



EMC Test Report

For

Planar Motor Inc.

218-6328 Larkin Drive, Vancouver, BC, V6T 2K2 Canada

Equipment: S3 Flyway
Model Number: S3-xS-04.08
FCC ID: 2BTRTS3
Project No.: 26-5960
Report No.: 20.01.26-5960-1
Revision No.: 2
Date: 2026-06-23

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RF Test Report		
Report Reference No.	20.01.26-5960-1	
Compiled by	Jack Qin	
Approved by	Anthony Chang	
Date of issue	2026-06-08	
Total number of pages	25	
Testing Laboratory	LabTest Certification Inc.	
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FCC Designation Number:	CA5970	
FCC Lab's Registration No.	721268	
CAB identifier number No.	CA5970	
Applicant's name	Planar Motor Inc.	
Address	218-6328 Larkin Drive, Vancouver, BC, V6T 2K2 Canada	
Standard	FCC Part 15, Subpart C: 15.203, 205, 207, 209	
Verdict Summary	In- compliance according to the test cases in the verdict summary. Accredited test report	
Competences and Guarantees: We, LabTest, are a testing laboratory competent to carry out the tests described in this report. To assure the traceability to other national and international laboratories, we have a calibration and maintenance program for its measurement equipment. We guarantee the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated in the report and it is based on the knowledge and technical facilities available at LabTest at the time of performance of all tests. We are liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of our test. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or Competent Authorities. All results presented in this test report applies only to the item under test established in this document. LabTest does not make any claims of compliance for samples or variants which were not tested. IMPORTANT: No parts of this report may be reproduced or quoted out of context, in any form or by any means, except in full, without the previous written permission of LabTest. This document is only valid if complete. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of LabTest.		

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Document History

Revision	Date	Reason for Change	Author
1	2026-06-23	Initial Data	Jack Qin
2	2026-07-27	Add OBW section	Jack Qin

Abbreviations

For the purpose of the present document, the following abbreviations apply:

Ant. Pol.: Antenna Polarization
AF: Antenna Factor
AVG: Average
BW: Bandwidth
CAV: CISPR Average
CDN: Coupling Decoupling Network
EUT: Equipment Under Test
FAC: Fully Anechoic Chamber
GRP: Ground Reference Plane
HCP: Horizontal Coupling Plane
NA: Not Applicable
QP: Quasi-Peak
RBW: Resolution Bandwidth
SAC: Semi-Anechoic Chamber
 U_N : Nominal Voltage
VBW: Video Bandwidth
VCP: Vertical Coupling Plane

1.0 Test Conditions

1.1 Measurement uncertainties

For all measurements where guidance for the calculation of the instrumentation uncertainty of a measurement is specified in CISPR 16-4-2/EN55016-4-2, IEC/EN 61000-4 series or a product standard, the measurement instrumentation uncertainty has been calculated and applied in accordance with these standards.

The tables below show measurement uncertainties of each test set-ups. Uncertainties have been calculated according to the LabTest internal documents. The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95%.

Emission Tests	Uncertainty	U _{CISPR}
Conducted Emissions; 150kHz – 30MHz	± 1.63 dB	3.44 dB
Radiated Emissions; 30MHz – 300MHz (Horz.)	± 3.87 dB	5.34 dB
Radiated Emissions; 30MHz – 300MHz (Vert.)	± 3.87 dB	6.32 dB
Radiated Emissions; 300MHz – 1000MHz (Horz.)	± 4.79 dB	5.34 dB
Radiated Emissions; 300MHz – 1000MHz (Vert.)	± 4.79 dB	6.32 dB
Radiated Emissions; 1GHz – 18GHz (Horz.)	± 5.03 dB	5.18 dB
Radiated Emissions; 1GHz – 18GHz (Vert.)	± 5.03 dB	5.18 dB

1.2 Environmental reference conditions

The climatic conditions during the tests are within the limits specified by the manufacturer for the operation of the EUT and the test equipment. If explicitly required in the basic standard or applied product standard the climatic values are recorded and documented separately in this test report. The climatic conditions during the tests were within the following limits:

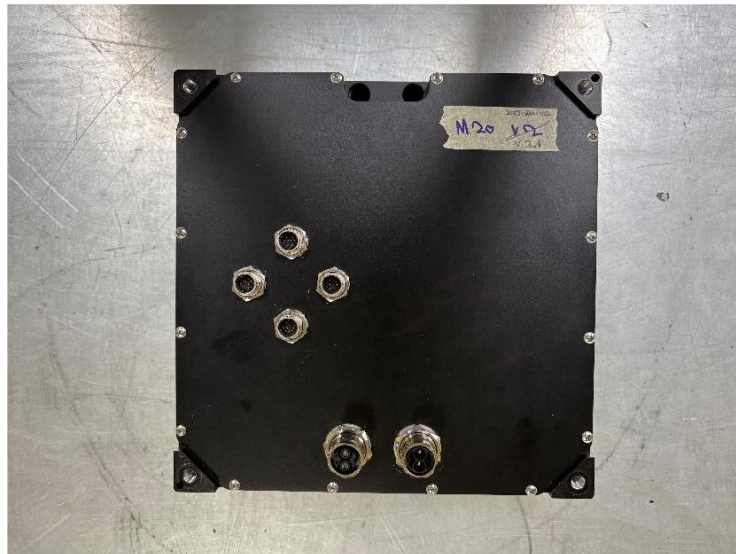
Temperature	Humidity	Atmospheric pressure
15 °C – 35 °C	30 % - 60 %	860 kPa – 1060 hPa

2.0 EUT (Equipment Under Test) Information

2.1 General description of EUT

EUT Name	S3 Flyway
Description	Planar Motor System is composed of XBots (movers), a stationary surface of modular Flyways (stators), and a PMC (controller). Each XBot is independently controlled via magnetic levitation with 6 degrees of freedom motion.
Model Number	S3-xS-04.08
Serial Number	2531-0D71
Manufacturer	Planar Motor Inc.
Trademark	
Input Power	48 VDC, 3A from external AC/DC convertor
Firmware	24-70
Maximum clock frequency	125MHz
Transmitter frequency	134.4 kHz
Transmitter FCC ID	2BTRTS3
Dimensions (W x H x D)	240 x 240 x 70 mm
Weight	6.6 kg

EUT Picture



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2.2 The environment(s) in which the EUT is intended to be used

