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CERTIFICATION TEST REPORT

Manufacturer: Babson Diagnostics, Inc.
1205 Sheldon Cove, Suite 2-J
Austin, Texas 78753 USA

Applicant: Same as Above

Product Name: Art Sample Preparation Device

Product Description: The Art Sample Preparation Device is a sample preparation device used to automate the mixing, centrifugation, and refrigeration of capillary blood samples for chemistry and hematology testing. It is used in settings where a capillary blood sample is collected by a trained healthcare worker.

Operating Voltage/Frequency: 120V/60 Hz

Model: Art Sample Preparation Device

FCC ID: 2A83TRFASPD

Testing Commenced: 2022-10-19

Testing Ended: 2022-10-21

Summary of Test Results: In Compliance

Standards:

- ❖ FCC Part 15 Subpart C, Section 15.209
- ❖ FCC Part 15 Subpart C, Section 15.215(c) – Additional provisions to the general radiated emission limitations
- ❖ FCC15.207 - Conducted Limits



Order Number: F2P28283E

Applicant: Babson Diagnostics, Inc.
Model: Art Sample Preparation Device

Evaluation Conducted by:

Julius Chiller, Senior Wireless Project Engineer

Report Reviewed by:

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1 ADMINISTRATIVE INFORMATION

1.1 Measurement Location:

F2 Labs in Middlefield, Ohio. Site description and attenuation data are on file with the FCC's Sampling and Measurement Branch at the FCC Laboratory in Columbia, MD.

1.2 Measurement Procedure:

All measurements were performed according to the 2013 version of ANSI C63.10 and recommended FCC procedure of measurement of equipment operating under Section 15.209. A list of the measurement equipment can be found in Section 6.



1.3 Uncertainty Budget:

The uncertainty in EMC measurements arises from several factors which affect the results, some associated with environmental conditions in the measurement room, the test equipment being used, and the measurement techniques adopted.

The measurement uncertainty budgets detailed below are calculated from the test and calibration data and are expressed with a 95% confidence factor using a coverage factor of k=2. The Uncertainty for a laboratory is referred to as *U_{lab}*. For Radiated and Conducted Emissions, the Expanded Uncertainty is compared to the *U_{cispr}* values to determine if a specific margin is required to deem compliance.

U_{lab}

Measurement Range	Combined Uncertainty	Expanded Uncertainty
Radiated Emissions <1 GHz @ 3m	2.54	5.07dB
Radiated Emissions <1 GHz @ 10m	2.55	5.09dB
Radiated Emissions 1 GHz to 2.7 GHz	1.81	3.62dB
Radiated Emissions 2.7 GHz to 18 GHz	1.55	3.10dB
AC Power Line Conducted Emissions, 150kHz to 30 MHz	1.38	2.76dB
AC Power Line Conducted Emissions, 9kHz to 150kHz	1.66	3.32dB

U_{cispr}

Measurement Range	Expanded Uncertainty
Radiated Emissions <1 GHz @ 3m	5.2dB
Radiated Emissions <1 GHz @ 10m	5.2dB
Radiated Emissions 1 GHz to 2.7 GHz	Under Consideration
Radiated Emissions 2.7 GHz to 18 GHz	Under Consideration
AC Power Line Conducted Emissions, 150kHz to 30 MHz	3.6dB
AC Power Line Conducted Emissions, 9kHz to 150kHz	4.0dB

If *U_{lab}* is less than or equal to *U_{cispr}*, then:

- compliance is deemed to occur if no measured disturbance exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance exceeds the disturbance limit.

If *U_{lab}* is greater than *U_{cispr}* in table 1, then:

- compliance is deemed to occur if no measured disturbance, increased by (*U_{lab}* – *U_{cispr}*), exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance, increased by (*U_{lab}* – *U_{cispr}*), exceeds the disturbance limit.

Note: Only measurements listed in the tables above that relate to tests included in this Test Report are applicable.



Order Number: F2P28283E

Applicant: Babson Diagnostics, Inc.
Model: Art Sample Preparation Device

1.4 Document History:

Document Number	Description	Issue Date	Approved By
F2P28283E-02E	First Issue	2022-11-11	K. Littell



2 SUMMARY OF TEST RESULTS

Test Name	Standard(s)	Results
-20dB Occupied Bandwidth	CFR 47 Part 15.215(c)	Complies
Field Strength of Emissions	CFR 47 Part 15.209	Complies
Radiated Spurious Emissions	CFR 47 Part 15.209	Complies
Conducted Emissions	CFR 47, Part 15.207	Complies

Modifications Made to the Equipment
No modifications were made to the EUT.



3 TABLE OF MEASURED is RESULTS

Test	13.56 MHz
Limit for Fundamental at 30 meters	30 μ V/m (29.54dB μ v/m)
Limit for Fundamental at 3 meters	49.54dB μ V/m
Field Strength of Fundamental at 3-meter distance	6.5dB μ V/m (-45dB μ A/m)
-20dB Occupied Bandwidth	57.7kHz

Note: Field strength measured in dB μ A/m and converted to dB μ V/m using correction factor of 51.5dB: -45dB μ A/m + 51.5 = 6.5dB μ V/m.



Order Number: F2P28283E

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Model: Art Sample Preparation Device**

4 ENGINEERING STATEMENT

This report has been prepared on behalf of Babson Diagnostics, Inc. to provide documentation for the testing described herein. This equipment has been tested and found to comply with Part 15.209 of the FCC Rules using ANSI C63.10 and Part 15 standards. The test results found in this test report relate only to the items tested.



