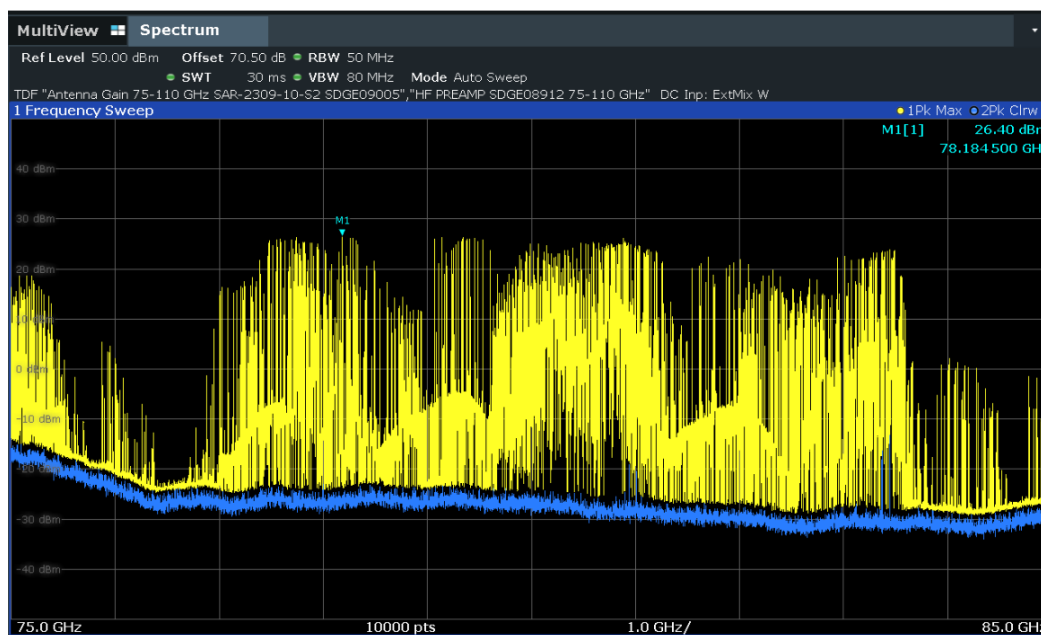
Ambient Temperature 22.7 °C
 Relative Humidity 43.2 %
 ATM Pressure 100.6 kPa

2.2.9 Additional Observations

- This is a radiated test. The spectrum was searched from 75GHz to 85GHz.
- This test was measured at a 1 meter distance.
- The FMCW chirps correction factor was calculated using the formula:
-

$$CF_{\text{chirp}} = 5 \times \log \left(1 + K \times \left(\frac{\text{Span}}{t \times \text{RBW}^2} \right)^2 \right)$$

- Guidance for calculating the correction factor is from Application Note 1EF107-1E Rohde & Schwarz Peak and Mean Power measurements on wideband FMCW radar signals.
- Guidance is based on 1MHz RBW/3MHz VBW since measurement uses 50MHz RBW/80MHz VBW, correction factor per Fig. 5 of the Application Note is utilized.



Frequency	Peak EIRP @ 50MHz RBW (dBm)	Peak Power Correction (dB)	Corrected Level (EIRP)	Limit (dBm)	Result
80 GHz	26.40	0.0	26.40	34	Passed

2.3 TRANSMITTER MAXIMUM AVERAGE EIRP

2.3.1 Specification Reference

FCC 47 CFR Part 15, Clause 15.256(g)(2)(i)
RSS-211 Clause 5.2(b)

2.3.2 Standard Applicable

(i) The EIRP in 1 MHz is computed from the maximum power level measured within any 1-MHz bandwidth using a power averaging detector.

2.3.3 Equipment Under Test and Modification State

Serial No: 2025/01/ Default Test Configuration

2.3.4 Date of Test/Initial of test personnel who performed the test

May 12, 2025 / JS

2.3.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

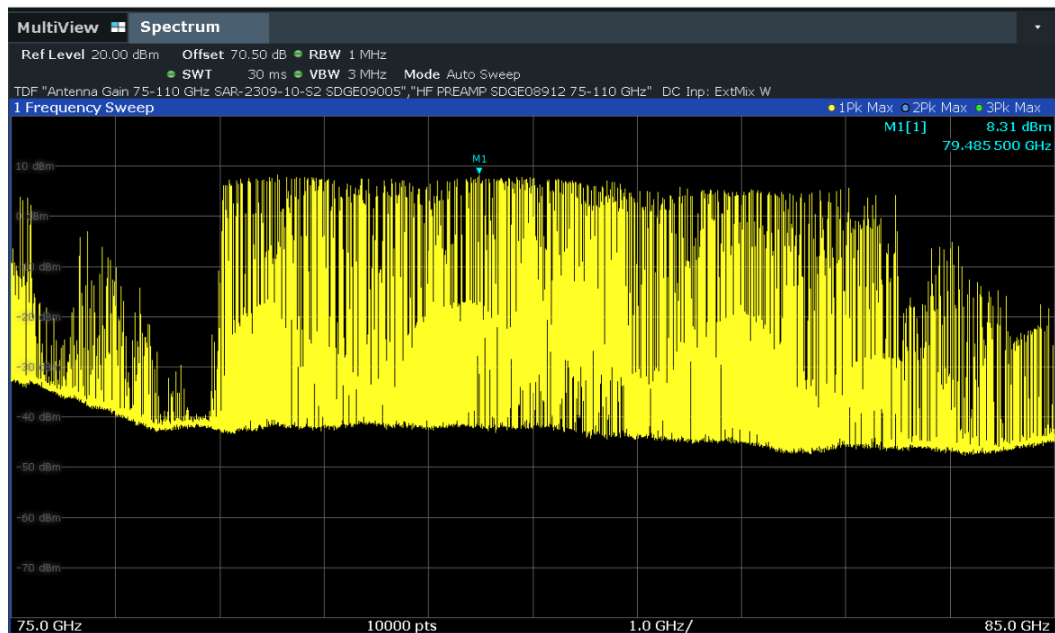
2.3.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Mira Mesa facility

Ambient Temperature	22.7 °C
Relative Humidity	43.2 %
ATM Pressure	100.6 kPa

2.3.7 Additional Observations

- This is a radiated test. The spectrum was searched from 75GHz to 85GHz.
- Offset of 70.5 dB corresponds to free space loss at 80GHz.
- The entire fundamental bandwidth was swept to determine the max peak power level



Frequency (GHz)	Average Factor (dB)	Peak detector (dBm)	Average EIRP (dBm)	Limit (dBm)	Result
80	-39.24	8.31	-30.93	-3	Pass

Dwell Time (TD) = Frequency sweep time (Ts)/ Chirp Bandwidth (F)
= .000218sec (Ts)/18.32 MHz (F)
= .000119sec (TD)

Average Factor = $10 \cdot \log [(TD)/\text{cycle time}]$
= $10 \cdot \log [(.000119\text{sec})/ 1\text{sec}]$
= -39.24 dB

Average EIRP = Average Factor + Peak @ 1MHz RBW
= -39.24dB + (8.31dBm)
= -30.93dBm

2.4 TRANSMITTER FREQUENCY STABILITY

2.4.1 Specification Reference

FCC 47 CFR Part 15, Clause 15.256(f)(2)
RSS-Gen Clause 8.11

2.4.2 Standard Applicable

(2) LPR devices operating under this section must confine their fundamental emission bandwidth within the 5.925–7.250 GHz, 24.05–29.00 GHz, and 75–85 GHz bands under all conditions of operation.

Clause 8.11. If the frequency stability of the licence-exempt radio apparatus is not specified in the applicable RSS, the fundamental emissions of the radio apparatus should be kept within at least the central 80% of its permitted operating frequency band in order to minimize the possibility of out-of-band operation. In addition, its occupied bandwidth shall be entirely outside the restricted bands and the prohibited TV bands of 54-72 MHz, 76-88 MHz, 174-216 MHz, and 470-602 MHz, unless otherwise indicated.

2.4.3 Equipment Under Test and Modification State

Serial No: 2025/01/ Default Test Configuration

2.4.4 Date of Test/Initial of test personnel who performed the test

May 14, 2025 / JS

2.4.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.4.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Mira Mesa facility

Ambient Temperature	22.7 °C
Relative Humidity	43.2 %
ATM Pressure	100.6 kPa

2.4.7 Additional Observations

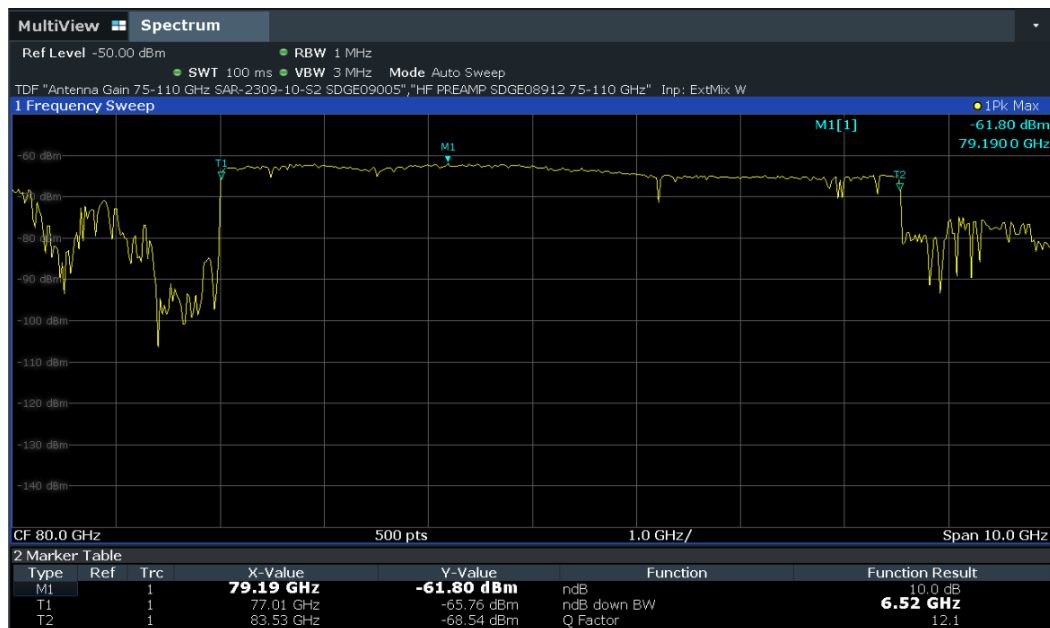
- This is a radiated test.
- Test methodology is per Section 6.8.1 and 6.8.2 of ANSI C63.10-2020.
- Temperature range used is -20°C to +50°C. During test the EUT spectrum was monitored in the entire temperature range at 10 °C intervals.

- The EUT was monitored at each temperature range to comply within the 76GHz to 84GHz (central 80% of the permitted operating frequency band).

2.4.8 Test Results

Performance assessment of the EUT made during this test: **Pass**

Temperature	Test Voltage	Observation
50°C	120VAC (60Hz)	Stayed within the operating frequency band
40°C	120VAC (60Hz)	
30°C	120VAC (60Hz)	
20°C	138VAC (60Hz)	
20°C	120VAC (60Hz)	
20°C	102VAC (60Hz)	
10°C	120VAC (60Hz)	
0°C	120VAC (60Hz)	
-10°C	120VAC (60Hz)	
-20°C	120VAC (60Hz)	



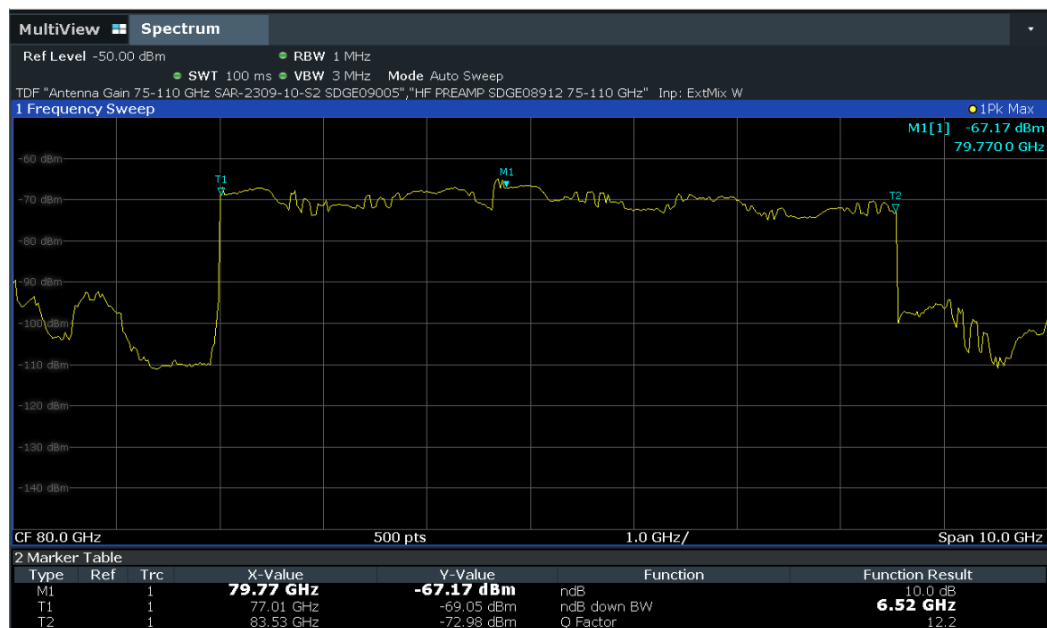
50°C at nominal voltage (120VAC)



40°C at nominal voltage (120VAC)



30°C at nominal voltage (120VAC)



20°C at 115% nominal voltage (138VAC)