☐	Residential (domestic) environment.
☐	Commercial and light-industrial environment.
☒	Industrial environment.
Other	

2.3 Port/Cable information

Cable	Description	Operational Voltage& Current	Shielded (Y/N)
Flyway Power & Signal	48 VDC power, 24 VDC Enable	Pwr: 48 VDC/3.0A Signal: 24VDC/0.3A	Y
PMNet	Proprietary data communication	1.2V	Y

2.4 Operating modes and functional performance

Item	Description	Model number
1	Main power to external power supply for flyway power	none
2	Planar Motor Controller	C-PLK-6.2
3	PMC power cable	none
4	Ethernet cable	none

3.0 Verdict Summary

The tables provided outline the test items and their respective results, conducted in accordance with the standards specified in quote "00003310", which represents an agreement between LabTest and Planar Motor Inc. It is important to note that the listed tests may not cover all aspects of the standards' requirements. For test methods, the latest versions are referenced unless otherwise stated. The detailed test results are presented in the following section.

Item	Test Description	Test Standards	Result
1	Antenna requirements	FCC §15.203	Compliant
2	Transmitter Radiated emissions	FCC §15.209	Compliant
3	Emissions Occupied Bandwidth	FCC §2.1049	Compliant
4	Radiated spurious emissions	FCC §15.205	Compliant
5	Conducted emissions (AC mains)	FCC §15.207	Compliant

4.0 Emission Test Results

4.1 Antenna requirements

Standards	FCC §15.203
Test Engineer	Jack Qin
Test date	2026-03-23
Requirement	The device must use a permanently attached, built-in, or uniquely coupled antenna. The antenna shall not be user-replaceable or use a standard RF connector, ensuring the RF characteristics remain as certified and preventing modification that could increase emissions or transmission range.
Verdict	Compliant

Test results

The antenna is a PCB-type antenna, so it meets the requirement.

4.2 Transmitter Radiated emissions

Standards	FCC §15.209		
Procedure standards	ANSI C63.10; FCC §15.31, §15.33, §15.35		
Test Engineer	Jack Qin		
Test date	2026-03-23		
Requirement	Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:		
	Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
	0.009-0.490	2400/F(kHz)	300
	0.490-1.705	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
	FCC §15.209 limit at 134 kHz: 65 dBµV/m @ 3 m		
Verdict	Compliant		

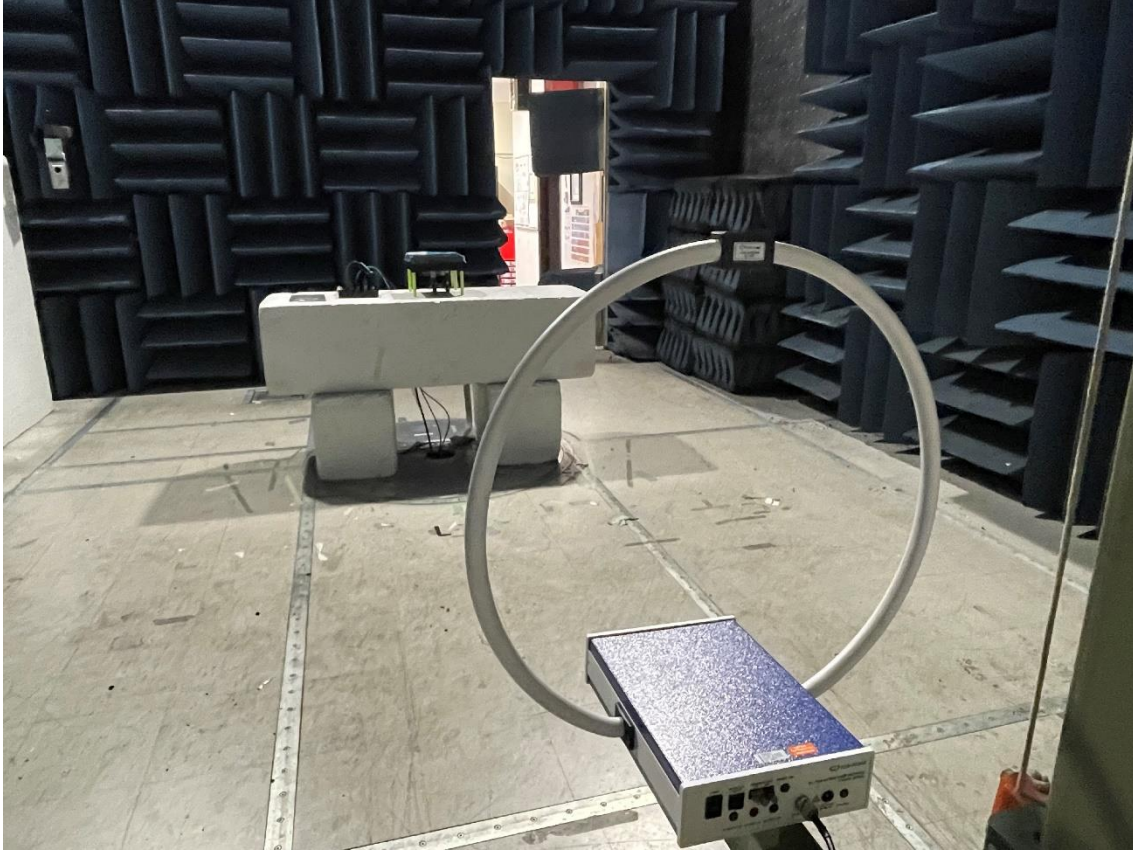
Test method

Radiated emissions were measured in accordance with the applicable requirements of FCC Part 15.209. The test was performed using the procedures defined in ANSI C63.10, with the Equipment Under Test (EUT) placed on a non-conductive turntable and rotated through 360° to obtain maximum emission levels. A calibrated receiving antenna or low-frequency magnetic field probe was used depending on the frequency range. Measurements were performed at the specified test distance, and the highest emission levels were recorded. Detector functions (peak, quasi-peak, and/or average) were applied in accordance with FCC §15.35 requirements. The measurement results were compared against the FCC Part 15.209 radiated emission limits for compliance evaluation.