5 EUT INFORMATION AND DATA

5.1 Equipment Under Test:

Product: Art Sample Preparation Device
Model: Art Sample Preparation Device
Serial Number: SE-9-10003
Firmware Version: N/A*
Software Version: N/A*
FCC ID: **2A83TRFASPD**

**The RFID transceiver has no firmware on board. It has a communication interface out to the base main PCA, which controls it. RFID Sensor Tag identification is as follows: Serial Number: SE-9-30002, Firmware Version: V3.0, Software Version N/A.*

5.2 Trade Name:
Babson Diagnostics, Inc.

5.3 Power Supply:
120VAC 60Hz

5.4 Applicable Rules:
CFR 47, Part 15.209

5.5 Equipment Category:
Radio Transmitter – RFID Reader

5.6 Antenna:
0dBi Integral Antenna

5.7 Accessories:
N/A

5.8 Test Item Condition:
The equipment to be tested was received in good condition.

5.9 Testing Algorithm:
EUT was set up with cartridge door open to enable the RFID Reader to operate continuously.



5 LIST OF MEASUREMENT INSTRUMENTATION

Equipment Type	Asset Number	Manufacturer	Model	Serial Number	Calibration Due Date
Shielded Chamber	CL166-E	AlbatrossProjects	B83117-DF435-T261	US140023	2023-08-22
Temp/Hum. Recorder	CL294	ProTech	TP50	02	2023-04-15
Receiver	CL151	Rohde & Schwarz	ESU40	100319	2023-03-31
Preamplifier	CL285	A.H. Systems, Inc.	PAM-0207	322	2023-03-30
Antenna, JB3 Combination	CL175	Sunol Sciences	JB3	A030315	2023-09-22
Amplifier w/Monopole & 18" Loop	CL163-Loop	AH Systems, Inc.	EHA-52B	100	2023-10-20
Software:	Tile Version 3.4.B.3. Software Verified: 2022-10-19				
Software:	EMC 32, Version 8.53.0			Software Verified: 2022-10-19	
Spectrum Analyzer	0204	Hewlett Packard	HP8591A	3149A02546	2023-03-29
Software:	EMC Analyzer 85712D Rev. A.00.01			Date Verified:	2022-10-21
Transient Limiter	0202	Hewlett Packard	11947A	3107A00729	2023-03-29
Software:	Tile Version 3.4.B.3.		Software Verified: 2022-10-21		
LISN	CL181	Com-Power	LI-125A	191226	2023-12-01
LISN	CL182	Com-Power	LI-125A	191225	2023-12-01
Temp/Hum. Recorder	CL234	Extech	445814	03	2023-05-19

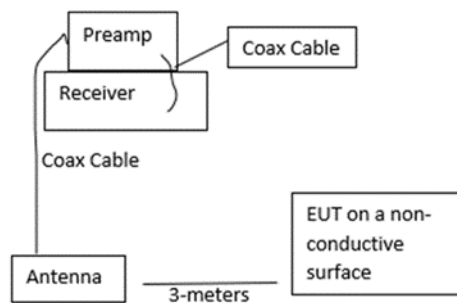


7 OCCUPIED BANDWIDTH

7.1 Requirements:

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the -20dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage.

Bandwidth measurements were made at 200Hz RBW using the Marker Delta method.

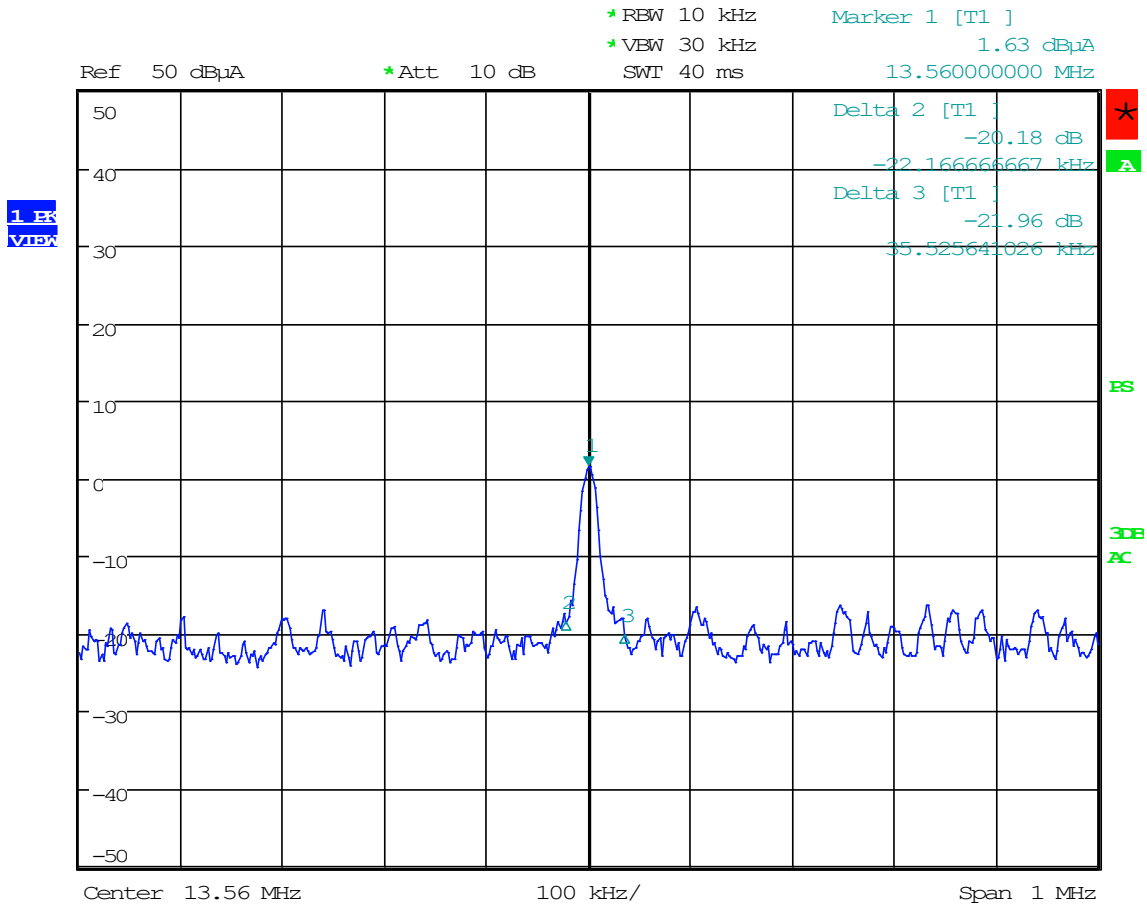




7.2 Test Data - Occupied Bandwidth

Test Date(s):	2022-10-19	Test Engineer(s):	J. Chiller
Standards:	CFR 47 Part 15.215(c)	Air Temperature:	21.7°C
		Relative Humidity:	38%