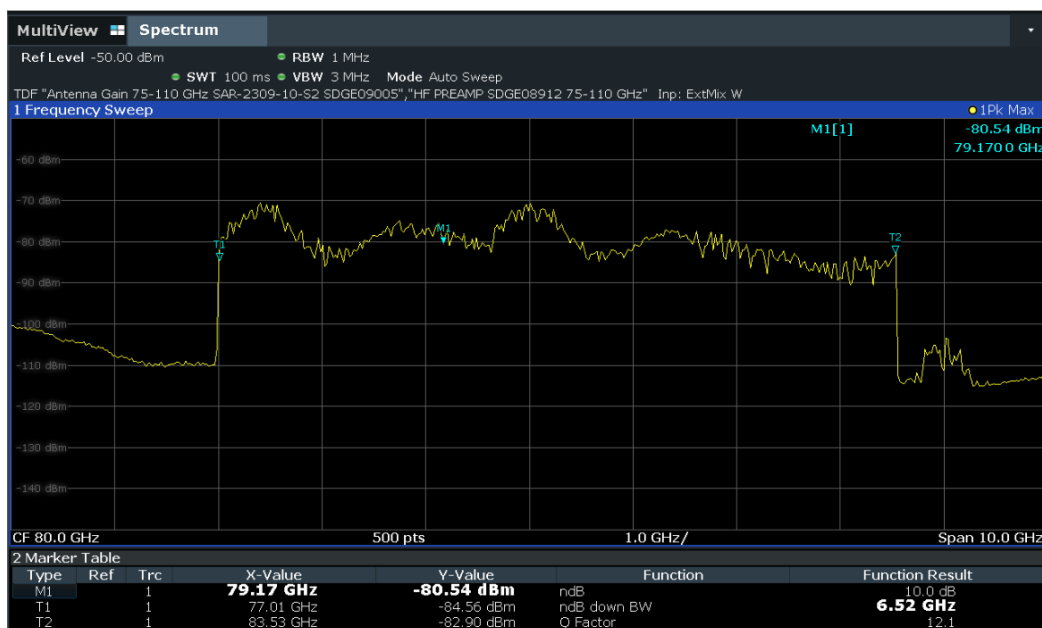
20°C at nominal voltage (120VAC)



20°C at 85% nominal voltage (102VAC)



10°C at nominal voltage (120VAC)



0°C at nominal voltage (120VAC)



-10°C at nominal voltage (120VAC)



-20°C at nominal voltage (120VAC)



2.5 TRANSMITTER UNWANTED EMISSIONS

2.5.1 Specification Reference

FCC 47 CFR Part 15, Clause 15.256(h)
RSS-Gen Clause 8.9

2.5.2 Standard Applicable

(h) Unwanted emissions limits. Unwanted emissions from LPR devices shall not exceed the general emission limit in § 15.209 of this chapter.

2.5.3 Equipment Under Test and Modification State

Serial No: 2025/01/ Default Test Configuration

2.5.4 Date of Test/Initial of test personnel who performed the test

May 16, 2025 / JS

2.5.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.5.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Mira Mesa facility

Ambient Temperature	22.7 °C
Relative Humidity	43.2 %
ATM Pressure	100.6 kPa

2.5.7 Additional Observations

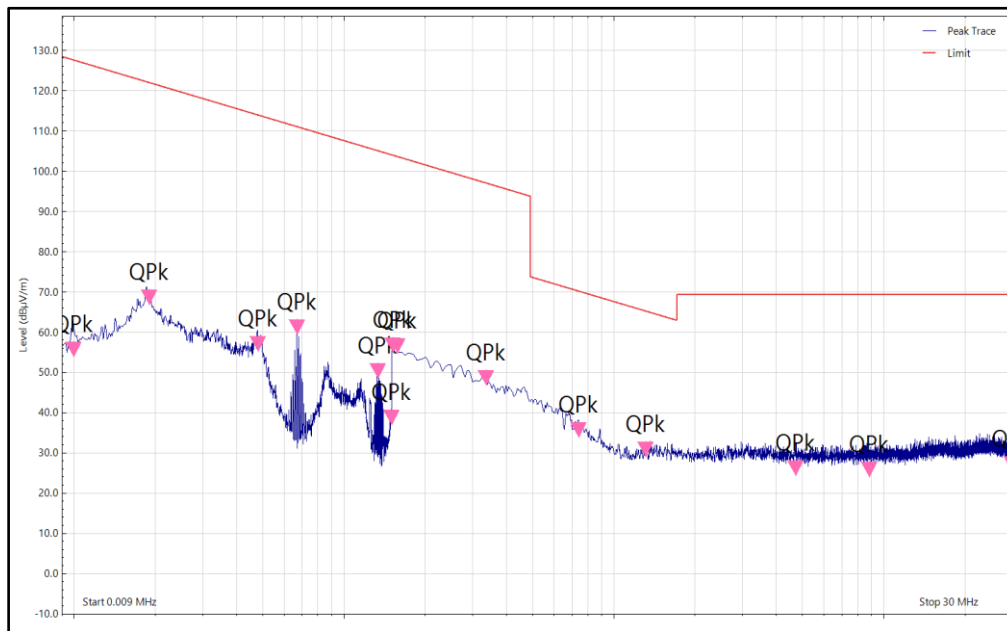
- This is a radiated test. The spectrum was searched from 9kHz to 200GHz.
- Measurements below 40GHz were done using EmX automated software. Reported level is the actual level with all the correction factors factored in. Correction Factor column is for informational purposes only. See Section 2.5.8 for sample computation.
- Measurement above 40GHz were done using harmonic mixers. Corresponding TDF (Transducer Factor) are programmed for each range.
- Lowest and Highest Pulse Repetition Frequencies were tested.
- The spectrum was not searched from 75GHz to 85GHz for spurious emissions. See section 2.1 for this frequency range.
- Tests distances and frequency ranges performed are summarized below:

Frequency Range	Test Distance
9 kHz to 30 MHz	3 meters
30 MHz to 1GHz	3 meters
1 GHz to 18 GHz	3 meters
18 GHz to 26 GHz	3 meters
26 GHz to 40 GHz	3 meters
40 GHz to 60 GHz	1 meter
60 GHz to 75 GHz	1 meter
75 GHz to 110 GHz	1 meter
110 GHz to 140 GHz	1 meter
140 GHz to 200 GHz	0.5 meter

2.5.8 Sample Computation (Radiated Emission)

Measuring equipment raw measurement (dbμV) @ 30 MHz			24.4
Correction Factor (dB/m)	Asset# 1066 (cable)	0.3 db	-12.6
	Asset# 1172 (cable)	0.3 db	
	Asset# 1016 (preamplifier)	-30.7 db	
	Asset# 1175(cable)	0.3 db	
	Asset# 1002 (antenna)	17.2 db/m	
Reported QuasiPeak Final Measurement (dbμV/m) @ 30MHz			11.8

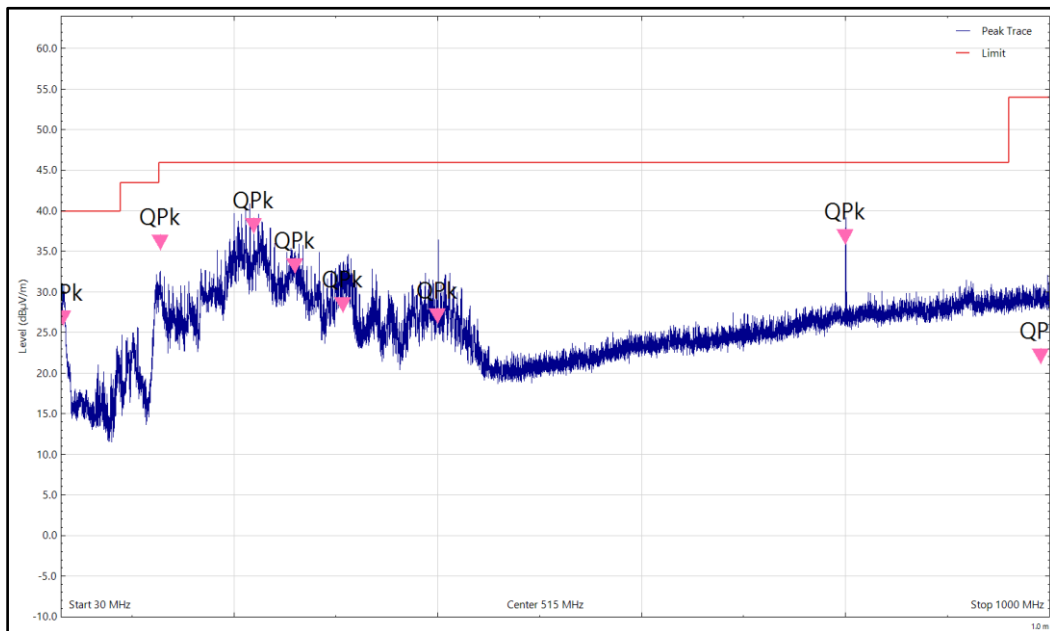
2.5.9 Below 30MHz Radiated Emission Test



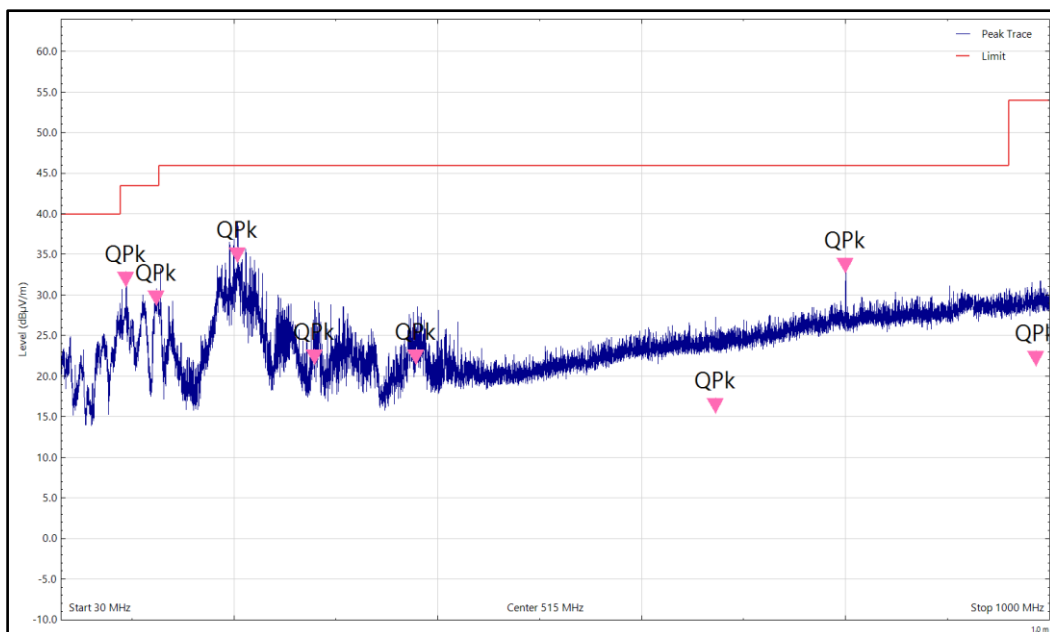
Quasi-Peak Data

Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
0.010	53.46	127.40	-73.94	Q-Peak	353	100	Horizontal
0.019	66.40	122.10	-55.70	Q-Peak	350	100	Horizontal
0.048	54.69	114.00	-59.31	Q-Peak	199	100	Horizontal
0.067	58.86	111.10	-52.24	Q-Peak	352	100	Horizontal
0.134	48.12	105.00	-56.88	Q-Peak	342	100	Horizontal
0.150	36.49	104.10	-67.61	Q-Peak	350	100	Horizontal
0.152	54.43	103.90	-49.47	Q-Peak	0	100	Horizontal
0.158	54.17	103.60	-49.43	Q-Peak	268	100	Horizontal
0.336	46.33	97.10	-50.77	Q-Peak	290	100	Horizontal
0.743	33.44	70.20	-36.76	Q-Peak	260	100	Horizontal
1.317	28.61	65.20	-36.59	Q-Peak	279	100	Horizontal
4.712	23.86	69.50	-45.64	Q-Peak	316	100	Horizontal
8.848	23.54	69.50	-45.96	Q-Peak	304	100	Horizontal
29.939	24.98	69.50	-44.52	Q-Peak	178	100	Horizontal