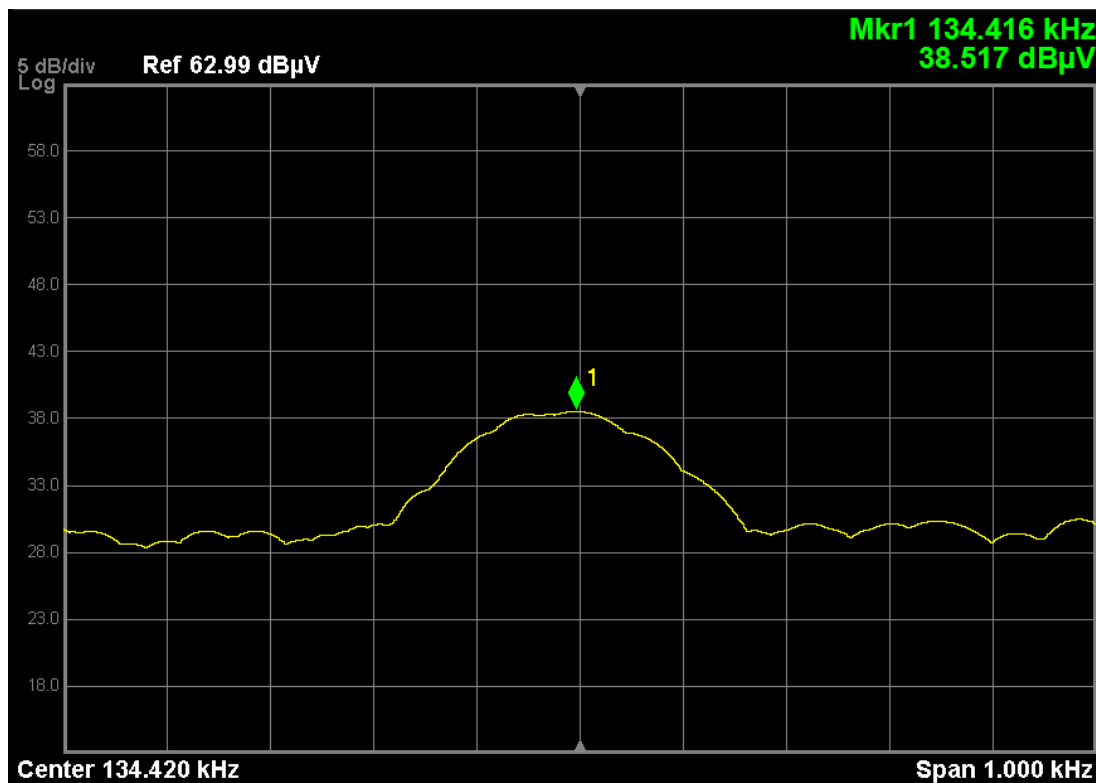
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Test setup



Test results



Item	Description	Value	Unit
1	Raw Peak	38.517	dBμV
2	Cable Loss Correction	+0.5	dB
3	Antenna Factor	+14.2	dB/m
4	Peak	53.2	dBμV/m
5	Margin	11.8	dB
6	Limit at 3 meters	65	dBμV/m

Note: Peak = Raw Peak + Cable Loss Correction + Antenna Factor

4.3 Emissions Occupied Bandwidth

Standards	FCC §2.1049
Procedure standards	ANSI C63.10-2020
Test Engineer	Jack Qin
Test date	2026-6-25
Requirement	The occupied bandwidth of the transmitter shall be measured in accordance with FCC §2.1049. The measured emission bandwidth shall be reported. The measurement shall demonstrate compliance with the applicable FCC requirements for intentional radiators operating under FCC §15.209.

Test method

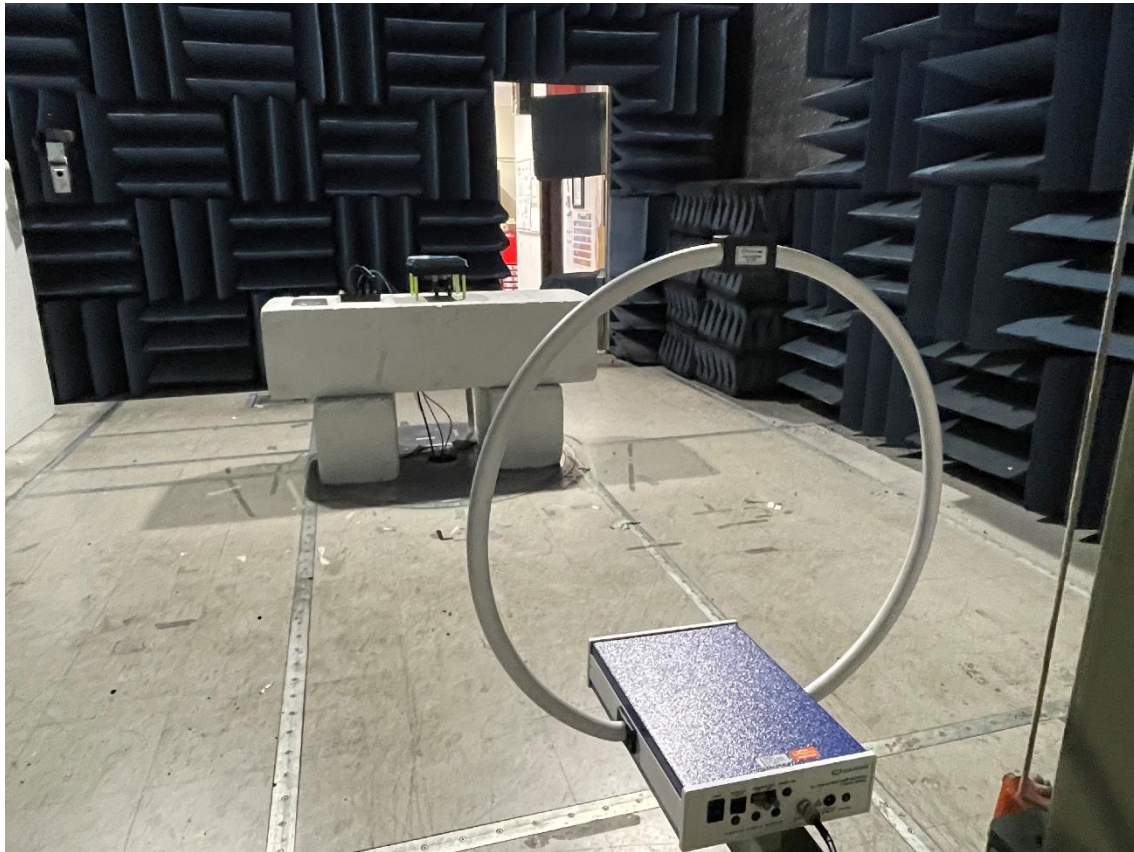
The occupied bandwidth was measured using a spectrum analyzer with the transmitter operating at maximum output power. The 99% occupied bandwidth measurement function was used. The spectrum analyzer was configured with an appropriate resolution bandwidth (RBW), video bandwidth (VBW), detector mode, and span to capture the complete emission spectrum.