13.56 MHz: -20dB



Date: 19.OCT.2022 08:58:38

Note: 1%-5% RBW not achievable due to nature of the signal.

8 FIELD STRENGTH OF EMISSIONS FROM INTENTIONAL RADIATORS

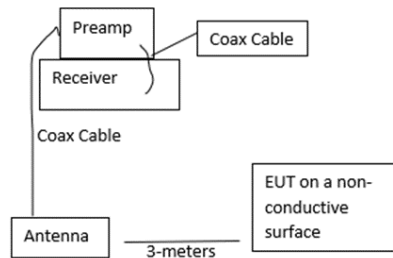
Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

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

Notes:

During the pre-scan evaluation, the EUT was rotated in all possible directions and all three orthogonal positions to find the maximum emissions. The orthogonal position that showed the highest emissions was used. The antenna was raised between 1 and 4 meters and the EUT turntable was rotated 360 degrees to maximize the emissions. The following plots are just prescan plots and do not necessarily reflect the actual limits. The measurement table has the correct limits.

13.56 MHz Field Strength was measured at 3m.



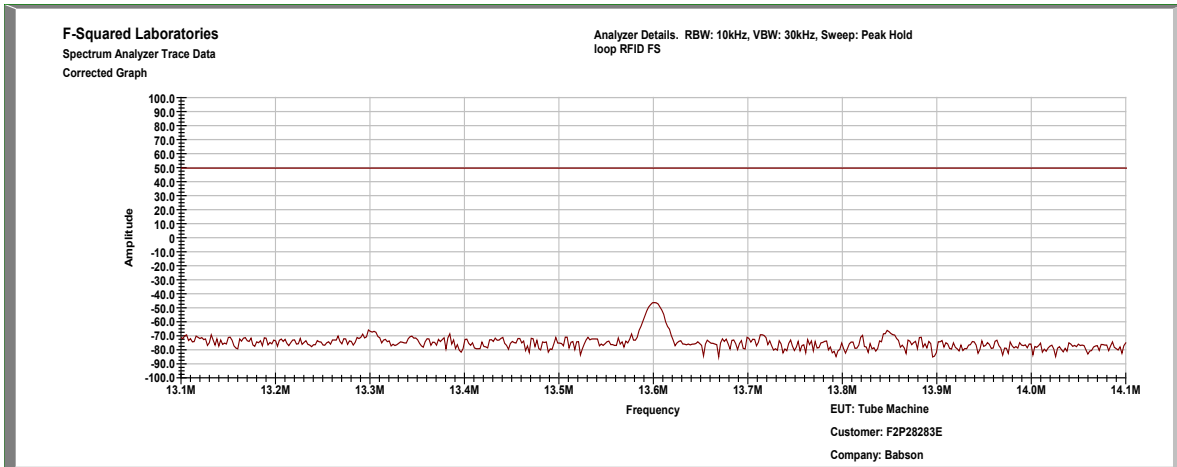
Note: Field strength measured in dB μ A/m and converted to dB μ V/m using correction factor of 51.5dB: $-45\text{dB}\mu\text{A/m} + 51.5 = 6.5\text{dB}\mu\text{V/m}$.



8.1 Test Data - Field Strength of Emissions from Intentional Radiators

Test Date(s):	2022-10-19	Test Engineer(s):	J. Chiller
Standards:	CFR 47 Part 15.209	Air Temperature:	21.6°C
Results:	Complies	Relative Humidity:	38%

13.56 MHz: Field Strength (dBuA/m) @ 3m





8.2 Test Data – Spurious Emissions

Notes: Plots are peak, max hold pre-scan data included only to determine what frequencies to investigate and measure. During the pre-scan evaluation, the EUT was rotated in all possible directions and three orthogonal positions to find the maximum emissions. The orthogonal position that showed the highest emissions was used. At some frequencies, no emissions from the EUT were measurable over the ambient noise floor. The readings did not change with EUT on and EUT off.

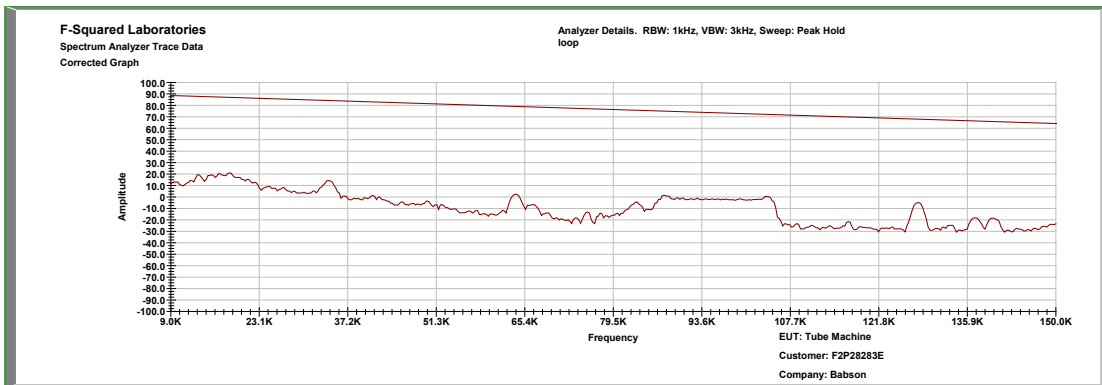
At least 6 of the highest frequencies were measured per ANSI 63.4 in a 3-meter anechoic chamber. Frequencies below 1GHz were measured using a quasi-peak detector. The antenna was raised between 1 and 4 meters and the EUT turntable was rotated 360 degrees to maximize the emissions. Some of the frequencies did not change with the EUT on or off. At those frequencies, the test distance was shortened to 1 meter and still no emissions from the EUT were visible or over the ambient or limit. Frequencies were scanned from 9kHz to 1000 MHz and the highest emissions are presented.