2.5.10 Below 1GHz Radiated Emission Test



30 MHz to 1 GHz, Horizontal

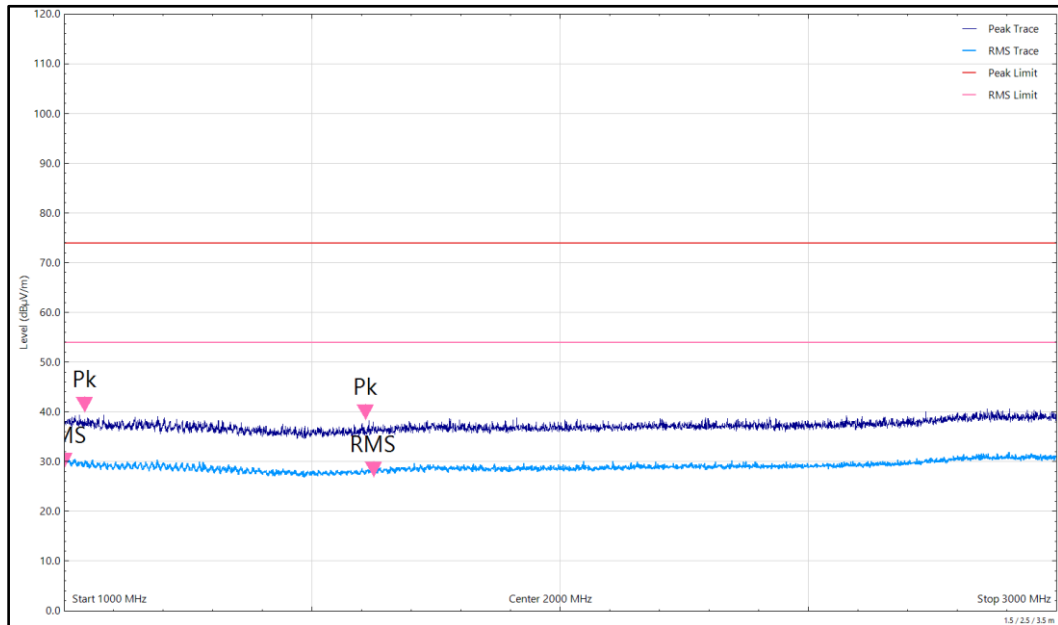


30 MHz to 1 GHz, Vertical

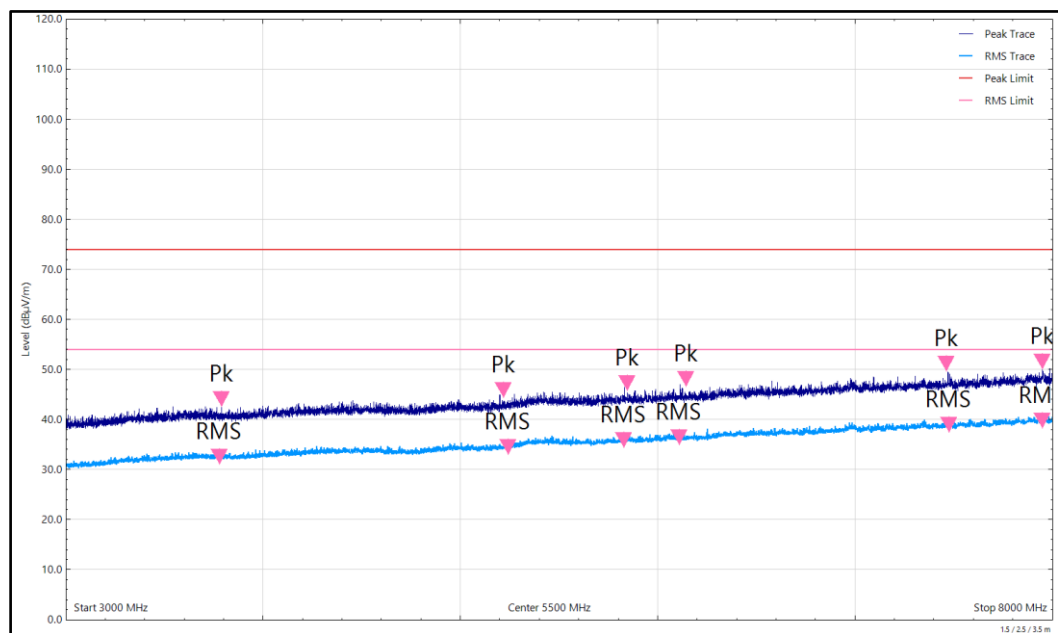
Quasi-Peak Data

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
32.622	25.61	40.00	-14.39	Q-Peak	186	128	Horizontal
94.122	30.75	43.50	-12.75	Q-Peak	91	100	Vertical
123.588	28.47	43.50	-15.03	Q-Peak	133	100	Vertical
127.810	34.95	46.00	-11.05	Q-Peak	268	294	Horizontal
203.764	33.74	46.00	-12.26	Q-Peak	61	100	Vertical
219.620	36.99	46.00	-9.01	Q-Peak	254	142	Horizontal
259.612	32.02	46.00	-13.98	Q-Peak	275	100	Horizontal
278.991	21.18	46.00	-24.82	Q-Peak	176	141	Vertical
306.943	27.29	46.00	-18.71	Q-Peak	146	127	Horizontal
378.824	21.15	46.00	-24.85	Q-Peak	245	123	Vertical
399.976	25.92	46.00	-20.08	Q-Peak	258	128	Horizontal
672.514	15.22	46.00	-30.78	Q-Peak	0	337	Vertical
799.998	35.62	46.00	-10.38	Q-Peak	140	125	Horizontal
799.999	32.45	46.00	-13.55	Q-Peak	266	181	Vertical
987.149	20.99	54.00	-33.01	Q-Peak	135	100	Vertical
991.783	20.96	54.00	-33.04	Q-Peak	140	100	Horizontal

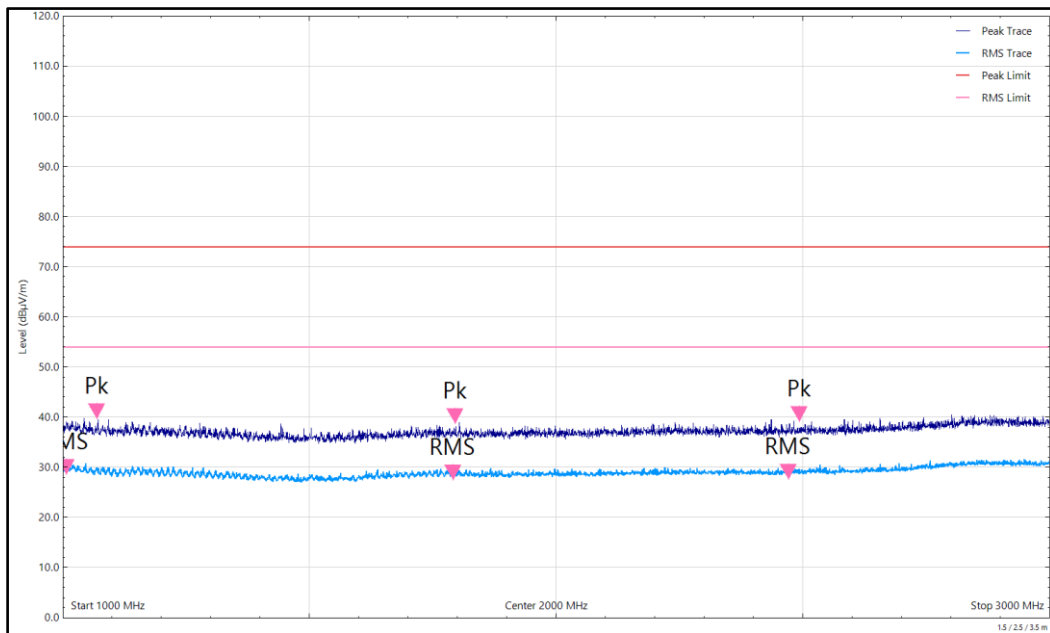
2.5.11 1GHz to 8GHz Radiated Emission Test



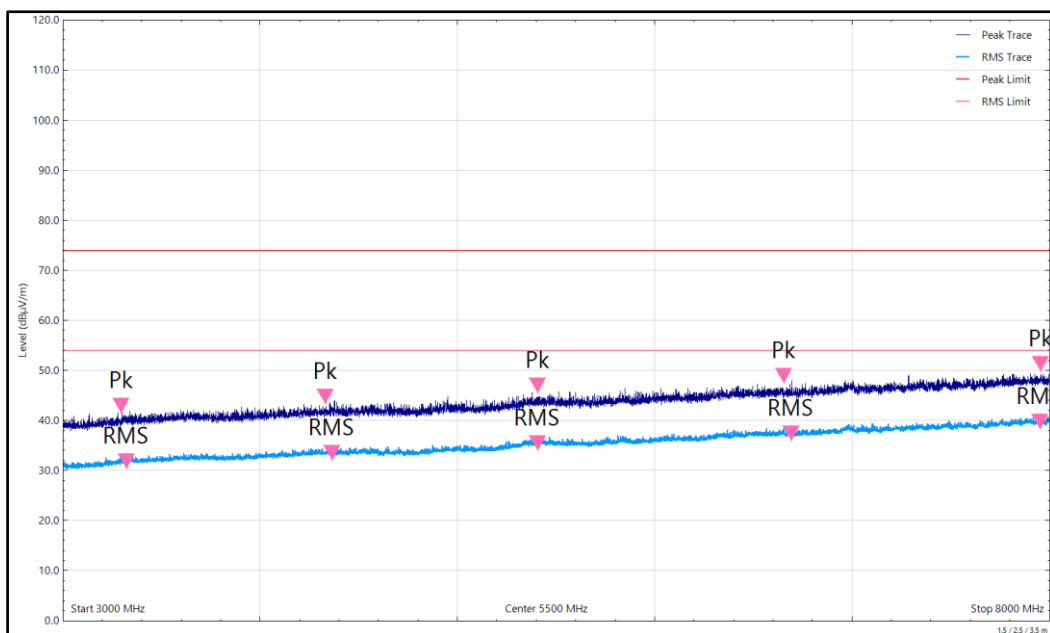
1 GHz to 3 GHz, Horizontal



3 GHz to 8 GHz, Horizontal



1 GHz to 3 GHz, Vertical

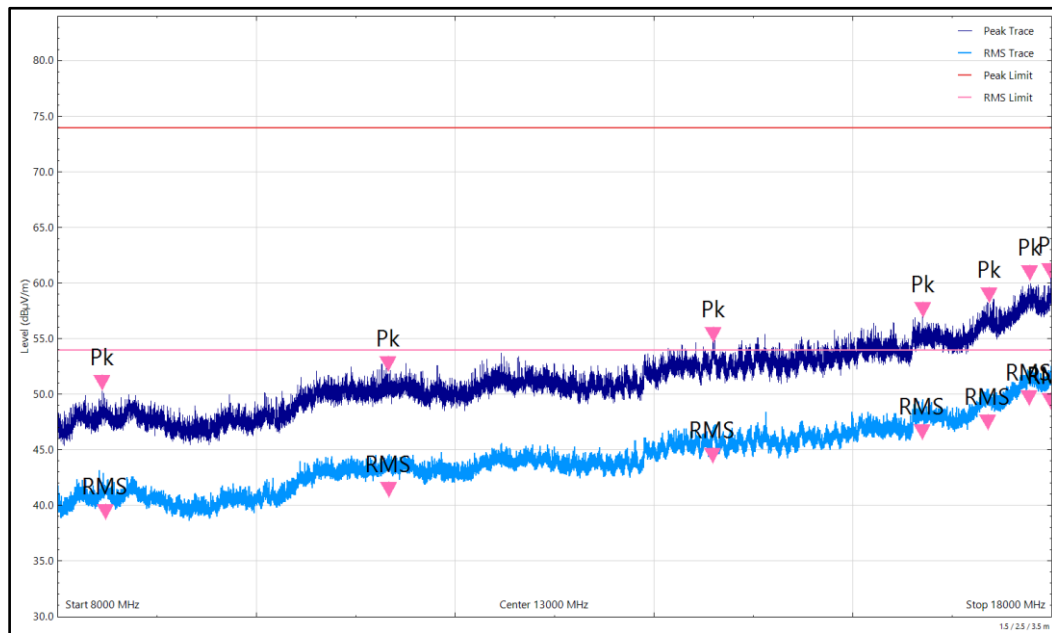


3 GHz to 8 GHz, Vertical

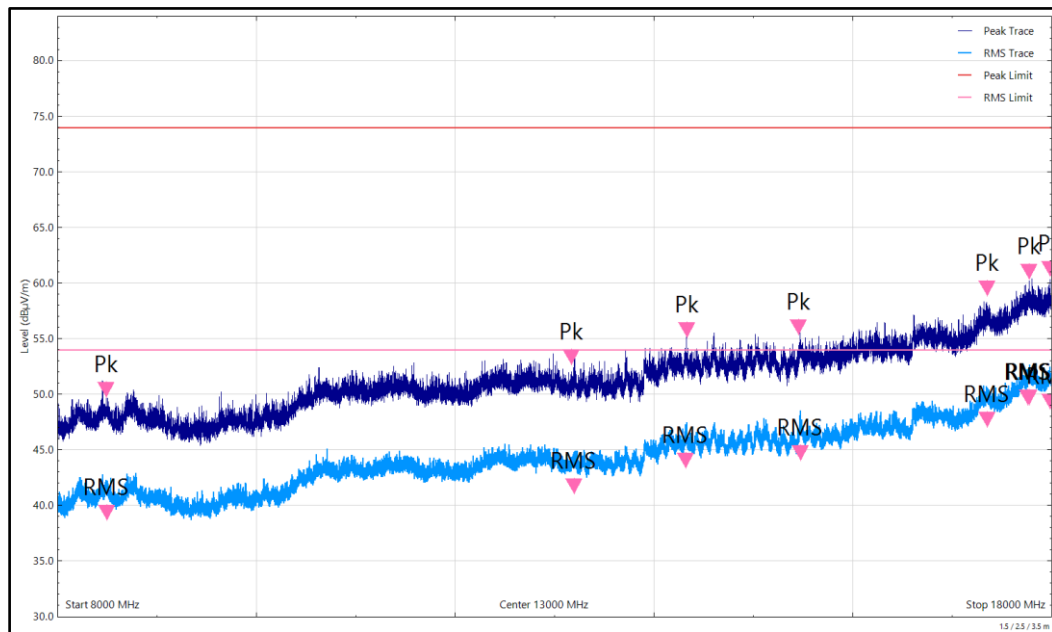
Peak and RMS Data

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
1000.164	28.40	54.00	-25.60	RMS	359	102	Horizontal
1008.175	28.18	54.00	-25.82	RMS	157	102	Vertical
1041.387	39.65	74.00	-34.35	Peak	359	102	Horizontal
1068.944	39.30	74.00	-34.70	Peak	157	102	Vertical
1607.483	38.13	74.00	-35.87	Peak	71	412	Horizontal
1624.266	26.50	54.00	-27.50	RMS	71	412	Horizontal
1792.045	27.06	54.00	-26.94	RMS	343	233	Vertical
1795.682	38.38	74.00	-35.62	Peak	343	233	Vertical
2471.112	27.22	54.00	-26.78	RMS	333	248	Vertical
2493.140	38.77	74.00	-35.23	Peak	333	248	Vertical
3297.350	41.18	74.00	-32.82	Peak	87	108	Vertical
3324.552	29.98	54.00	-24.02	RMS	87	108	Vertical
3780.734	30.66	54.00	-23.34	RMS	30	102	Horizontal
3789.545	42.18	74.00	-31.82	Peak	30	102	Horizontal
4331.003	42.92	74.00	-31.08	Peak	190	102	Vertical
4364.780	31.74	54.00	-22.26	RMS	190	102	Vertical
5219.280	44.07	74.00	-29.93	Peak	341	105	Horizontal
5241.448	32.68	54.00	-21.32	RMS	341	105	Horizontal
5407.493	33.65	54.00	-20.35	RMS	327	104	Vertical
5408.892	45.12	74.00	-28.88	Peak	327	104	Vertical
5829.371	34.10	54.00	-19.90	RMS	235	102	Horizontal
5845.175	45.47	74.00	-28.53	Peak	235	102	Horizontal
6109.413	34.55	54.00	-19.45	RMS	343	238	Horizontal
6143.469	46.33	74.00	-27.67	Peak	343	238	Horizontal
6654.210	47.08	74.00	-26.92	Peak	150	329	Vertical
6693.371	35.52	54.00	-18.48	RMS	150	329	Vertical
7463.787	49.38	74.00	-24.62	Peak	42	197	Horizontal
7476.164	37.08	54.00	-16.92	RMS	42	197	Horizontal
7948.836	49.80	74.00	-24.20	Peak	73	382	Horizontal
7951.353	37.99	54.00	-16.01	RMS	73	382	Horizontal
7952.157	38.01	54.00	-15.99	RMS	330	108	Vertical
7958.793	49.47	74.00	-24.53	Peak	330	108	Vertical

