

CERTIFICATION TEST REPORT

**FOR THE
SEED2 DFM**

**EN55032:2015/EN55035:2017/A11:2020
COMPLIANCE**

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TABLE OF CONTENTS

Administrative Information	3
Summary Of Results	4
Equipment Under Test (EUT) Description	4
Peripheral Devices	4
Specifications, and Requirements	5
Report of Measurements	6
Table 1; Six Highest Radiated Emission Levels	7
Table 2: Six Highest Conducted Emission Levels	8
Table A: List of Test Equipment Used	9
EUT Set up: Radiated and Conducted Emissions	10
Test Instrumentation and Analyzer Settings	11
Spectrum Analyzer Detector Functions	12
Test Methods	13
Radiated Emissions Testing	13
Conducted emissions Testing	14
Sample Calculations	14
EUT Set up : Immunity	15
Determination of Pass/Fail Criterion	16
Monitoring of Operating Parameters	16
Test Methods	16
ESD and Radiated Immunity	16
EFT Burst/ Surge/ Conducted Immunity Test	17
Magnetic Immunity /Voltage Dips and Interrupts Test	17
Appendix A: Information About The Equipment Under Test	18
Information About The Equipment Under Test	19
Required EUT changes to comply	19
Cable Information	20
Cable Connection Diagram	22
Photograph Showing Radiated Emissions (Front)	23
Photograph Showing Radiated Emissions (Rear)	24
Photograph Showing Conducted Emissions (Front)	25
Photograph Showing Conducted Emissions (Rear)	26
Appendix B: Measurement Data Sheets	27

ADMINISTRATIVE INFORMATION

DATE OF TEST: February 01, 2023

PURPOSE OF TEST: To demonstrate compliance of the EUT with the requirements for EN55032:2015/EN55035:2017/A11:2020 Standards.

MANUFACTURER: ELECTROSMITH, CORP.
1100 Calle Cordillera
San Clemente, CA 92637

REPRESENTATIVE: Andrew Ikenberry

TEST LOCATION: CKC LABS, INC.
110 North Olinda Place
Brea, CA 92823

TEST PERSONNEL: E. Wong

TEST METHOD: See Specifications, Requirements

EQUIPMENT UNDER TEST (EUT): SEED2 DFM

ADMINISTRATIVE NOTE: All tests were conducted under the supervision of Doug Tobias, EMC Consultant

Summary of Results

The Electrosmith, EUT was tested in accordance with EN55032:2015/EN55035:2017/A11:2020.

As received, the above equipment was found to be fully compliant (without modifications) with the limits of EN55032:2015/EN55035:2017/A11:2020. Additionally, it should be noted that the results in this report apply only to the items tested, as identified herein.

EQUIPMENT UNDER TEST (EUT) DESCRIPTION

The EUT is in a substantial metal enclosure.

PERIPHERAL DEVICES

Device	Manufacturer	Model #	S/N
Headphone	Sony	NA	NA
Powered Speaker	M-Audio	BX 8 Studiophile	NA
Non Powered Speaker	M-Audio	BX 6	

SPECIFICATIONS, REQUIREMENTS

The following summarizes the specifications, and requirements for EN55032:2015 Radio Frequency Emissions Tests and EN55035:2017 Immunity Tests performed on the EUTs. The Test Levels and Performance Criteria are in accordance with EN55032:2015/EN55035:2017/A11:2020.

<u>Test</u>	<u>Test Requirement</u>	<u>Specification</u>	<u>Requirement</u>
Conducted Emissions	EN55032:2015 +A11:2020	EN55032:2015	Limits per Data Sheets
Radiated Emissions	EN55032:2015 +A11:2020	EN55032:2015	Limits per Data Sheets
Harmonic Emissions	EN55035:2017 +A11:2020	EN61000-3-2:2006/ A1:2009/A2:2009	Clause 7 of EN61000-3-2
Flicker Emissions	EN55035:2017 +A11:2020	EN61000-3-3:2008	Clause 5 of EN61000-3-3
Electrostatic Discharge	EN55035:2017 +A11:2020	EN61000-4-2:2009	4 kV contact 8 kV air discharge
Radiated Immunity	EN55035:2017 +A11:2020	EN61000-4-3:2006/ A1:2008/A2:2010	3 V/m, 80% modulation
Electrical Fast Transient Burst	EN55035:2017 +A11:2020	EN61000-4-4:2012	1 kV (AC) 0.5 kV (I/O)
Surge Immunity	EN55035:2017 +A11:2020	EN61000-4-5:2006	2 kV common mode 1 kV differential mode
Conducted Immunity	EN55035:2017 +A11:2020	EN61000-4-6:2009	3 Vrms, 80% modulation
Magnetic Immunity	EN55035:2017 +A11:2020	EN61000-4-8:2010	3A/m
Voltage Dips/ Short Interruptions	EN55035:2017 +A11:2020	EN61000-4-11:2004	As per data sheet

REPORT OF MEASUREMENTS

The following Tables report the results recorded during the tests performed on the EUTs.