Parameter	Spectrum Analyzer Setting
Center Frequency	134.4 kHz
Span	20 kHz (adjust as needed)
Resolution Bandwidth (RBW)	100 Hz
Video Bandwidth (VBW)	300 Hz
Detector	Peak
Sweep Time	Auto
Trace Mode	Max Hold
OBW Method	99% Occupied Bandwidth

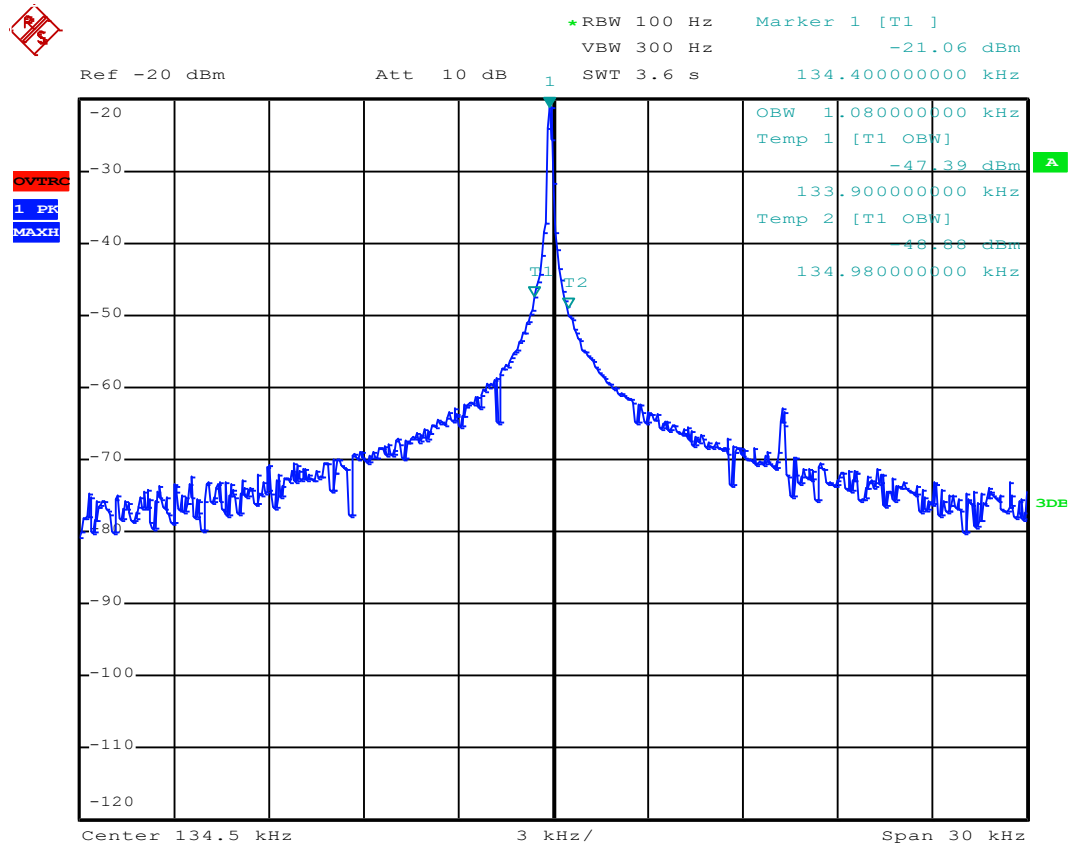
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Test setup



Test results



Result: 99% occupied bandwidth is 1.08 kHz

4.4 Spurious Radiated Emissions

Standards	FCC §15.205		
Procedure standards	ANSI C63.10; FCC §15.31, §15.33, §15.35		
Test Engineer	Jack Qin		
Test date	2026-03-23		
Limit	Spurious emissions must be 20 dB below the measured value of the carrier frequency, with the exceptions of spurious emissions in the restricted frequency bands which must meet the Class B limits.		
	Radiated Emission FCC Class B Limit at 3 Meters		
	Frequency (MHz)	Quasi-peak (dB μV/m)	
	30 – 88	40	
	88 – 216	43.5	
	216 - 960	46	
	960 – 1000	54	
	Frequency (GHz)	Average (dB μV/m)	Peak (dB μV/m)
	> 1	54	74
Verdict	Compliant		

Test method

This test measures the radiated emissions from the EUT, evaluating its potential to cause radio frequency interference with other electronic devices. Testing was conducted in accordance with the test standards referenced in the test summary section of this report. The EUT was configured as specified by the requirements of the applicable test standard.

The Equipment Under Test (EUT) is placed on a table at a height of 80 cm for tests conducted below 1000 MHz, and at a height of 150 cm for tests above 1000 MHz. It is positioned 3 meters away from the receiving antenna. During the measurement, the table is rotated continuously from 0° to 360°, while the antenna height is varied between 1 meter and 4 meters to capture the maximum emission levels.