2.5.12 8GHz to 18GHz Radiated Emission Test



8 GHz to 18 GHz, Horizontal

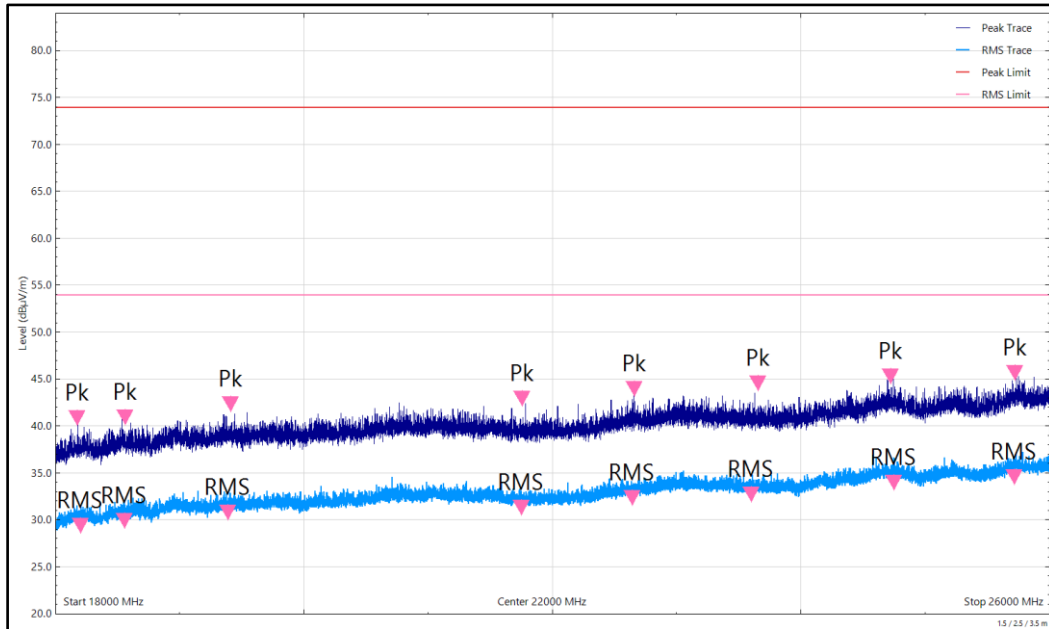


8 GHz to 18 GHz, Vertical

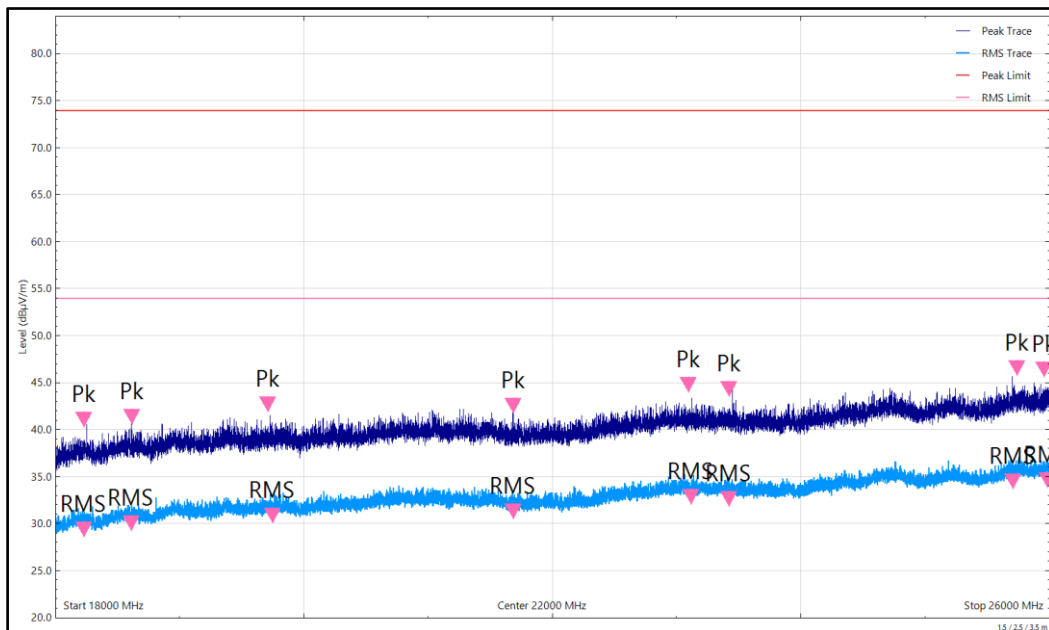
Peak and RMS Data

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
8453.300	50.20	74.00	-23.80	Peak	333	106	Horizontal
8486.070	38.59	54.00	-15.41	RMS	333	106	Horizontal
8490.760	49.56	74.00	-24.44	Peak	333	370	Vertical
8496.860	38.50	54.00	-15.50	RMS	333	370	Vertical
11326.660	51.89	74.00	-22.11	Peak	333	102	Horizontal
11335.850	40.61	54.00	-13.39	RMS	333	102	Horizontal
13171.130	52.52	74.00	-21.48	Peak	237	232	Vertical
13199.600	40.92	54.00	-13.08	RMS	237	232	Vertical
14323.900	43.22	54.00	-10.78	RMS	323	102	Vertical
14333.790	54.95	74.00	-19.05	Peak	323	102	Vertical
14596.220	43.61	54.00	-10.39	RMS	63	136	Horizontal
14602.110	54.48	74.00	-19.52	Peak	63	136	Horizontal
15462.400	55.20	74.00	-18.80	Peak	329	356	Vertical
15480.590	43.90	54.00	-10.10	RMS	329	356	Vertical
16703.970	45.76	54.00	-8.24	RMS	333	108	Horizontal
16710.660	56.78	74.00	-17.22	Peak	333	108	Horizontal
17354.490	58.66	74.00	-15.34	Peak	201	108	Vertical
17354.990	46.90	54.00	-7.10	RMS	201	108	Vertical
17362.350	46.62	54.00	-7.38	RMS	333	104	Horizontal
17374.840	58.04	74.00	-15.96	Peak	333	104	Horizontal
17768.220	48.86	54.00	-5.14	RMS	333	108	Vertical
17776.450	48.80	54.00	-5.20	RMS	335	105	Horizontal
17778.120	48.88	54.00	-5.12	RMS	118	380	Vertical
17778.420	60.16	74.00	-13.84	Peak	118	380	Vertical
17783.240	60.06	74.00	-13.94	Peak	335	105	Horizontal
17986.721	60.24	74.00	-13.76	Peak	24	102	Horizontal
17990.370	60.43	74.00	-13.57	Peak	333	111	Vertical
17990.689	48.54	54.00	-5.46	RMS	333	111	Vertical
17997.754	48.56	54.00	-5.44	RMS	24	102	Horizontal
17999.030	48.53	54.00	-5.47	RMS	355	107	Horizontal

2.5.13 18GHz to 26GHz Radiated Emission Test



18 GHz to 26 GHz, Horizontal

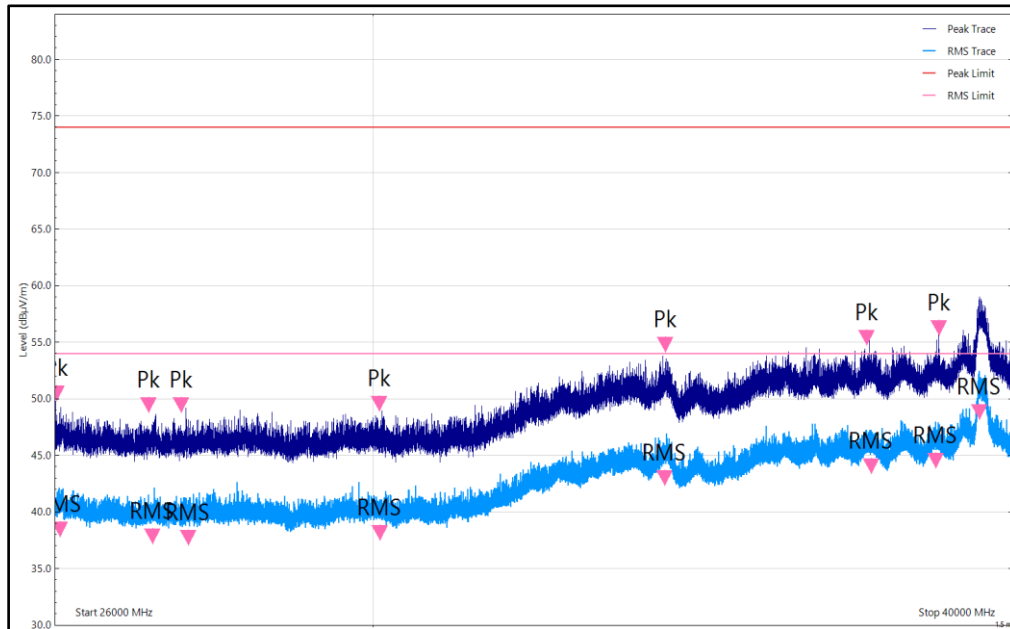


18 GHz to 26 GHz, Vertical

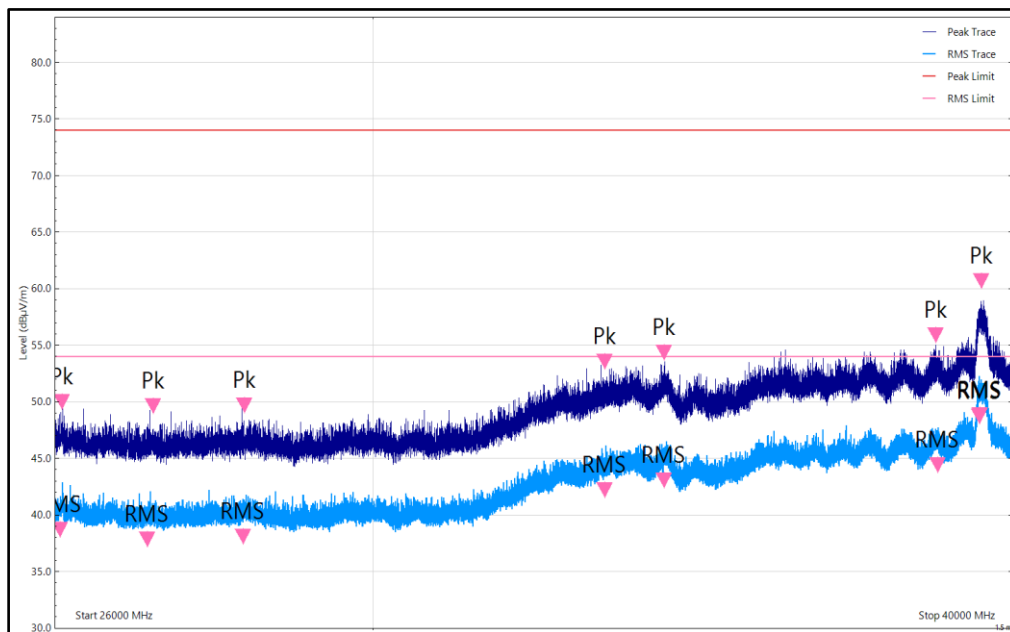
Peak and RMS Data

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
18177.184	39.88	74.00	-34.12	Peak	333	150	Horizontal
18204.197	28.43	54.00	-25.57	RMS	333	150	Horizontal
18229.001	40.11	74.00	-33.89	Peak	196	150	Vertical
18232.598	28.39	54.00	-25.61	RMS	196	150	Vertical
18558.715	28.93	54.00	-25.07	RMS	95	150	Horizontal
18563.431	39.91	74.00	-34.09	Peak	95	150	Horizontal
18613.357	29.07	54.00	-24.93	RMS	333	150	Vertical
18618.312	40.37	74.00	-33.63	Peak	333	150	Vertical
19391.502	29.81	54.00	-24.19	RMS	175	150	Horizontal
19413.481	41.35	74.00	-32.65	Peak	175	150	Horizontal
19713.414	41.69	74.00	-32.31	Peak	274	150	Vertical
19752.175	29.90	54.00	-24.10	RMS	274	150	Vertical
21685.976	30.32	54.00	-23.68	RMS	193	150	Vertical
21688.293	41.57	74.00	-32.43	Peak	193	150	Vertical
21755.048	30.32	54.00	-23.68	RMS	315	150	Horizontal
21756.967	41.91	74.00	-32.09	Peak	315	150	Horizontal
22642.490	31.35	54.00	-22.65	RMS	295	150	Horizontal
22660.392	43.01	74.00	-30.99	Peak	295	150	Horizontal
23095.327	43.77	74.00	-30.23	Peak	59	150	Vertical
23119.303	31.85	54.00	-22.15	RMS	59	150	Vertical
23421.145	43.35	74.00	-30.65	Peak	32	150	Vertical
23423.383	31.67	54.00	-22.33	RMS	32	150	Vertical
23600.965	31.74	54.00	-22.26	RMS	323	150	Horizontal
23654.431	43.60	74.00	-30.40	Peak	323	150	Horizontal
24723.741	44.33	74.00	-29.67	Peak	186	150	Horizontal
24753.312	32.95	54.00	-21.05	RMS	186	150	Horizontal
25709.890	33.49	54.00	-20.51	RMS	341	150	Vertical
25721.110	33.56	54.00	-20.44	RMS	359	150	Horizontal
25724.627	44.70	74.00	-29.30	Peak	359	150	Horizontal
25739.140	45.53	74.00	-28.47	Peak	341	150	Vertical
25957.551	45.42	74.00	-28.58	Peak	281	150	Vertical
25989.042	33.63	54.00	-20.37	RMS	281	150	Vertical