In the following plots, the red line indicates the measurement with the EUT on. Emissions to be found by the EUT were measured and listed in tables below.

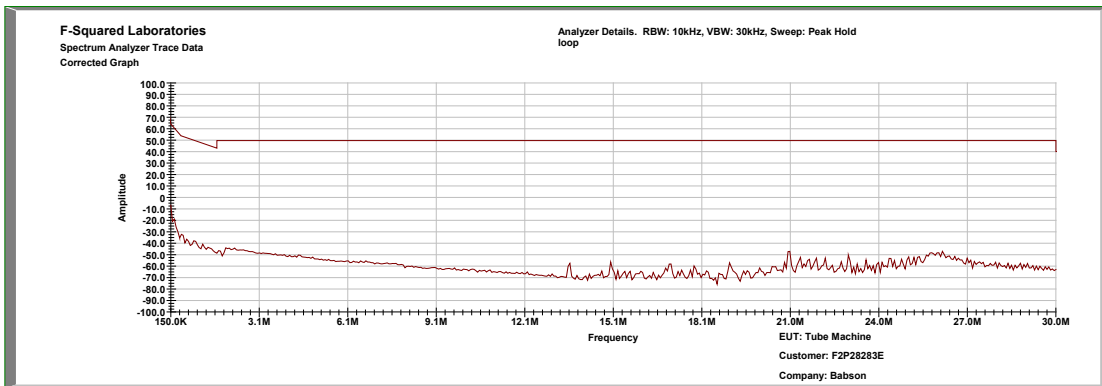


Test Date(s):	2022-10-19	Test Engineer(s):	J. Chiller
Standards:	CFR 47 Part 15.209	Air Temperature:	21.7°C
Results:	Complies	Relative Humidity:	38%

13.56 MHz: Characterization Scan, 0.009 MHz to 0.15 MHz (Loop Antenna)



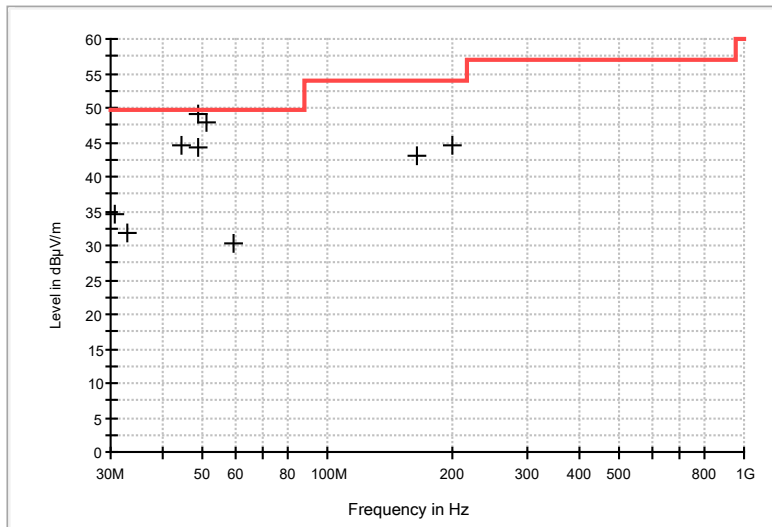
13.56 MHz: Characterization Scan, 0.15 MHz to 30 MHz (Loop Antenna)