Specification	Frequency Range	Compliance Status
EN55032:2015/CISPR 32:2012, Class "A" Conducted Emissions	0.15 MHz - 30.0 MHz	PASS
EN55032:2015/CISPR 32:2012, Class "A" Radiated Emissions	30.0 MHz - 1000 MHz	PASS
EN61000-3-2, Harmonic Emissions	Clause 7	PASS
EN61000-3-3, Flicker Emissions	Clause 5	PASS

Specifications	Minimum Severity/Criterion Level	Severity/Criterion Level Tested	Compliance Status
EN61000-4-2 -ESD Immunity	Criterion A air discharge up to ± 8 kV contact discharge up to ± 4 kV	Criterion A air discharge up to ± 8 kV contact discharge up to ± 4 kV	PASS
EN61000-4-3 -RF Immunity	Criterion A Radiation field strength of 3 V/m from 80 MHz to 1000 MHz (80% AM at 1 kHz)	Criterion A Radiation field strength of 3 V/m from 80 MHz to 1000 MHz (80% AM at 1 kHz)	PASS
EN61000-4-4 -Electrical Fast Transient Burst	Criterion A power line pulses of ± 1 kV	Criterion A power line pulses of ± 1 kV	PASS
EN61000-4-5 -Surge	Criterion A	Criterion A	PASS
EN61000-4-6 -Conducted Immunity	Criterion A	Criterion A	PASS
EN61000-4-8 -Magnetic Immunity	Criterion A	Criterion A	PASS
EN61000-4-11 -Voltage Dips/ Interruptions	Criterion A Criterion A Criterion C	Criterion A Criterion A Criterion C	PASS

REPORT OF MEASUREMENTS RADIATED EMISSIONS

The following Tables 1 and 2 report the six highest radiated and conducted emissions levels recorded during the tests performed on the EUT. The data sheets from which these tables were compiled are contained in Appendix B.

TABLE 1: SIX HIGHEST RADIATED EMISSION LEVELS					
FREQUENCY MHz	METER READING dBuV	CORRECTED READING dBuV/m	SPEC LIMIT dBuV/m	MARGIN dB	NOTES
140.600	36.4	28.1	50.0	-21.9	H
344.185	38.7	35.0	57.0	-22.0	H
172.103	35.9	25.9	50.0	-24.1	V
344.215	36.6	32.9	57.0	-24.1	V
140.629	33.1	24.8	50.0	-25.2	V
368.762	34.3	31.2	57.0	-25.8	H

Test Method: CISPR 32: 2012
Spec Limit: CISPR 32 A
Test Distance: 3 Meters

NOTES: H= Horizontal Polarization
V= Vertical Polarization
N= No Polarization
D= Dipole Reading
Q= Quasi Peak Reading
A= Average Reading

Modifications:

NONE

REPORT OF MEASUREMENTS CONDUCTED EMISSIONS

TABLE 2: SIX HIGHEST CONDUCTED EMISSION LEVELS				
FREQUENCY MHz	METER READING dBuV	CORRECTED READING dBuV/m	SPEC LIMIT dBuV/m	MARGIN dB
00.167453	36.4	42.6	66.0	-23.4 - L1(L) lead
00.467789	32.9	39.0	66.0	-27.0 - L1(L) lead
26.780000	23.1	30.3	60.0	-29.7 - L1(L) lead
00.164544	35.4	41.7	66.0	-24.3 - L2(N) lead
25.717000	22.1	29.4	60.0	-30.6 - L2(N) lead
24.998000	21.3	28.6	60.0	-31.4 - L2(N) lead

Test Method:
Spec Limit:

CISPR 32: 2012
CISPR 32, CLASS A

NOTES:

Q= Quasi Peak Reading
A= Average Reading

Modifications:

NONE

TABLE A
LIST OF TEST EQUIPMENT USED

SEE TEST DATA SHEETS

EUT SET UP

In general, the equipment under test (EUT) and the peripherals listed were setup in a manner that represented their normal use. Any special conditions required for the EUT to operate normally are identified in the comments that accompany Table 1 for radiated emissions, and Table 2 for conducted emissions. Additionally, a complete description of all the ports and I/O cables is included on the information sheets contained in Appendix A.

During radiated emissions testing, the EUT was mounted on a nonconductive rotating table 1 meter above the conductive grid. The nonconductive table dimensions were 1 meter by 1.5 meters. This configuration is typical for radiated emissions testing of table top devices.

I/O cables were connected to the EUT and peripherals in the manner required for normal operation of the system. Excess cabling was bundled in the center in a serpentine fashion using 30-40 centimeter lengths.