2.5.14 26GHz to 40GHz Radiated Emission Test



26 GHz to 40 GHz, Horizontal

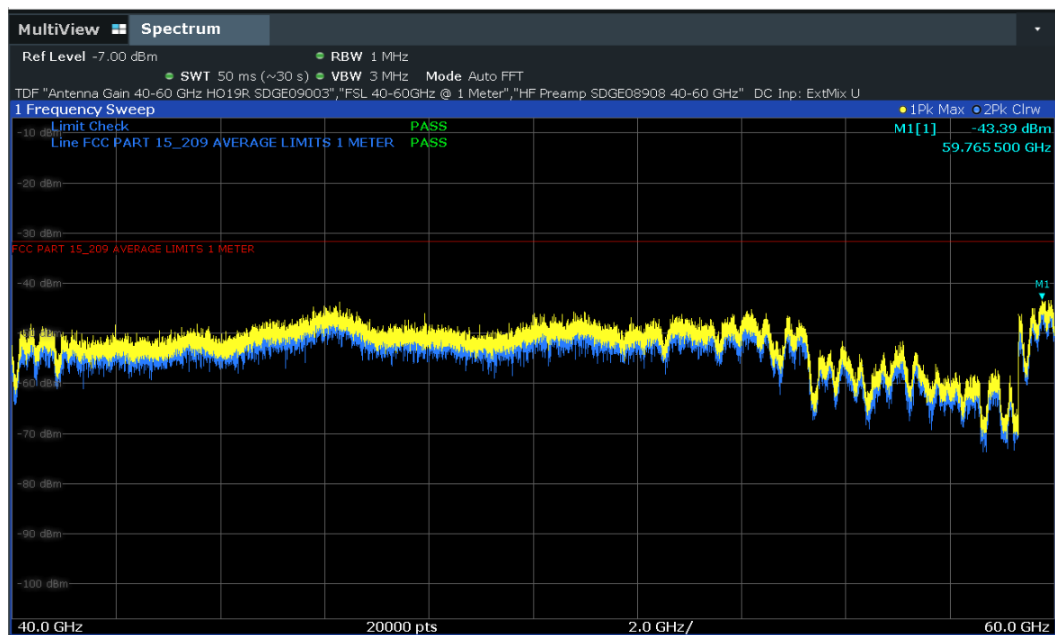


18 GHz to 26 GHz, Vertical

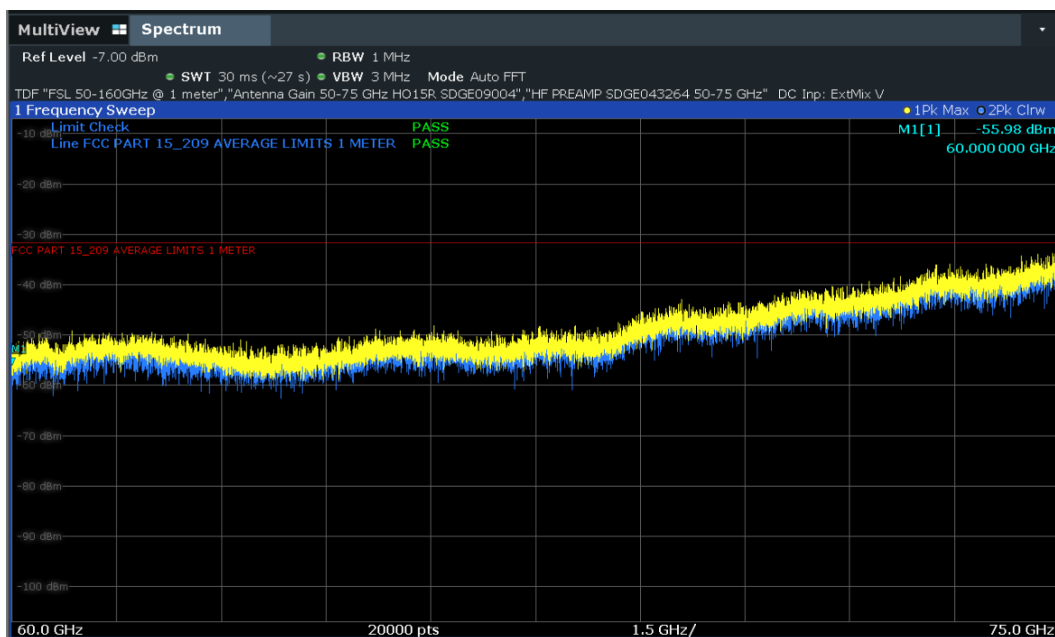
Peak and RMS Data

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Angle (°)	Height (cm)	Polarisation
26024.488	49.64	74.00	-24.36	Peak	153	150	Horizontal
26065.019	37.67	54.00	-16.33	RMS	153	150	Horizontal
26065.800	37.87	54.00	-16.13	RMS	343	150	Vertical
26084.970	49.17	74.00	-24.83	Peak	343	150	Vertical
27112.650	37.04	54.00	-16.96	RMS	335	150	Vertical
27124.810	48.60	74.00	-25.40	Peak	323	150	Horizontal
27169.560	37.01	54.00	-16.99	RMS	323	150	Horizontal
27176.980	48.78	74.00	-25.22	Peak	335	150	Vertical
27524.130	48.61	74.00	-25.39	Peak	122	150	Horizontal
27617.140	36.92	54.00	-17.08	RMS	122	150	Horizontal
28305.130	37.30	54.00	-16.70	RMS	349	150	Vertical
28316.180	48.88	74.00	-25.12	Peak	349	150	Vertical
30089.230	48.74	74.00	-25.26	Peak	17	150	Horizontal
30101.400	37.33	54.00	-16.67	RMS	17	150	Horizontal
33302.830	52.75	74.00	-21.25	Peak	162	150	Vertical
33302.830	41.38	54.00	-12.62	RMS	162	150	Vertical
34196.510	53.55	74.00	-20.45	Peak	81	150	Vertical
34203.780	42.24	54.00	-11.76	RMS	81	150	Vertical
34209.660	42.21	54.00	-11.79	RMS	312	150	Horizontal
34217.220	53.99	74.00	-20.01	Peak	312	150	Horizontal
37463.860	54.58	74.00	-19.42	Peak	102	150	Horizontal
37543.160	43.23	54.00	-10.77	RMS	102	150	Horizontal
38642.630	55.06	74.00	-18.94	Peak	354	150	Vertical
38644.720	43.69	54.00	-10.31	RMS	222	150	Horizontal
38676.200	43.62	54.00	-10.38	RMS	354	150	Vertical
38703.320	55.41	74.00	-18.59	Peak	222	150	Horizontal
39409.900	47.91	54.00	-6.09	RMS	323	150	Vertical
39417.180	48.04	54.00	-5.96	RMS	331	150	Horizontal
39422.260	48.01	54.00	-5.99	RMS	279	150	Vertical
39442.120	59.86	74.00	-14.14	Peak	279	150	Vertical

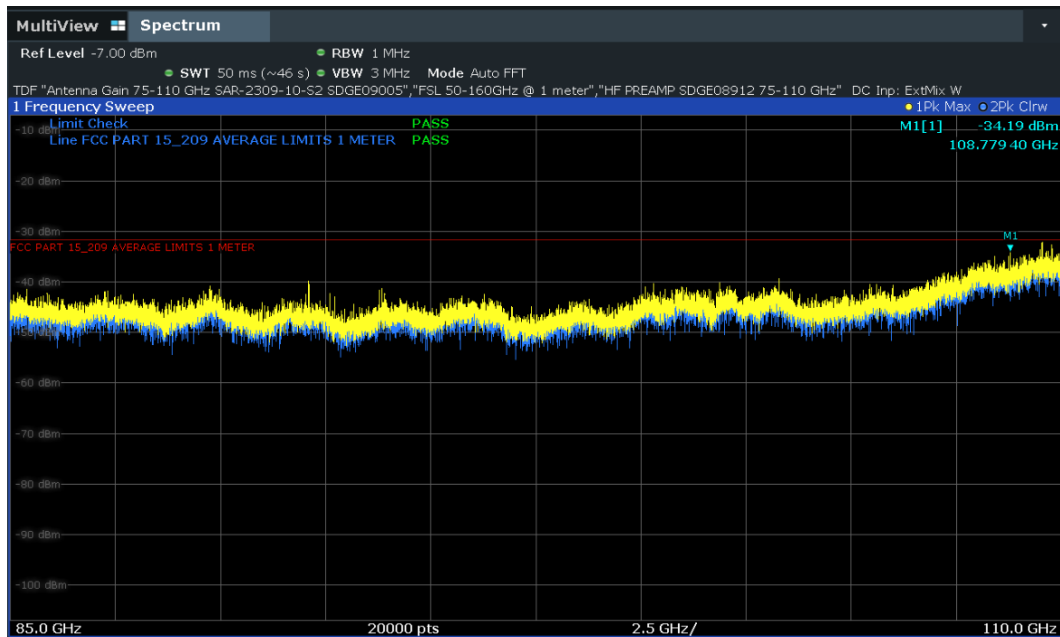
2.5.15 40GHz to 200GHz Maximized Plots



40GHz to 60GHz Plot



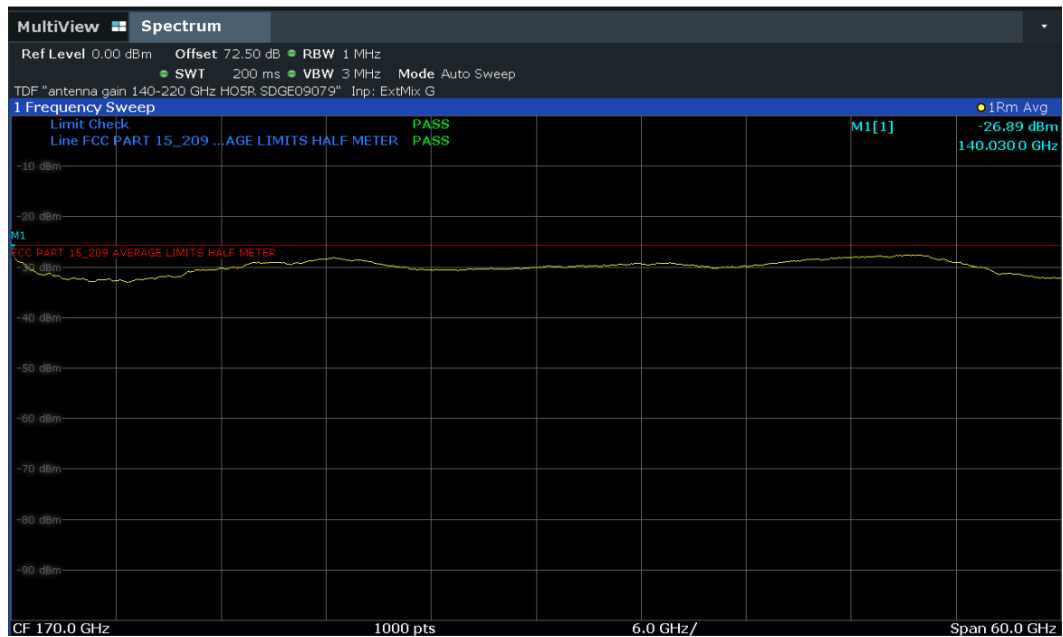
60GHz to 75GHz Plot



85GHz to 110GHz Plot



110GHz to 140GHz Plot



140GHz to 200GHz Plot

2.6 ANTENNA BEAMWIDTH

2.6.1 Specification Reference

FCC 47 CFR Part 15, Clause 15.256(i)(B)
RSS-211 Clause 5.2(a)

2.6.2 Standard Applicable

(B) LPR devices operating under the provisions of this section within the 75–85 GHz band must use an antenna with a –3 dB beamwidth no greater than 8 degrees.

2.6.3 Equipment Under Test and Modification State

Serial No: 2025/01/ Default Test Configuration

2.6.4 Date of Test/Initial of test personnel who performed the test.

May 17, 2025 / JS

2.6.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.6.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Mira Mesa facility

Ambient Temperature	24.0 °C
Relative Humidity	50.1 %
ATM Pressure	99.9 kPa

2.6.7 Additional Observations

- This is a radiated antenna pattern test.
- Test results from Section 2.7.8 of this test report applies.
- The half-power beamwidth of the EUT is verified as no greater than 8 degrees relative to the main beam gain.