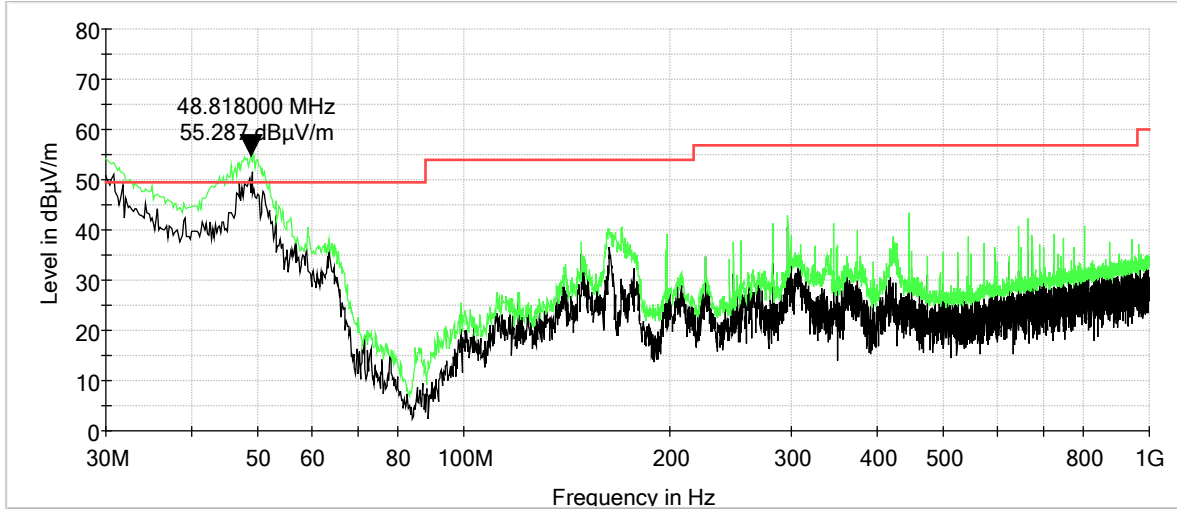
13.56 MHz: 30 MHz to 1000 MHz

Frequency (MHz)	Antenna Polarization	Antenna Height (cm)	Azimuth (degrees)	QuaziPeak reading	Cable Loss & Antenna Factor (dB)	Emission	Limit (dBµV/m)	Margin (dB)
30.700000	V	100.00	0.00	36.2	-1.7	34.50	49.6	-15.1
33.000000	V	100.00	0.00	35.3	-3.5	31.80	49.6	-17.8
44.542000	V	100.00	333.00	56.2	-11.8	44.40	49.6	-5.2
48.430000	V	100.00	0.00	63.2	-14.2	49.00	49.6	-0.6
48.818000	V	100.00	359.00	58.1	-13.9	44.20	49.6	-5.4
51.000000	V	100.00	7.00	62.3	-14.5	47.80	49.6	-1.8
59.000000	V	100.00	0.00	45.5	-15.1	30.40	49.6	-19.2
162.890000	H	150.00	0.00	52.5	-9.5	43.00	54.0	-11.0
198.004000	H	100.00	134.00	53.2	-8.7	44.50	54.0	-9.5

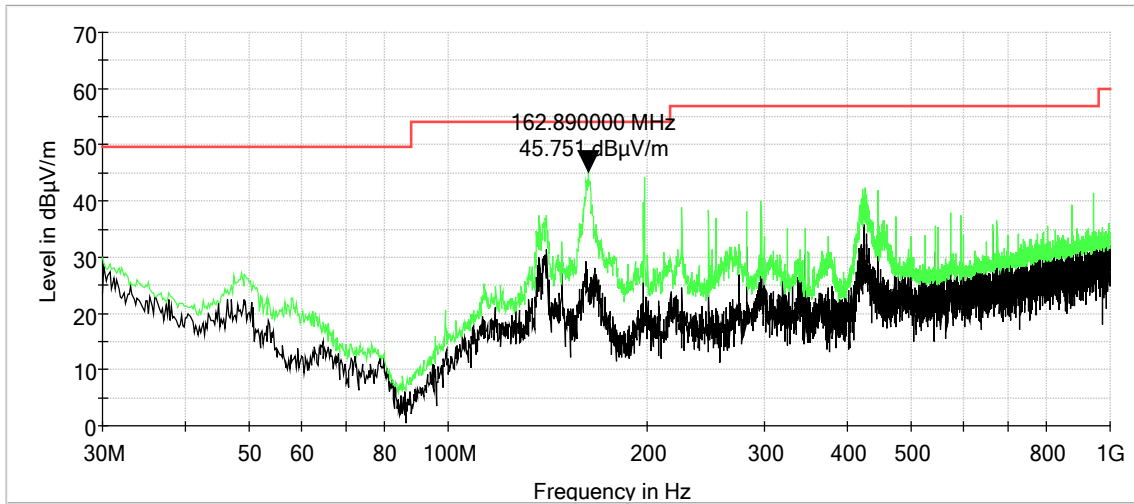




Characterization Scan, 30 to 1000 MHz, Vertical



Characterization Scan, 30 to 1000 MHz, Horizontal





16 CONDUCTED EMISSIONS

16.1 Requirements

In accordance with FCC CFR 47 Part 15.207(a), “Except as shown in paragraphs (b) and (c) of this section, for 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). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

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.

16.2 Procedure

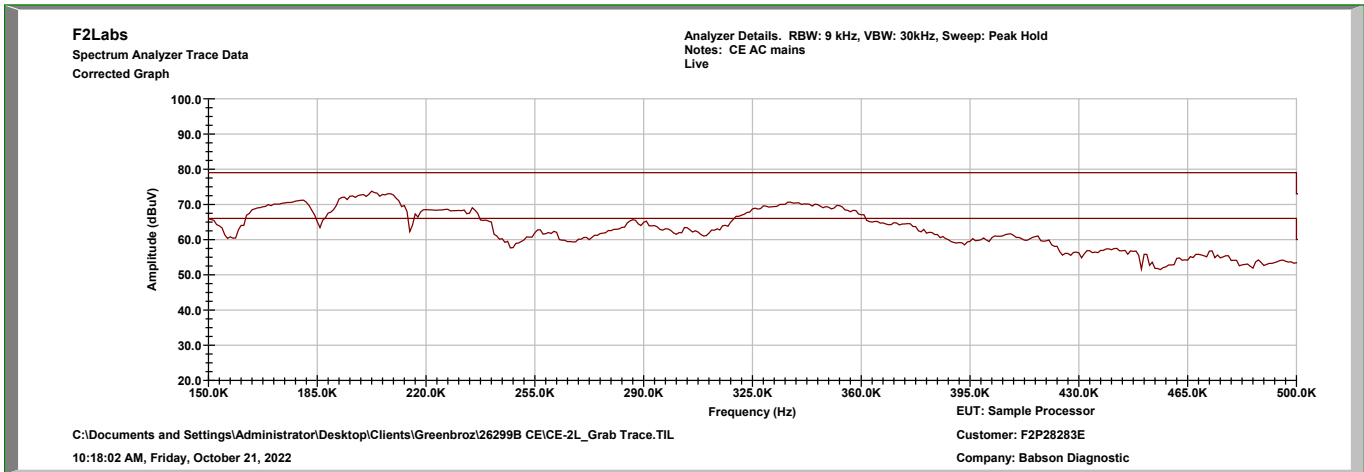
The EUT was placed on a 1.0 x 1.5 meter non-conductive table, 0.8 meter above a horizontal ground plane and 0.4 meter from a vertical ground plane. Power was provided to the EUT through a LISN bonded to a 3 x 2 meter ground plane. The LISN and peripherals were supplied power through a filtered AC power source. The output of the LISN was connected to the input of the receiver via a transient limiter, and emissions in the range 150 kHz to 30 MHz were measured. The measurements were recorded using the quasi-peak and average detectors as directed by the standard, and the resolution bandwidth during testing was 9 kHz. The raw measurements were corrected to allow for attenuation from the LISN, transient limiter and cables.