Initially, a pre-scan is performed using an EMC analyzer set to peak detector mode, controlled by EMC test software, Tile7. The receiver's resolution bandwidth is configured as follows:

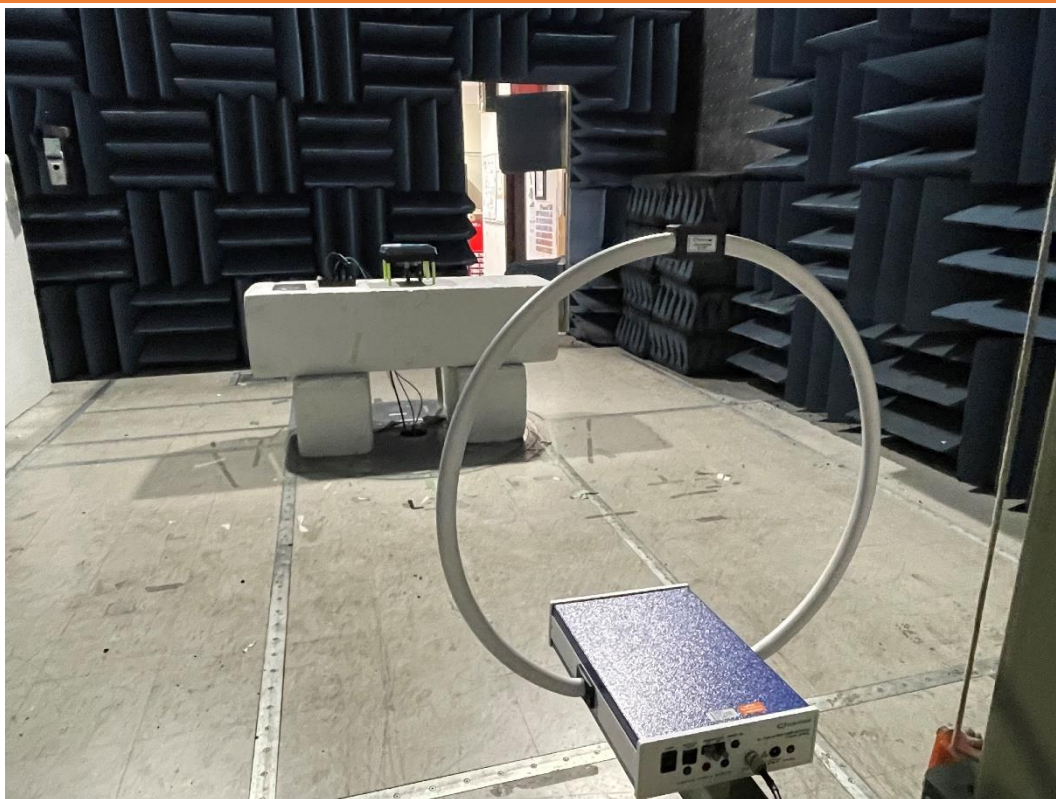
- 9 kHz for the range 150 kHz to 30 MHz
- 120 kHz for the range 30 MHz to 1000 MHz
- 1 MHz for frequencies above 1 GHz

After the pre-scan, the worst-case frequencies within 10 dB of the limit line are selected for final measurement. The EMC analyzer is set to CISPR quasi-peak mode for frequencies below 1 GHz and to both peak and average detectors for frequencies above 1 GHz.

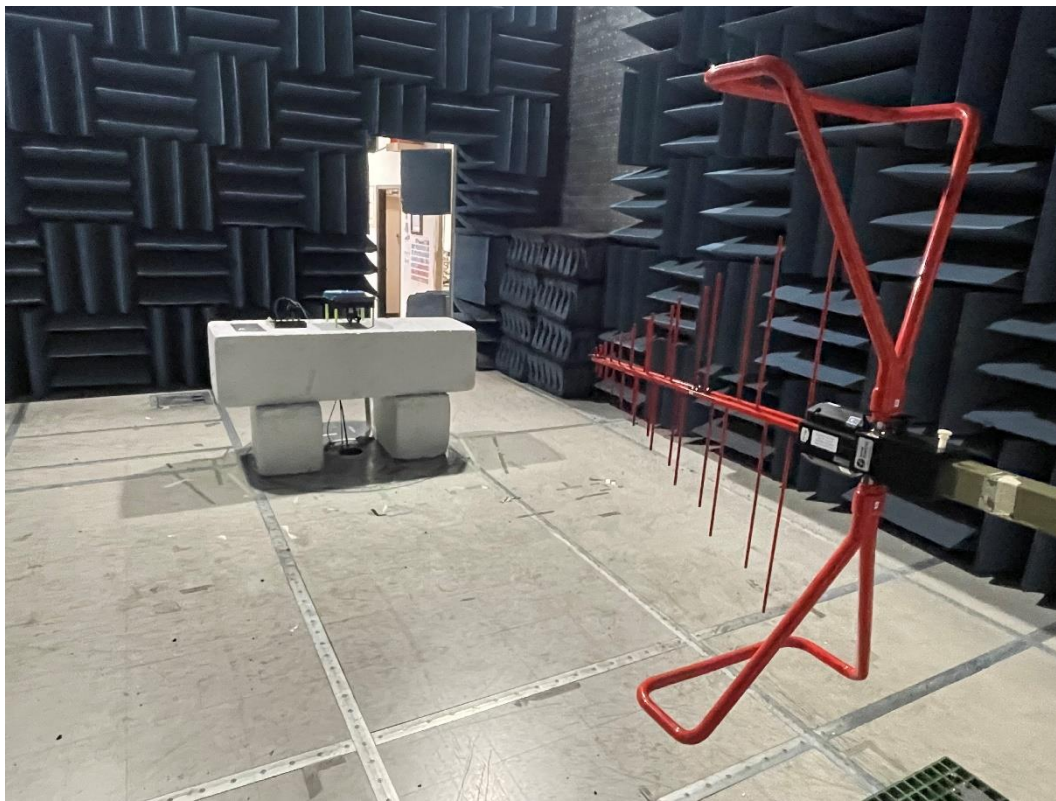
The numerical results provided confirm compliance with the applicable standards.

Note: A high pass filter was used for the measurements above 1 GHz with the EUT transmitter turned on. This was needed to attenuate the fundamental so that it would not overload the amplifier used in the measurement setup.