2.7 ANTENNA SIDE LOBE GAIN

2.7.1 Specification Reference

FCC 47 CFR Part 15, Clause 15.256(j)
RSS-211 Clause 5.2(c)

2.7.2 Standard Applicable

Antenna side lobe gain. LPR devices operating under the provisions of this section must limit the side lobe antenna gain relative to the main beam gain for off-axis angles from the main beam of greater than 60 degrees to the levels provided in the following table:

Frequency Range (GHz)	Antenna side lobe gain limit relative to main beam gain
5.925 – 7.250	-22
24.05 – 29.00	-27
75 -85	-38

2.7.3 Equipment Under Test and Modification State

Serial No: 2025/01/ Default Test Configuration

2.7.4 Date of Test/Initial of test personnel who performed the test

October 24, 2025 / JS

2.7.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.7.6 Environmental Conditions/ Test Location

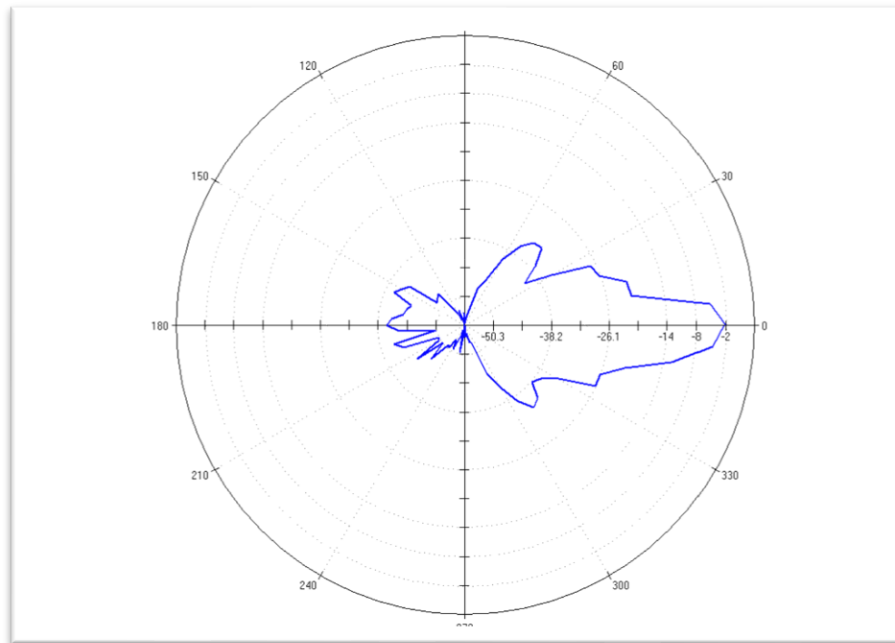
Test performed at TÜV SÜD America Inc. Mira Mesa facility

Ambient Temperature 24.0 °C
Relative Humidity 50.1 %
ATM Pressure 99.9 kPa

2.7.7 Additional Observations

- This is a radiated antenna pattern test.
- At no greater than 8°, the antenna side lobe gain relative to main beam gain is - 3dB.
- At greater than 60°, the antenna side lobe gain relative to main beam gain is - 38dB.
- Additional absorbers added to the screen room. The power cable was moved to the alternate.
- Only relevant polarity presented.

2.7.8 Test Results



Degrees	Gain (dB)	Degrees	Gain (dB)	Degrees	Gain (dB)	Degrees	Gain (dB)	Degrees	Gain (dB)
0	0	70	-46.13	145	-40.37	220	-48.68	295	-43.28
5	-3.11	75	-51.16	150	-39.25	225	-44.56	300	-39.32
8	-11.28	80	-53.12	155	-38.16	230	-49.03	305	-35.19
10	-18.97	85	-54.05	160	-42.47	235	-48.78	310	-31.95
15	-19.39	90	-53.58	165	-41.70	240	-51.05	315	-32.34
20	-24.28	95	-51.74	170	-41.28	245	-48.83	320	-35.94
25	-25.34	100	-54.19	175	-39.10	250	-52.21	325	-34.95
30	-33.32	105	-52.99	180	-38.10	255	-53.36	330	-32.52
35	-39.12	110	-51.10	185	-40.93	260	-48.70	335	-24.27
40	-35.22	115	-53.20	190	-48.34	265	-53.43	340	-24.19
45	-31.53	120	-51.55	195	-39.16	270	-54.40	345	-28.79
50	-31.91	125	-49.92	200	-40.93	275	-51.78	350	-19.69
55	-34.18	130	-45.83	205	-48.36	280	-52.73	352	-10.39
60	-38.50	135	-46.34	210	-48.17	285	-50.74	355	-2.47
65	-44.15	140	-47.10	215	-42.26	290	-50.48	360	0

2.8 AC CONDUCTED EMISSIONS LIMITS.

2.8.1 2.1.1 Specification Reference

47 CFR FCC Part 15 Subpart C 15.207(a) and RSS-210 Issue 10 December 2019.

2.8.2 2.1.2 Standard Applicable

An intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN).

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	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.

2.8.3 Equipment Under Test and Modification State

Serial No: 2025/01/ Default Test Configuration

2.8.4 Date of Test/Initial of test personnel who performed the test

May 15, 2025 / JS

2.8.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.8.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Mira Mesa facility

Ambient Temperature	24.0 °C
Relative Humidity	50.1 %
ATM Pressure	99.9 kPa

2.8.7 Additional Observations

Measurement was done using EMC32 automated software. Reported level is the actual level with all the correction factors factored in. Correction Factor column is for informational purposes only. See Section 2.2.8 for sample computation.



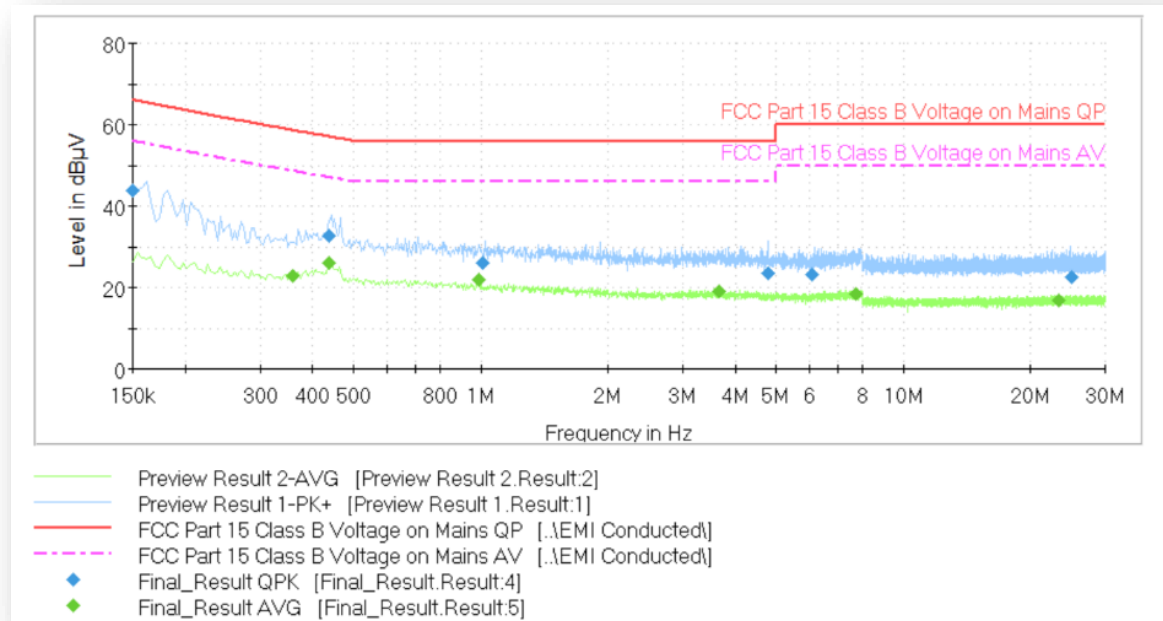
2.8.8 Sample Computation (Conducted Emission – Quasi Peak)

Measuring equipment raw measurement (dbμV) @ 150kHz			5.5
Correction Factor (dB)	Asset# 8607 (20 dB attenuator)	19.9	20.7
	Asset# 1177 (cable)	0.15	
	Asset# 1176 (cable)	0.35	
	Asset# 7568 (LISN)	0.30	
Reported QuasiPeak Final Measurement (dbμV) @ 150kHz			26.2

2.8.9 Test Results

Compliant. See attached plots and tables.

2.8.1 TX Mode using 120V-60Hz NIPOWER PPK-421-1 Line 1



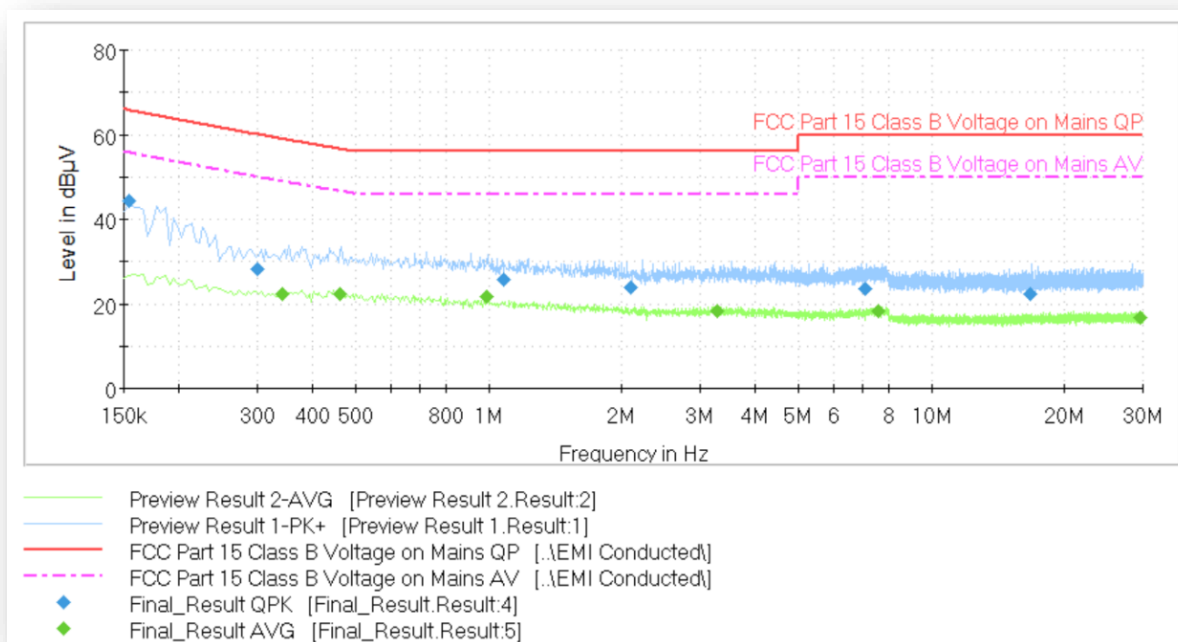
Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.150000	43.80	66.00	22.20	1000.0	9.000	L1	GND	20.0
0.437500	32.85	57.03	24.18	1000.0	9.000	L1	GND	19.9
1.012500	25.92	56.00	30.08	1000.0	9.000	L1	GND	20.0
4.796000	23.50	56.00	32.50	1000.0	9.000	L1	GND	20.2
6.083500	23.32	60.00	36.68	1000.0	9.000	L1	GND	20.3
24.926000	22.57	60.00	37.43	1000.0	9.000	L1	GND	20.7

Average Data

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.358000	22.93	48.58	25.65	1000.0	9.000	L1	GND	19.8
0.438000	26.15	47.01	20.86	1000.0	9.000	L1	GND	19.9
0.986000	21.76	46.00	24.24	1000.0	9.000	L1	GND	20.0
3.658000	19.09	46.00	26.91	1000.0	9.000	L1	GND	20.2
7.694000	18.39	50.00	31.61	1000.0	9.000	L1	GND	20.3
23.282000	16.74	50.00	33.26	1000.0	9.000	L1	GND	20.7

2.8.2 TX Mode using 120V-60Hz NIPOWER PPK-421-1 Line 2



Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.154500	44.21	65.73	21.52	1000.00	9.000	N	FLO	19.9
0.299500	28.33	60.06	31.73	1000.00	9.000	N	FLO	19.6
1.080500	25.80	56.00	30.20	1000.00	9.000	N	FLO	20.1
2.096000	23.94	56.00	32.06	1000.00	9.000	N	FLO	20.1
7.105000	23.63	60.00	36.37	1000.00	9.000	N	FLO	20.2
16.649500	22.22	60.00	37.78	1000.00	9.000	N	FLO	20.5

Average Data

Frequency (MHz)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.342000	22.31	48.95	26.64	1000.00	9.000	N	FLO	19.8
0.462000	22.31	46.60	24.11	1000.00	9.000	N	FLO	19.8
0.986000	21.74	46.00	24.26	1000.00	9.000	N	FLO	20.0
3.274000	18.33	46.00	27.67	1000.00	9.000	N	FLO	20.1
7.582000	18.21	50.00	31.79	1000.00	9.000	N	FLO	20.3
29.662000	16.83	50.00	33.19	1000.00	9.000	N	FLO	20.5