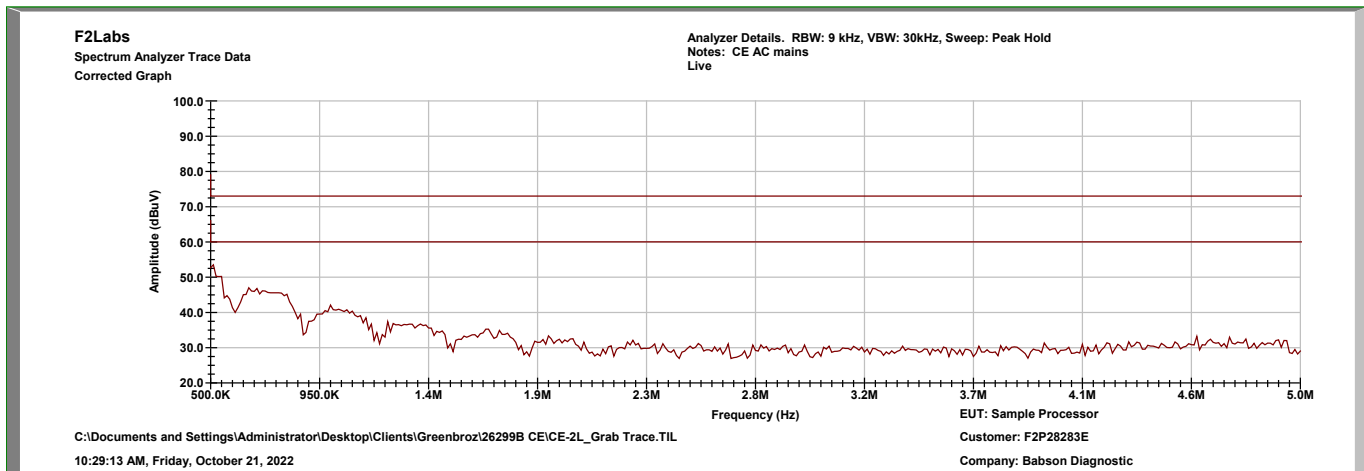
16.3 Conducted Emissions Test Data

Test Date:	2021-10-21	Test Engineer:	J. Chiller
Rule:	15.207	Air Temperature:	20.4° C
Test Results:	Pass	Relative Humidity:	33%