Test setup



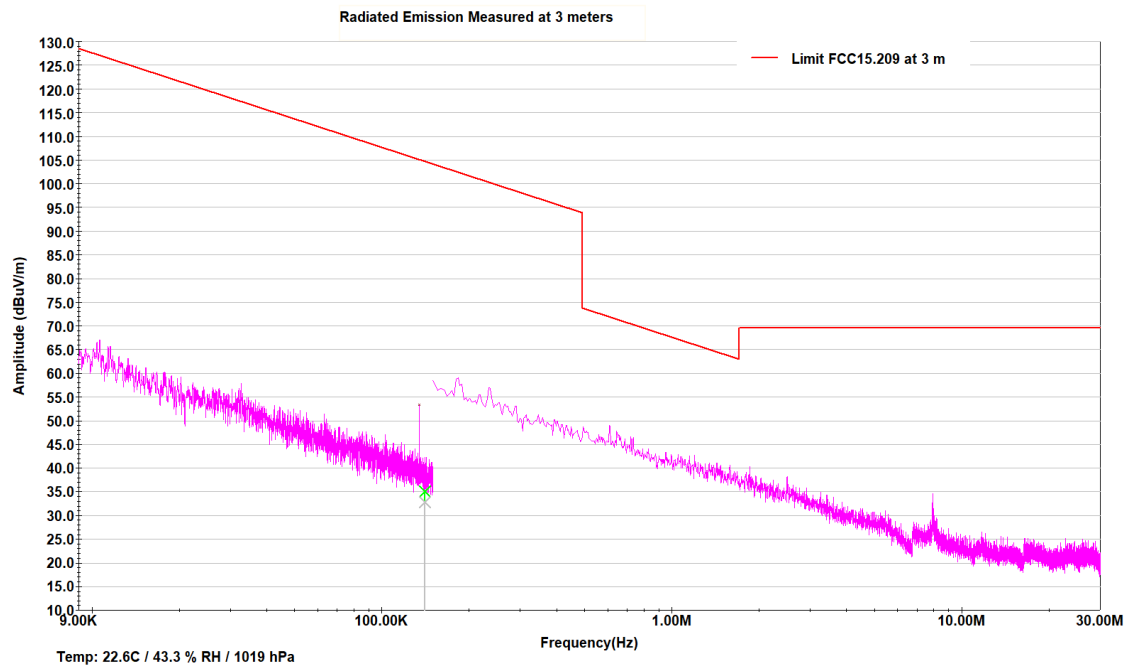
Radiated emissions below 30 MHz



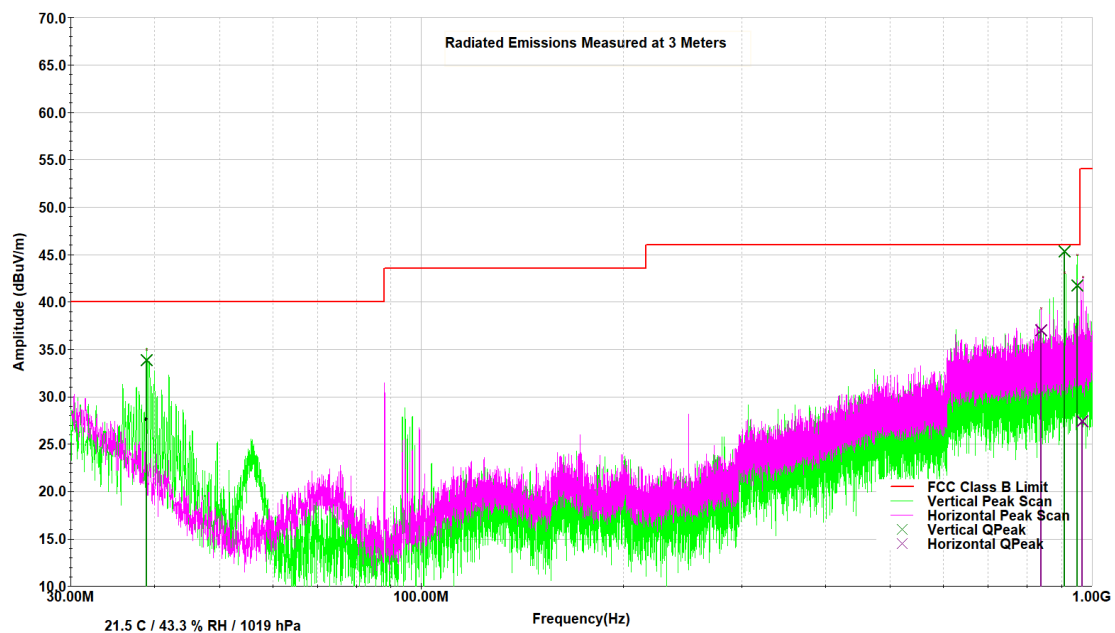
Radiated emissions 30 -1000 MHz

Test results

Spurious Radiated Emissions, 9 kHz – 30 MHz



Spurious Radiated Emissions, 30 MHz – 1000 MHz



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Frequency	Antenna Polarization	Raw QPeak	Antenna Factor	Correction Factor	QPeak	Margin	Limit
MHz	V/H	dBuV	dB/m	dB	dBuV/m	dB	dBuV/m
839.8337	H	9	25.1	2.9	37	9	46
966.9122	H	-1.7	26.1	3	27.4	26.6	54
38.94764	V	14.3	18.8	0.7	33.9	6.1	40
910.1371	V	16.8	25.5	3	45.4	0.6	46
949.2144	V	12.5	26.2	3	41.7	4.3	46

Remark:

1. Only the worst-case spot frequencies from the EUT were selected for the final measurement.
2. $QPeak = Raw\ QPeak + Antenna\ Factor + Correction\ Factor$.

4.5 Conducted Emission – AC Mains Port

Standards	FCC §15.207		
Procedure standards	ANSI C63.4		
Test Engineer	Jack Qin		
Test date	2026-03-23		
Test Limit			
	Conducted emissions Class A limits (AC mains power terminals)		
	Frequency (MHz)	Quasi-Peak (dBμV)	Average (dBμV)
	0.15 - 0.50	79	66
	0.5 - 30	73	60
	Note 1 The lower limit shall apply at the transition frequencies		
Verdict	Compliant		