SECTION 3

TEST EQUIPMENT USED



3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

ID Number (SDGE/SDRB)	Test Equipment	Type	Serial Number	Manufacturer	Cal Date	Cal Due Date
Radiated Emission						
68210	EMI Test Receiver	ESW44	103416	Rohde & Schwarz	06/29/25	06/29/26
74136	TUV SSU 010 PLC US	SSU 010	SSU001	TUV SUD UK	04/16/25	04/16/26
69562	7.5-18 GHz Double Ridge Horn Antenna	HWRD 750	00076	Schwarzbeck Mess Elektronik	11/06/24	11/06/25
69563	1-10 GHz Broad-Band Horn Antenna	BBHA 9120 B	00875	Schwarzbeck Mess Elektronik	11/06/24	11/06/25
7611	Signal/Spectrum Analyzer	FSW26	102017	Rohde & Schwarz	02/26/25	02/26/26
1002	Bilog Antenna	3142C	0058717	EMCO	12/01/23	12/01/25
46797	Preamplifier	PA-122	181925	Com Power	01/06/25	01/06/26
6628	Loop Antenna	HFH2- Z2335.4711.52	FNr.800.458/2 5	Schwarbeck	07/02/24	07/02/26
9001	Horn antenna (18- 26.5GHz)	HO42S	101	Custom Microwave	09/16/25	09/16/27
9003	Horn antenna (26-40 GHz)	HO28S	102	Custom Microwaves	09/16/25	09/16/27
40815	Pre-amplifier (18-40 GHz)	SLKKa-30-6	15G27	Spacek Labs	11/03/25	11/03/26
7637	Harmonics mixer (40- 60 GHz)	FS-Z60	100009	Rhode & Schwarz	03/19/24	03/19/26
51288	Harmonics mixer (50- 75 GHz)	FS-Z75	100988	Rhode & Schwarz	10/10/25	10/10/27
7633	Harmonics mixer (75- 110 GHz)	HM-110-7	101000	Radiometer Physics	10/02/25	10/02/27
7634	Harmonics mixer (110-170 GHz)	HM-170	0062	Radiometer Physics	10/02/25	10/02/27
7635	Harmonics mixer (170-220 GHz)	HM-220	020022	Radiometer Physics	10/02/25	10/02/27
7632	Harmonics mixer (220-325 GHz)	HM-325	020075	Radiometer Physics	10/02/25	10/02/27
9003	Horn antenna (40-60 GHz)	HO19R	103	Custom Microwaves	Verified by 7611 and corresponding antenna/Active multiplier combination	
9004	Horn antenna (50-75 GHz)	HO15R	104	Custom Microwaves		
9079	Horn antenna (140- 220 GHz)	HO5R	HO5R	Custom Microwaves		
9078	Horn antenna (110- 170 GHz)	HO6R	HO6R	Custom Microwaves		
7628	Horn antenna (75-110 GHz)	SAR-2309-10-S2	13481-01	Sage Millimeter, Inc.	Verified by 7611 and corresponding antenna/Active multiplier combination	
9082	Horn antenna (140- 220 GHz)	HO5R	N/A	Custom Microwaves		
8872	Direct Reading Attenuator (40-60)	STA-60-19-D1	11875-01	Sage Millimeter, Inc.	Verified by 7611 and corresponding antenna/mixer combination	
8860	Direct Reading Attenuator (50-75)	STA-60-15-D1	11466-01	Sage Millimeter, Inc.		
8861	Direct Reading Attenuator (75-110)	STA-60-10-D1	11466-01	Sage Millimeter, Inc.		



8919	Direct Reading Attenuator (90-140	STA-60-08-D1	12605-01	Sage Millimeter, Inc.	Verified by 7611 and corresponding antenna/mixer combination	
8909	Direct Reading Attenuator (140-220	STA-60-05-D1	12020-01	Sage Millimeter, Inc.		
8873	Active Multiplier (40-60 GHz)	AMC-19-RFH00	124	Millitech, Inc.		
8914	Active Multiplier (50-75 GHz)	AMC-15-RFH00	283	Millitech, Inc.		
8915	Active Multiplier (75-110 GHz)	AMC-10-RFH00	606	Millitech, Inc.		
8920	Active Multiplier (90-140 GHz)	AMC-08-RFH00	58	Millitech, Inc.		
8909	Active Multiplier (140-220 GHz)	MCA-05-150096	13	Millitech, Inc.		
AC Conducted Emissions						
30216	EMI Test Receiver	ESU40	100399	Rohde & Schwarz	08/05/25	08/05/26
07567	LISN	FCC-LISN-50-25-2-10	120304	Fischer Custom Comm	04/14/25	04/14/26
08870	Bi-Directional Attenuator	34-20-34	BP8030	MCE / Weinschel	02/13/25	02/13/26
Miscellaneous						
6805	Environmental Chamber	ESL-4CA	18021	Espec	04/10/25	04/10/26
-	Test Software	EMC32	V10.60.20	Rohde & Schwarz	N/A	
-	Test Software	EMX	V3.5.2	TUV SUD UK	N/A	

3.2 Measurement Uncertainty

Calculation of Measurement Uncertainty per CISPR 16-4-2:2011 with Corr. 1

3.2.1 Radiated Measurements (9 kHz to 30 MHz)

<i>Radiated Measurement 9kHz - 30 MHz at a distance of 3 m</i>							
	Input Quantity (Contribution) X_i	Value	Prob. Dist.	Divisor	$u_i(x)$	$u_i(x)^2$	
1	Receiver reading	0.10 dB	Normal, k=1	1.000	0.10	0.01	
2	Attenuation: antenna-receiver	0.20 dB	Normal, k=2	2.000	0.10	0.01	
3	Antenna factor AF	0.44 dB	Normal, k=2	2.000	0.22	0.05	
4	Receiver sinewave accuracy	0.15 dB	Normal, k=2	2.000	0.08	0.01	
5	Receiver pulse amplitude	1.50 dB	Rectangular	1.732	0.87	0.75	
6	Receiver pulse repetition rate	1.50 dB	Rectangular	1.732	0.87	0.75	
7	Noise floor proximity	0.50 dB	Rectangular	1.732	0.29	0.08	
8	Mismatch: antenna-receiver	0.95 dB	U-shaped	1.414	0.67	0.45	
9	AF frequency interpolation	0.30 dB	Rectangular	1.732	0.17	0.03	
10	AF height deviations	0.10 dB	Rectangular	1.732	0.06	0.00	
11	Directivity difference at 3 m	3.12 dB	Rectangular	1.732	1.80	3.24	
12	Phase center location at 3 m	1.00 dB	Rectangular	1.732	0.58	0.33	
13	Cross-polarisation	0.90 dB	Rectangular	1.732	0.52	0.27	
14	Balance	0.00 dB	Rectangular	1.732	0.00	0.00	
15	Site imperfections	0.00 dB	Triangular	2.449	0.00	0.00	
16	Separation distance at 3 m	0.30 dB	Rectangular	1.732	0.17	0.03	
17	Effect of setup table material	0.00 dB	Rectangular	1.732	0.00	0.00	
18	Table height at 3 m	0.10 dB	Normal, k=2	2.000	0.05	0.00	
19	Near-field effects	0.00 dB	Triangular	2.449	0.00	0.00	
20	Effect of ambient noise on OATS	0.00 dB				0.00	
Combined standard uncertainty				Normal	2.45 dB		
Expanded uncertainty				Normal, k=2	4.91 dB		

3.2.2 Radiated Emission Measurements (30 MHz to 1GHz)

<i>Radiated Measurement 30 - 1000 MHz at a distance of 3 m</i>					
Input Quantity (Contribution) X_i	Value	Prob. Dist.	Divisor	$u_i(x)$	$u_i(x)^2$
Receiver reading	0.10 dB	Normal, k=1	1.000	0.10	0.01
Attenuation: antenna-receiver	0.20 dB	Normal, k=2	2.000	0.10	0.01
Antenna factor AF	0.58 dB	Normal, k=2	2.000	0.29	0.08
Receiver sinewave accuracy	0.15 dB	Normal, k=2	2.000	0.08	0.01
Receiver pulse amplitude	1.50 dB	Rectangular	1.732	0.87	0.75
Receiver pulse repetition rate	1.50 dB	Rectangular	1.732	0.87	0.75
Noise floor proximity	0.50 dB	Rectangular	1.732	0.29	0.08
Mismatch: antenna-receiver	0.95 dB	U-shaped	1.414	0.67	0.45
AF frequency interpolation	0.30 dB	Rectangular	1.732	0.17	0.03
AF height deviations	0.10 dB	Rectangular	1.732	0.06	0.00
Directivity difference at 3 m	3.12 dB	Rectangular	1.732	1.80	3.24
Phase center location at 3 m	1.00 dB	Rectangular	1.732	0.58	0.33
Cross-polarisation	0.90 dB	Rectangular	1.732	0.52	0.27
Balance	0.00 dB	Rectangular	1.732	0.00	0.00
Site imperfections	3.99 dB	Triangular	2.449	1.63	2.65
Separation distance at 3 m	0.30 dB	Rectangular	1.732	0.17	0.03
Effect of setup table material	0.57 dB	Rectangular	1.732	0.33	0.11
Table height at 3 m	0.10 dB	Normal, k=2	2.000	0.05	0.00
Near-field effects	0.00 dB	Triangular	2.449	0.00	0.00
Effect of ambient noise on OATS	0.00 dB				0.00
Combined standard uncertainty		Normal	2.97 dB		
Expanded uncertainty		Normal, k=2	5.94 dB		

3.2.3 Radiated Emission Measurements (Above 1GHz)

<i>Radiated Measurement (1 GHz-40 GHz) at a distance of 3 m</i>						
Input Quantity (Contribution) X_i	Value	Prob. Dist.	Divisor	$u_i(x)$	$u_i(x)^2$	
Receiver reading	0.10 dB	Normal, k=1	1.000	0.10	0.01	
Attenuation: antenna-receiver	0.30 dB	Normal, k=2	2.000	0.15	0.02	
Preamplifier Gain	0.20 dB	Normal, k=2	2.000	0.10	0.01	
Antenna factor AF	0.47 dB	Normal, k=2	2.000	0.24	0.06	
Sinewave accuracy	0.15 dB	Normal, k=2	2.000	0.08	0.01	
Instability of preamp gain	1.21 dB	Rectangular	1.732	0.70	0.49	
Noise floor proximity	0.70 dB	Rectangular	1.732	0.40	0.16	
Mismatch: antenna-preamplifier	1.41 dB	U-shaped	1.414	1.00	0.99	
Mismatch: preamplifier-receiver	1.30 dB	U-shaped	1.414	0.92	0.85	
AF frequency interpolation	0.30 dB	Rectangular	1.732	0.17	0.03	
Directivity difference at 3 m	1.50 dB	Rectangular	1.732	0.87	0.75	
Phase center location at 3 m	0.30 dB	Rectangular	1.732	0.17	0.03	
Cross-polarisation	0.90 dB	Rectangular	1.732	0.52	0.27	
Site imperfections VSWR (Method 2)	5.53 dB	Triangular	2.000	4.89	1.13	
Effect of setup table material	1.57 dB	Rectangular	1.732	0.91	0.82	
Separation distance at 3 m	0.30 dB	Rectangular	1.732	0.17	0.03	
Table height at 3 m	0.00 dB	Normal, k=2	2.000	0.00	0.00	
Combined standard uncertainty			Normal	2.38 dB		
Expanded uncertainty			Normal, k=2	4.76 dB		

3.2.4 Radiated Emission Measurements (Above 40GHz)

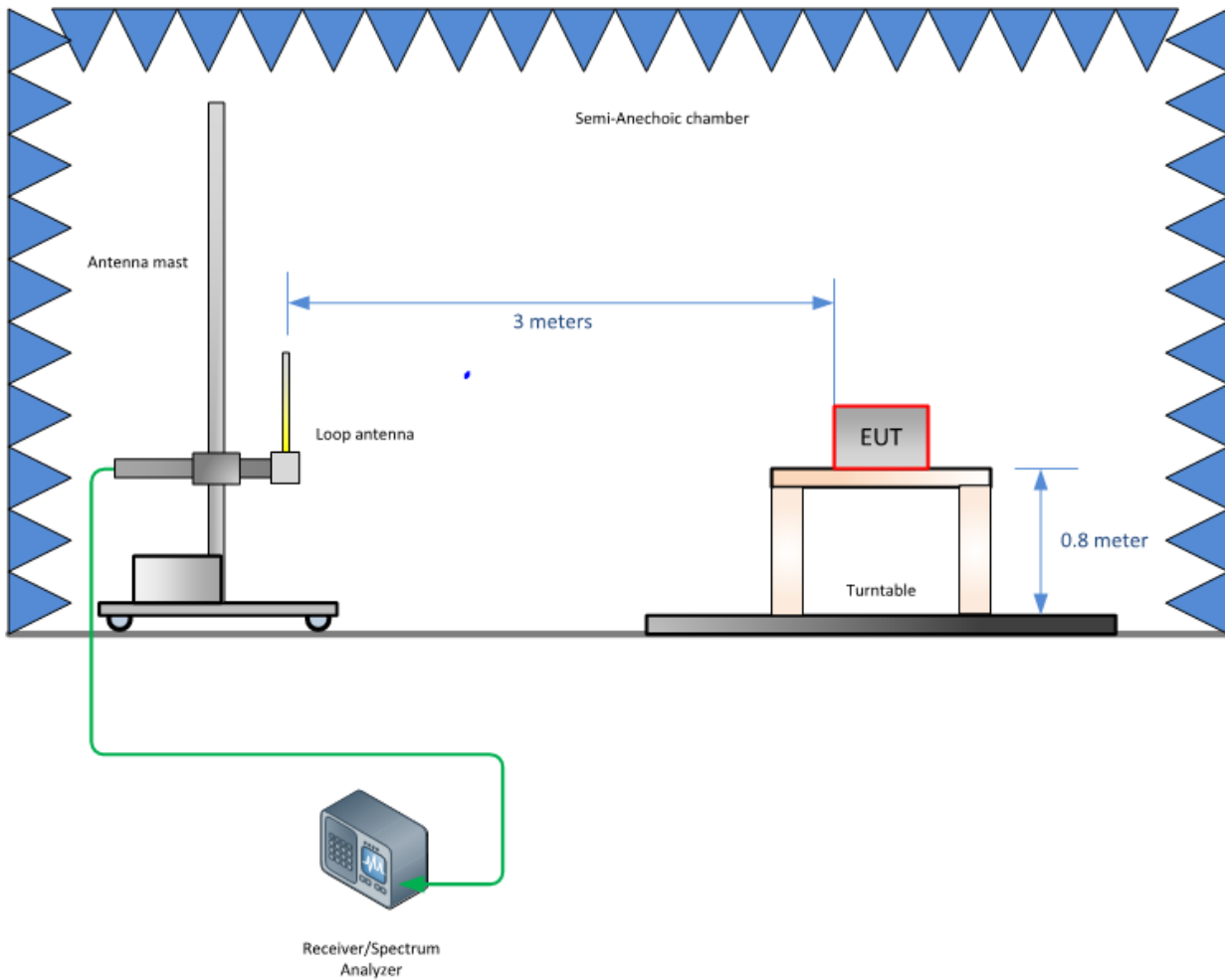
<i>Radiated Measurement (above 40 GHz) at a distance of 3 m</i>						
	Input Quantity (Contribution) X_i	Value	Prob. Dist.	Divisor	$u_i(x)$	$u_i(x)^2$
1	Receiver reading	0.10 dB	Normal, k=1	1.000	0.10	0.01
2	Attenuation: antenna-receiver	0.30 dB	Normal, k=2	2.000	0.15	0.02
3	Preamplifier Gain	0.50 dB	Normal, k=2	2.000	0.25	0.06
4	Antenna Gain	0.75 dB	Normal, k=2	2.000	0.38	0.14
5	Sinewave accuracy	0.15 dB	Normal, k=2	2.000	0.08	0.01
6	Mixer Operation	1.21 dB	Rectangular	1.732	0.70	0.49
7	Instability of preamp gain	1.21 dB	Rectangular	1.732	0.70	0.49
8	Noise floor proximity	0.70 dB	Rectangular	1.732	0.40	0.16
9	Mismatch: antenna-preamplifier	1.41 dB	U-shaped	1.414	1.00	0.99
10	Mismatch: preamplifier-receiver	1.30 dB	U-shaped	1.414	0.92	0.85
11	AF frequency interpolation	0.30 dB	Rectangular	1.732	0.17	0.03
12	Cross-polarisation	0.90 dB	Rectangular	1.732	0.52	0.27
Combined standard uncertainty			Normal	1.88 dB		
Expanded uncertainty			Normal, k=2	3.75 dB		