Conducted Test – Live: 0.15 MHz to 0.5 MHz

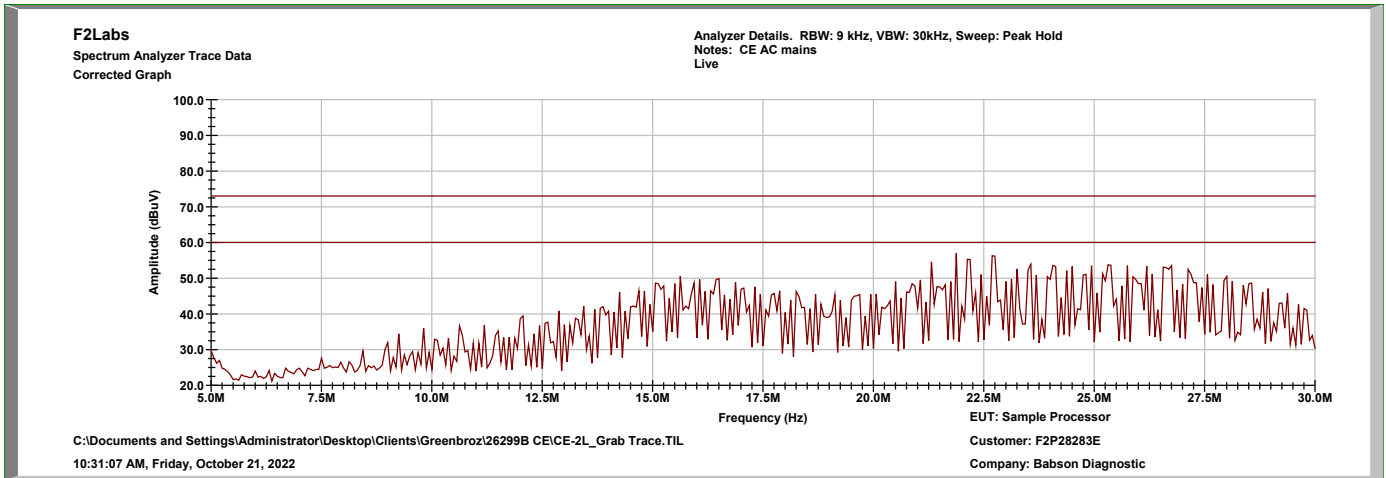


Conducted Test – Live: 0.5 MHz to 5.0 MHz





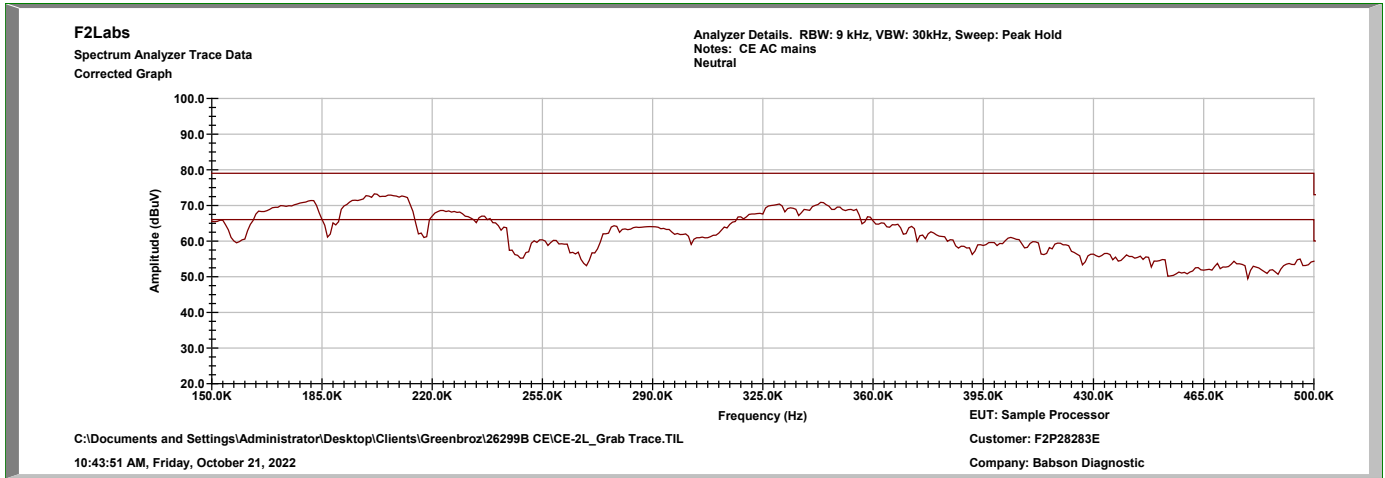
Conducted Test – Live: 5.0 MHz to 30.0 MHz



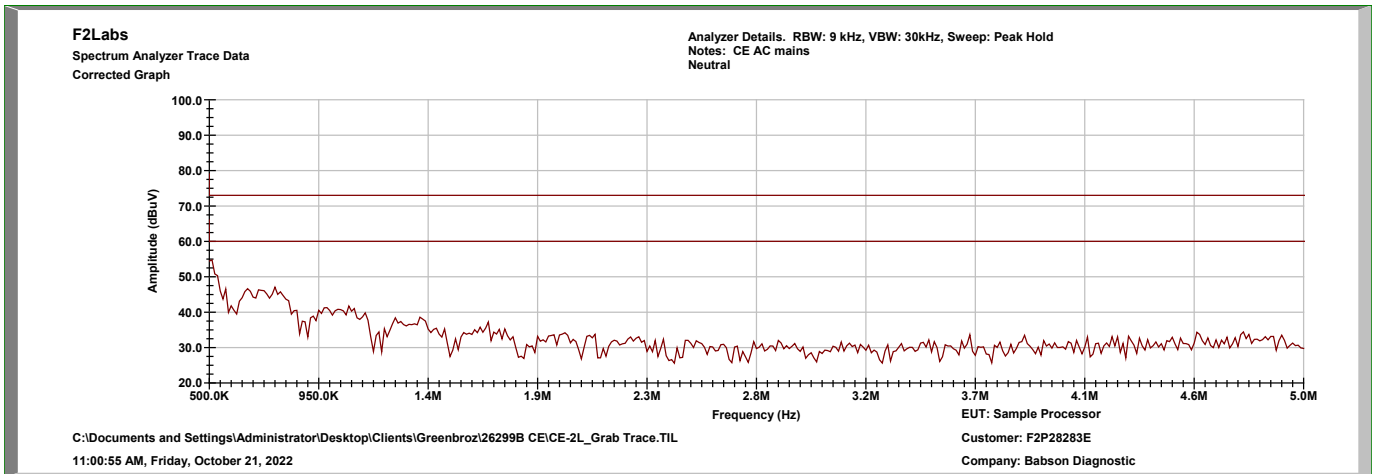
Top Discrete Measurements								
No.	Conductor	Frequency (MHz)	Detector	Level (dBµV)	Adjustment (dB)	Results (dBµV)	Limit (dBµV)	Margin (dB)
1	Live	0.180	Quasi-Peak	58.9	11.08	69.98	79	-9.0
			Average	48.08	11.08	59.16	66	-6.8
2	Live	0.204	Quasi-Peak	60.51	10.88	71.39	79	-7.6
			Average	52.19	10.88	63.07	66	-2.9
3	Live	0.208	Quasi-Peak	60.58	10.86	71.44	79	-7.6
			Average	52.39	10.86	63.25	66	-2.8
4	Live	0.234	Quasi-Peak	56.23	10.73	66.96	79	-12.0
			Average	50.35	10.73	61.08	66	-4.9
5	Live	0.329	Quasi-Peak	58.84	10.52	69.36	79	-9.6
			Average	50.62	10.52	61.14	66	-4.9
6	Live	0.337	Quasi-Peak	58.98	10.516	69.50	79	-9.5
			Average	50.71	10.516	61.23	66	-4.8
7	Live	0.353	Quasi-Peak	57.01	10.502	67.51	79	-11.5
			Average	50.13	10.502	60.63	66	-5.4
8	Live	21.31	Quasi-Peak	44.73	11.939	56.67	73	-16.3
			Average	44.71	11.939	56.65	60	-3.4
9	Live	21.875	Quasi-Peak	44.54	11.964	56.50	73	-16.5
			Average	44.51	11.964	56.47	60	-3.5
10	Live	22.75	Quasi-Peak	44.12	12.017	56.14	73	-16.9
			Average	44.06	12.017	56.08	60	-3.9