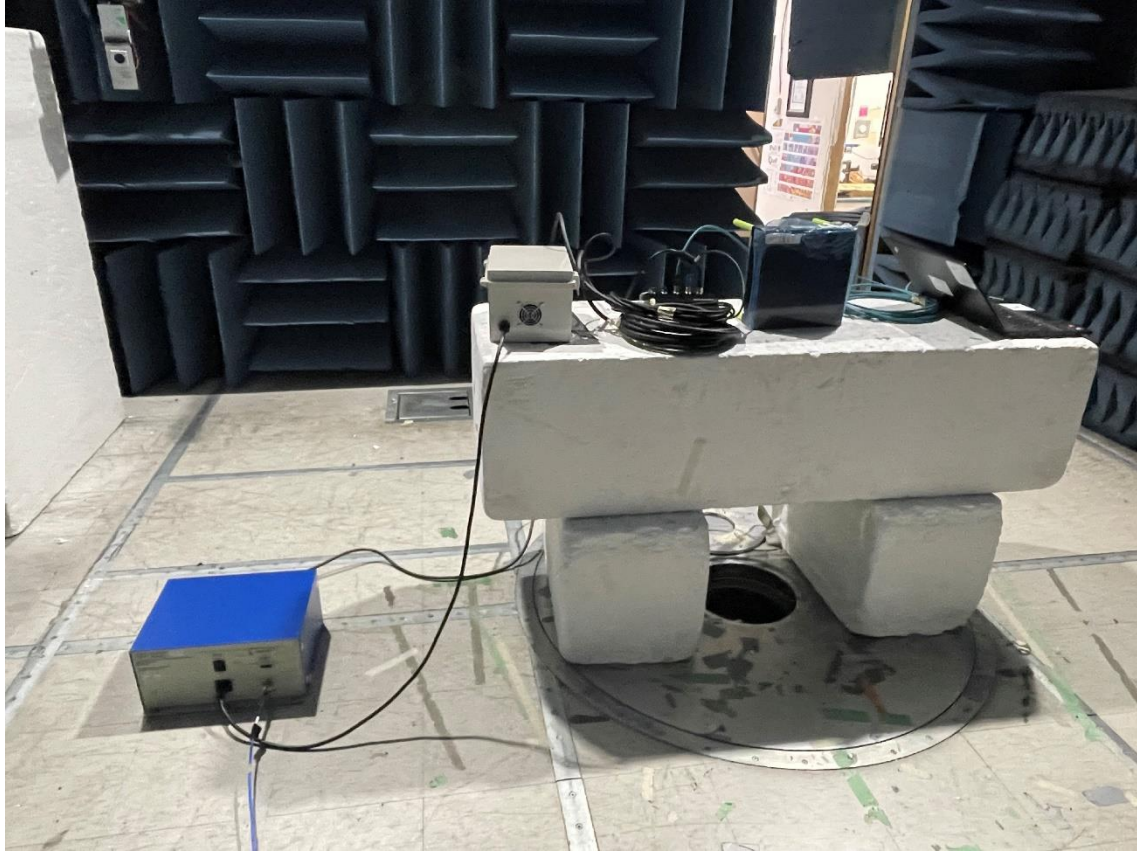
Test method

This test measures the levels emanating from the EUT, thus evaluating the potential for the EUT to cause radio frequency interference to other electronic devices. Testing is performed in accordance with the test standards referenced in the test summary section of this report. The EUT is configured based on the requirements of the applicable test standard. Initially, a scan is made with an EMC Analyzer, controlled by EMC Test Software, Tile7!, from 150 kHz to 30 MHz on each phase with the receiver in the peak mode. The measuring bandwidth is set up 9 kHz and VBW is 30 kHz. Measurements are then made using CISPR16-1 quasi-peak and averaging detectors when the peak readings are within 10dB of the Quasi-peak limit line.

Emission level is presented according to the below formula:

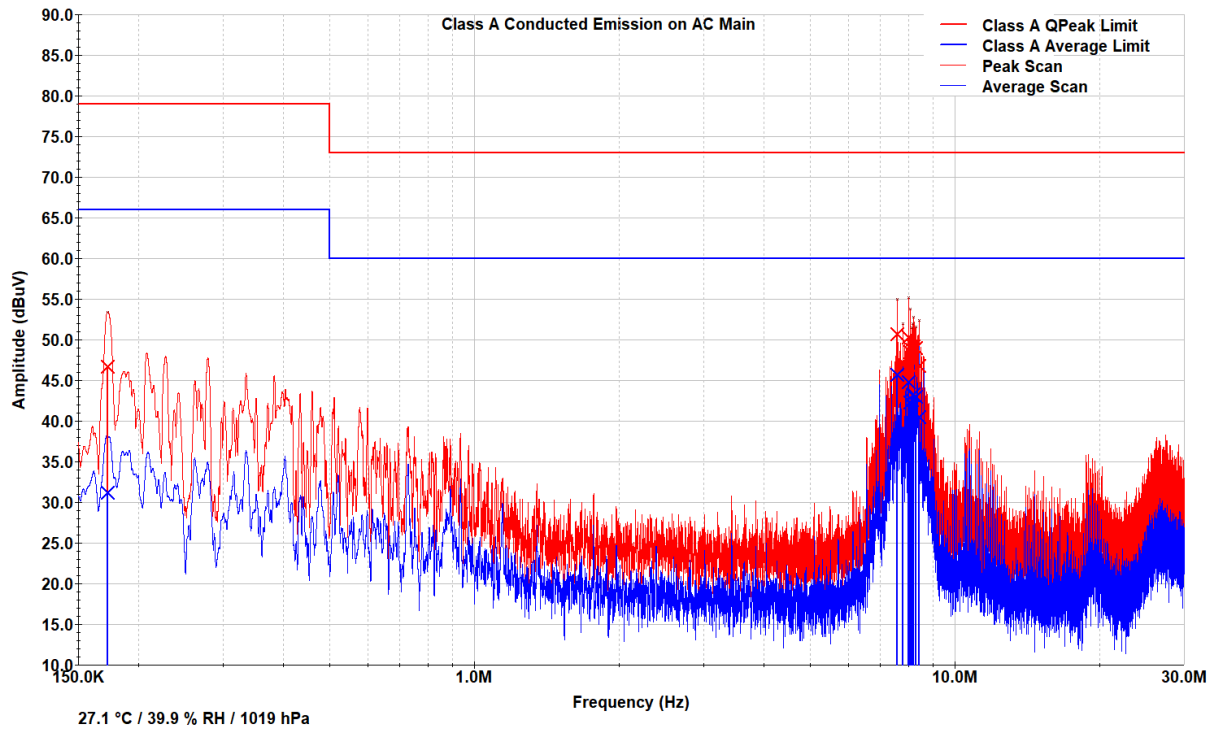
Conducted Emission (dBμV) = Measured Emission (dBμV) + Cable Loss(dB) + LISN Correction Factor (dB)