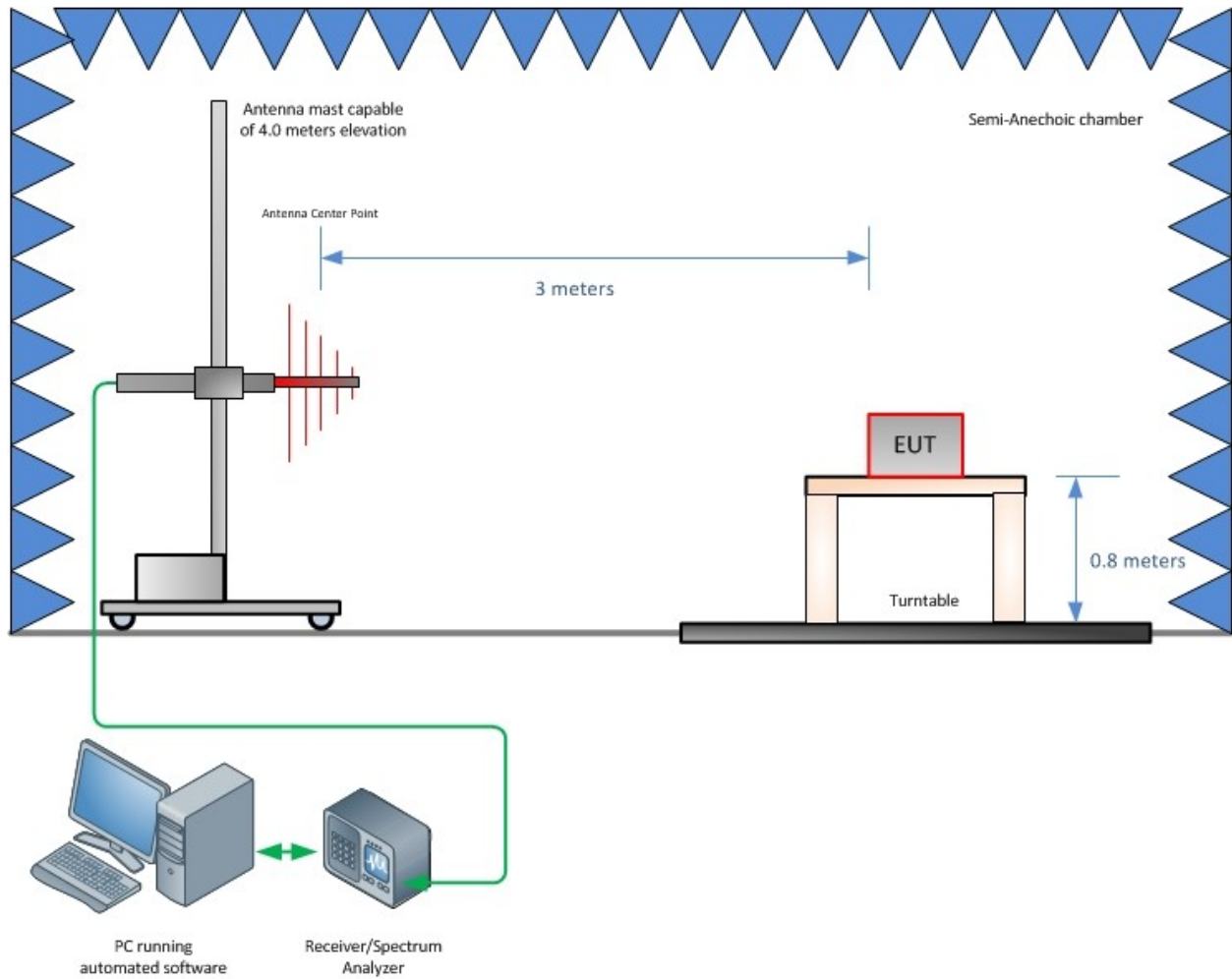
SECTION 4

Diagram of Test Setup

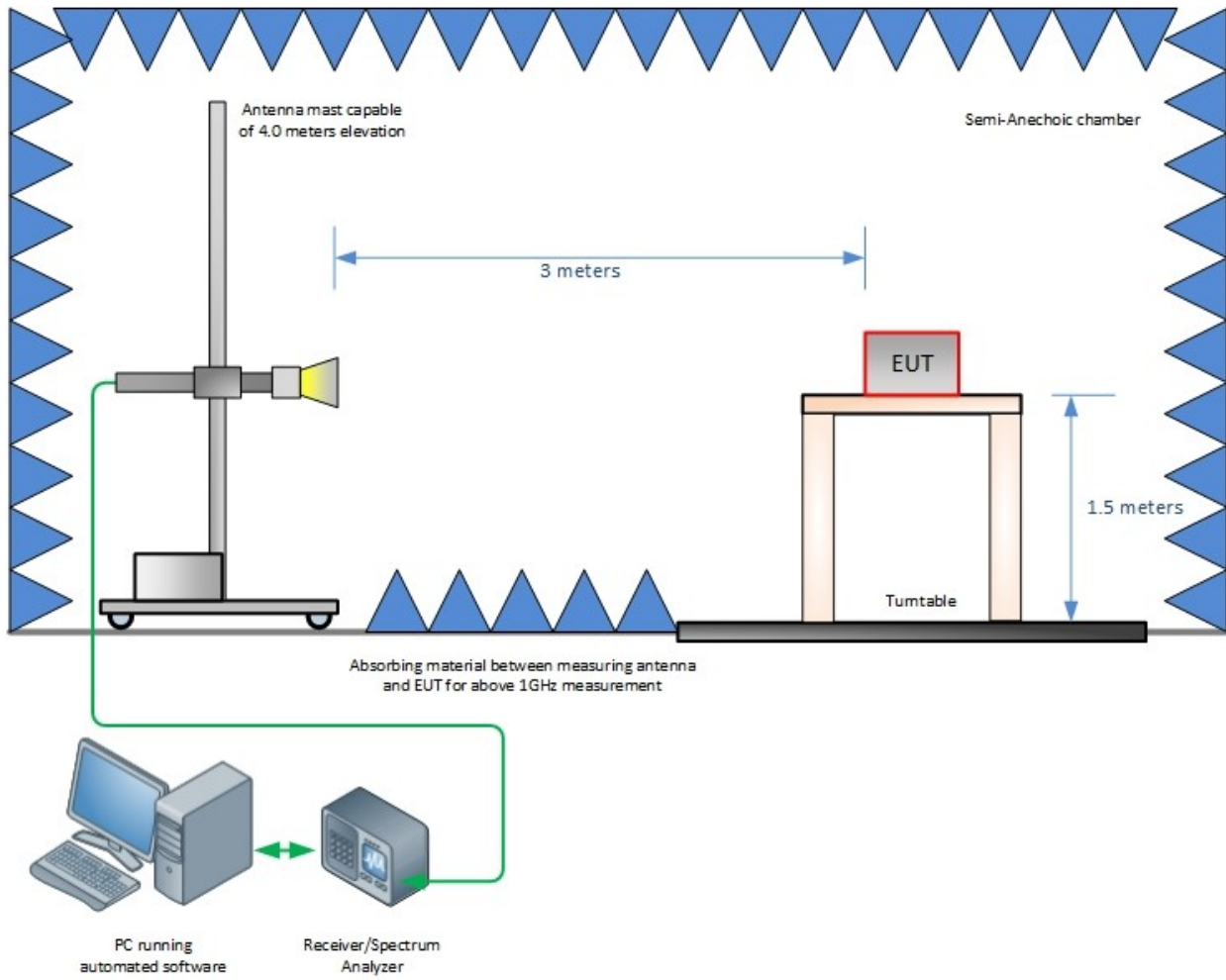
4.1 TEST SETUP DIAGRAM



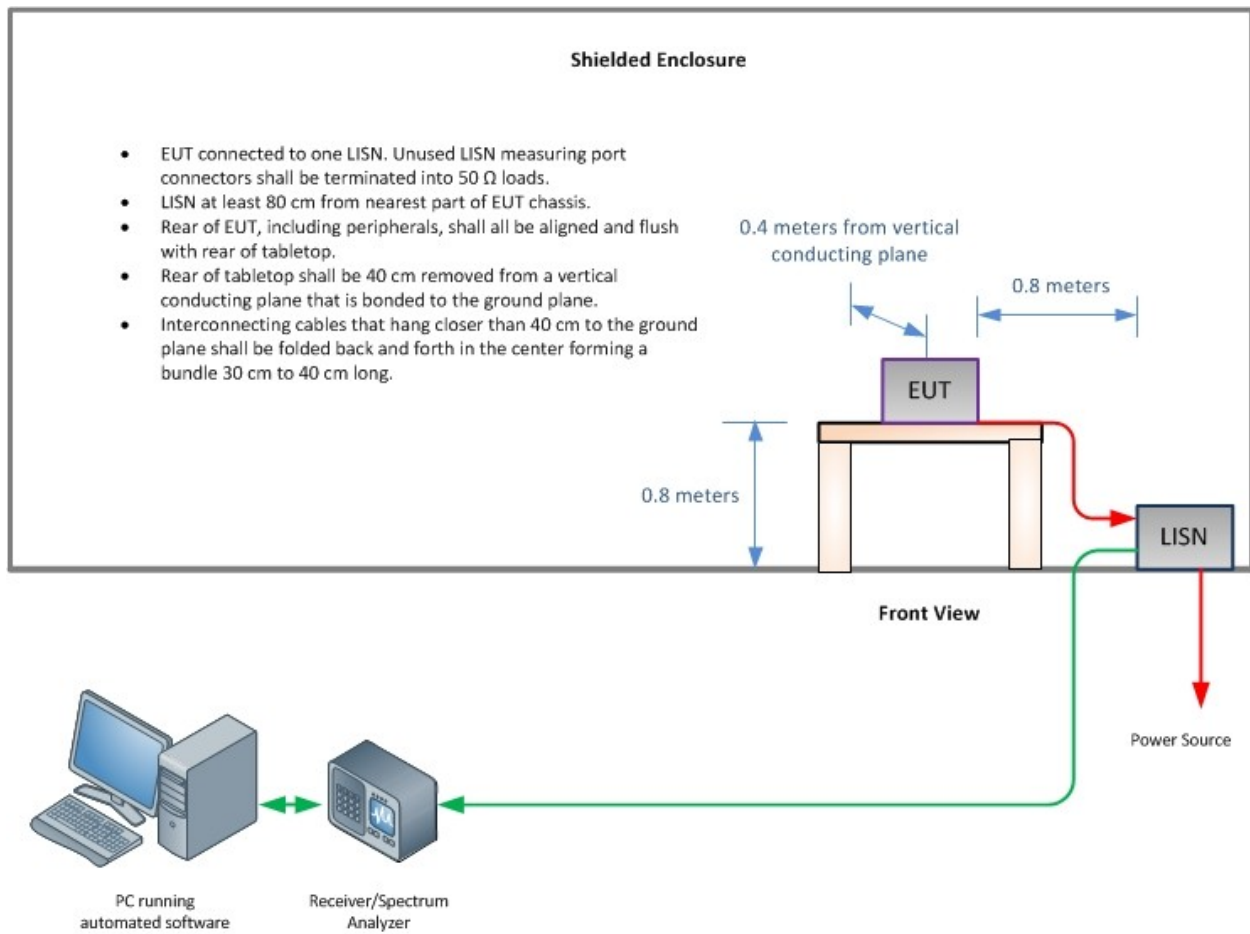
Radiated Emission Test Setup (Below 30MHz)



Radiated Emission Test Setup (Below 1GHz)



Radiated Emission Test Setup (Above 1GHz)



AC Conducted Emission Test Setup (for reference only)



SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT



5.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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