Conducted Test – Neutral: 0.15 MHz to 0.5 MHz

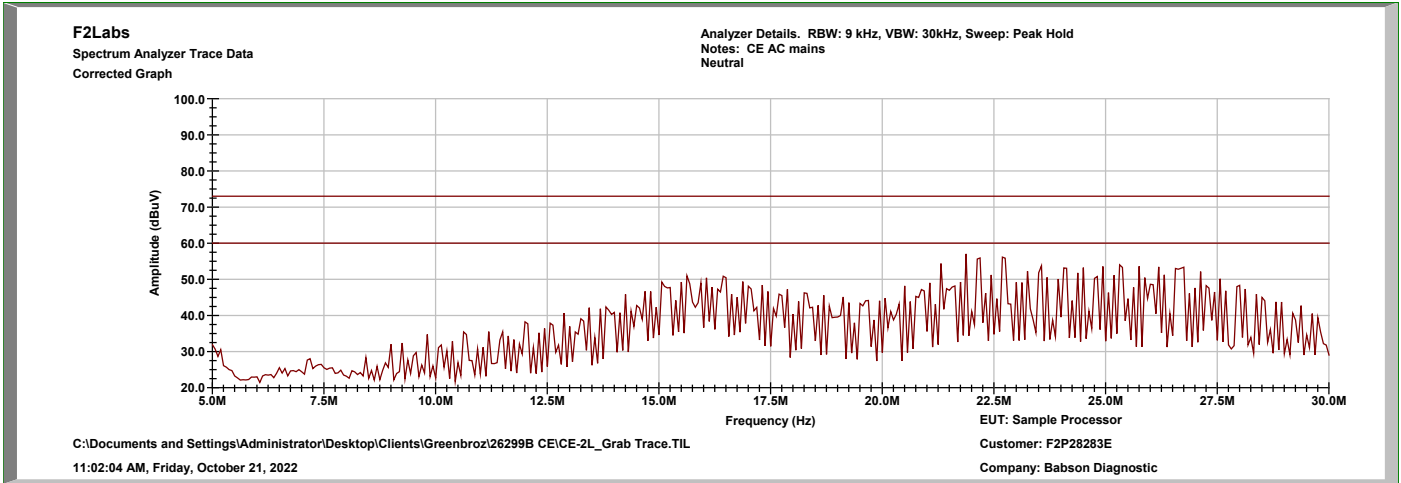


Conducted Test – Neutral: 0.5 MHz to 5.0 MHz





Conducted Test – Neutral: 5.0 MHz to 30.0 MHz



Top Discrete Measurements								
No.	Conductor	Frequency (MHz)	Detector	Level (dBµV)	Adjustment (dB)	Results (dBµV)	Limit (dBµV)	Margin (dB)
1	Neutral	0.165	Quasi-Peak	57.58	11.547	69.13	79	-9.9
			Average	53.33	11.547	64.88	66	-1.1
2	Neutral	0.181	Quasi-Peak	58.86	11.381	70.24	79	-8.8
			Average	50.69	11.381	62.07	66	-3.9
3	Neutral	0.201	Quasi-Peak	60.67	11.196	71.87	79	-7.1
			Average	51.39	11.196	62.59	66	-3.4
4	Neutral	0.210	Quasi-Peak	60.45	11.134	71.58	79	-7.4
			Average	50.01	11.134	61.14	66	-4.9
5	Neutral	0.223	Quasi-Peak	56.61	11.041	67.65	79	-11.3
			Average	48.72	11.041	59.76	66	-6.2
6	Neutral	0.236	Quasi-Peak	54.07	10.947	65.02	79	-14.0
			Average	47.80	10.947	58.75	66	-7.3
7	Neutral	0.330	Quasi-Peak	58.96	10.718	69.68	79	-9.3
			Average	50.70	10.718	61.42	66	-4.6
8	Neutral	0.344	Quasi-Peak	58.95	10.699	69.65	79	-9.4
			Average	50.75	10.699	61.45	66	-4.6
9	Neutral	0.354	Quasi-Peak	58.13	10.69	68.82	79	-10.2
			Average	49.40	10.69	60.09	66	-5.9
10	Neutral	21.875	Quasi-Peak	45.51	11.626	57.14	73	-15.9
			Average	45.34	11.626	56.97	60	-3.0
11	Neutral	22.687	Quasi-Peak	44.86	11.683	56.54	73	-16.5
			Average	45.00	11.683	56.68	60	-3.3



10 PHOTOGRAPHS

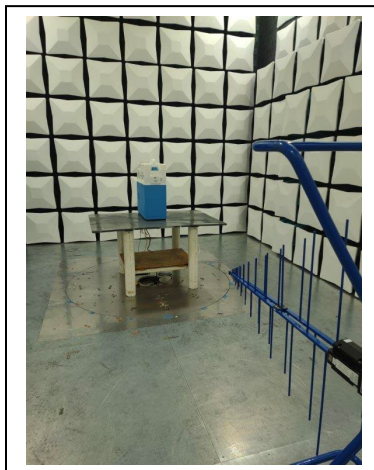
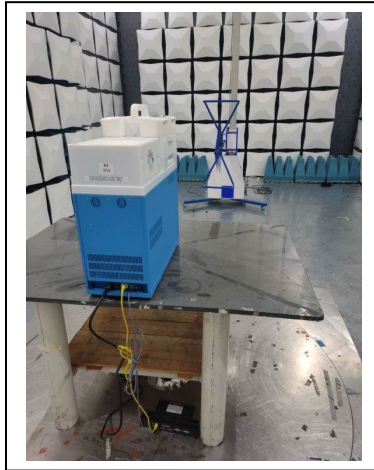
Radiated Spurious Emissions, Field Strength, Occupied Bandwidth

0.009 MHz to 30 MHz





Radiated Spurious Emissions: 30 MHz to 1000 MHz





Order Number: F2P28283E

Applicant: Babson Diagnostics, Inc.
Model: Art Sample Preparation Device

Conducted Emissions