Test setup



Test results

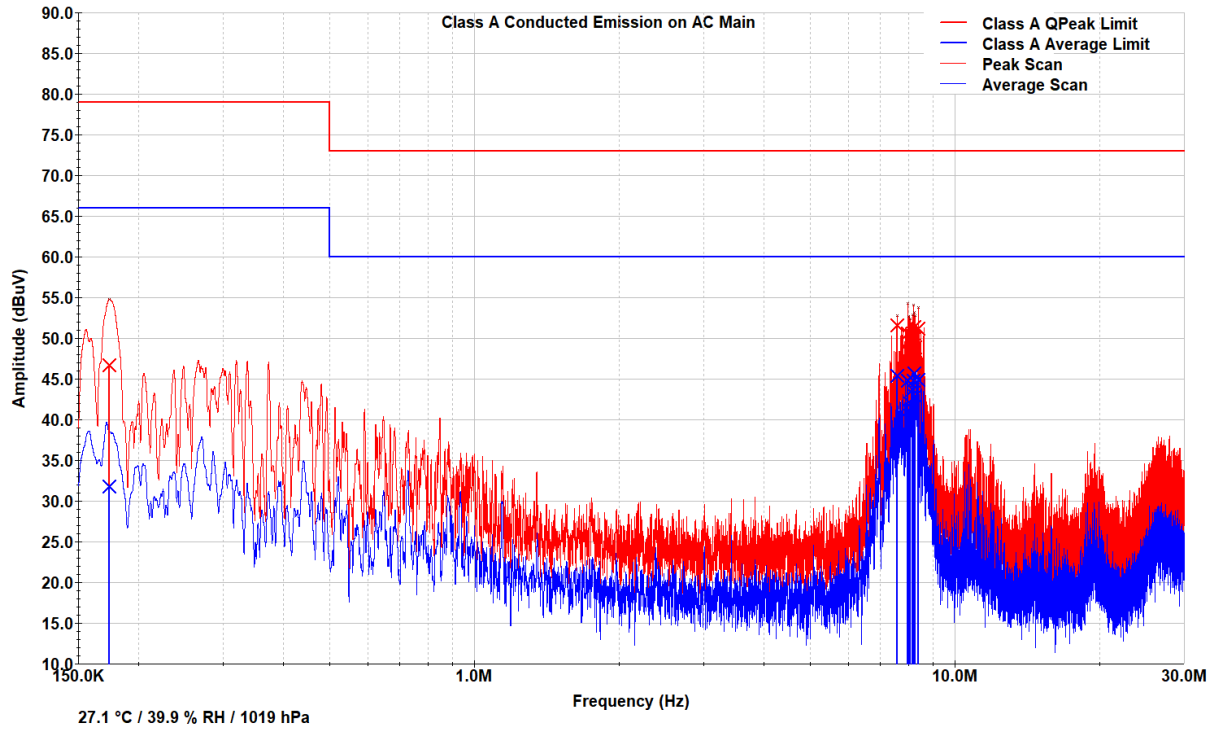
Conducted Emission on AC Main L1 with Class A Limit



Frequency	Correction Factor	QP	QP Margin	QP Limit	AVG	AVG Margin	AVG Limit
MHz	dB	dBμV	dB	dBμV	dBμV	dB	dBμV
0.173	20.684	46.72	32.28	79	31.177	34.82	66
7.59	20.471	50.7	22.3	73	45.675	14.32	60
7.794	20.469	46	27	73	39.093	20.91	60
8.005	20.468	50.28	22.72	73	44.827	15.17	60
8.082	20.474	48.54	24.46	73	42.308	17.69	60
8.13	20.48	48.84	24.16	73	42.617	17.38	60
8.178	20.485	49.3	23.7	73	43.24	16.76	60
8.206	20.488	49.19	23.81	73	43.301	16.7	60
8.294	20.493	49.02	23.98	73	43	17	60
8.417	20.499	46.85	26.15	73	40.451	19.55	60

Note: Correction Factor = Cable Loss (dB) + 20 dB attenuator

Conducted Emission on AC Main L2 with Class A Limit



Frequency	Correction Factor	QP	QP Margin	QP Limit	AVG	AVG Margin	AVG Limit
MHz	dB	dBμV	dB	dBμV	dBμV	dB	dBμV
0.174	20.677	46.68	32.32	79	31.778	34.22	66
7.592	20.471	51.59	21.41	73	45.391	14.61	60
7.99	20.468	50.58	22.42	73	44.817	15.18	60
8.025	20.469	48.3	24.7	73	41.161	18.84	60
8.06	20.472	48.41	24.59	73	41.995	18	60
8.174	20.484	50.25	22.75	73	43.706	16.29	60
8.198	20.487	50.62	22.38	73	44.842	15.16	60
8.218	20.489	51.36	21.64	73	45.722	14.28	60
8.249	20.491	48.91	24.09	73	42.9	17.1	60
8.4	20.498	51.22	21.78	73	44.926	15.07	60

Note : Correction Factor = Cable Loss (dB) + 20 dB attenuator

Appendix A. List of Test Equipment

Equipment	Manufacturer	Model	LabTest ID	Last calibration	Calibration due*
Test Stand #1					
LISN	Com-Power	LIN-120C	920	03-Sep-2025	03-Sep-2026
EMC Analyzer	Keysight	N9038A	702	22-Oct-2025	22-Oct-2026
RF Cable	Lighthorse	CBB-2NMNT	NA	IHC	IHC
AC Power Source	Pacific Power Source	360AMXT-UPC32	955	IHC	IHC
Used Software	Tile 7!, v7.3.0.6				
Test Stand #2					
Horn Antenna	A.H Systems	SAS-571	227C	04-Feb-2025	04-Feb-2027
Broadband Antenna	Sunol	JB1	371	13-Jan-2025	13-Jan-2027
EMC Analyzer	Keysight	N9038A	702	22-Oct-2025	22-Oct-2026
RF Preamplifier	Agilent	8449B	273	IHC	IHC
Motion Controller	Sunol	SC104V	235A	IHC	IHC
Antenna Tower	Sunol	TWR95-4	235B	IHC	IHC
Turn Table	Sunol	SM46C	235C	IHC	IHC
EMC Shielded Enclosure	USC	USC-26	374	IHC	IHC
RF Cable	A.H. Systems	SAC-26G-3	227D	IHC	IHC
RF Cable	MRO	NA	NA	IHC	IHC
AC Power Source	Pacific Power Source	360AMXT-UPC32	955	IHC	IHC
Used Software	Tile 7!, v7.3.0.6				

* Calibration interval extended based on enough calibration data and experience of use (see IEC 61010-1:2015 clause 8.3)

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