During conducted emissions testing the EUT was located 80 centimeters above the conducting ground plane on the same non-conducting table as was used for radiated testing. The metal plane was grounded to the earth through the green wire safety ground. Power to the EUT was provided via 3 meters of shielded power cable from a filter grounded to the metal plane to a LISN. The LISN was also grounded to the plane and attached to the LISN was a 4 ganged grounded outlet whose source was also shielded and 60 centimeters in length. All other objects were kept a minimum of 1 meter away from the EUT during the conducted test.

TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed in Table A was used to collect both the radiated and conducted emissions data for the EUT. For radiated measurements below 300 MHz, the Bi-conical type antenna listed was used. For frequencies from 300 to 1000 MHz, the log periodic antenna was used. All antennas were located at a distance of 3 meters from the edge of the EUT. Conducted emissions tests required the use of the FCC type LISN's.

The HP spectrum analyzer was used for all measurements. Table B shows the analyzer bandwidth settings that were used in designated frequency bands. For conducted emissions, a reference level of 100 dBuV and a vertical scale size of 10 dB per division was used. A 10 dB external attenuator was also used during conducted tests, with internal offset correction in the analyzer. During radiated testing, the measurements were made with 0 dB of attenuation, a reference level of 97 dBuV, and a vertical scale of 10 dB per division.

SPECTRUM ANALYZER DETECTOR FUNCTIONS

The notes that accompany the measurements contained in Tables 1 and 2 indicate the type of detector function used to obtain the given readings. Unless otherwise noted, all readings were made in the “Peak” mode. Whenever a “Quasi-Peak” or “Average” reading is listed as one of the six highest readings, this is indicated as a “Q” or an “A” in Table 1 or Table 2. The following paragraphs describe in more detail the detector functions and when they were used to obtain the emissions data for the EUT.

Peak

In this mode, the Spectrum Analyzer or test engineer recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature of the analyzer called “peak hold”, the analyzer had the ability to measure transients or low duty cycle transient emission peak levels. In this mode the analyzer made a slow scan across the frequency band selected and measured the peak emission value found at each frequency across the band.

Quasi-Peak

When the true peak values exceeded or were within 2 dB of the specification limit, quasi-peak measurements were taken using the HP 85650A Quasi-Peak Adapter for the HP 8566B Spectrum analyzer. The detailed procedure for making quasi peak measurements contained in the HP Quasi-Peak Adapter manual were followed.

Average

When the frequencies exceed 1 GHz , average measurements may be made using the spectrum analyzer. To make these measurements, the test engineer reduces the video bandwidth on the analyzer until the modulation of the signal is filtered out. At this point the analyzer is set in the linear mode and scan time is reduced.

Test Methods

The radiated and conducted emissions data of the EUT, was taken with the HP Spectrum Analyzer. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in the “Sample Calculations”. The corrected data was then compared to the CISPR 32 emissions limits to determine compliance.,

Preliminary and final measurements were taken in order to better ensure that all emissions from the EUT were found and maximized.

Radiated Emissions Testing

During the preliminary radiated scan, the EUT was powered up and operating in its defined FCC test mode (printing “H”s to the CRT and peripherals if applicable) with the I/O cables and line cords facing the antenna. The frequency range of 30 MHz-88 MHz was then scanned with the Bi-conical antenna located about 1.5 meter above the ground plane in the vertical configuration. During this scan, the turntable was rotated and all peaks which were at or near the limit were recorded. Next, the frequency range of 100-300 MHz was scanned in the same manner with the Bi-conical antenna, and the peaks recorded. Lastly, a scan of the FM band from 88-110 MHz was made, using a reduced resolution bandwidth and a reduced frequency span. The Bi-conical antenna was changed to the horizontal polarity and the above steps were repeated. After changing to the log periodic antenna in the horizontal configuration, the frequency range of 300-1000 MHz was scanned. The log periodic antenna was changed to the vertical polarity and the frequency range of 300 - 1000 MHz was again scanned. Care was taken to ensure that no frequencies were missed within the FM and TV bands. An analysis was performed to determine if the signals that were at or near the limit were caused by an ambient transmission. If unable to determine by analysis, the equipment was powered down to make the final determination if the EUT was the source of the emission.

For the final radiated scan, the equipment was again positioned with it’s I/O and power cables facing the antenna, and a thorough scan of all the frequencies using a small frequency span was manually made. The turntable was rotated as needed. Comparison with the previously recorded measurements was then made.

Using the peak readings from both scans as a guide, the test engineer then maximizes the readings with respect to the table rotation, antenna height and configuration of the peripherals and cables. Maximizing of the cables was achieved by monitoring the spectrum analyzer on a closed circuit television monitor while the EUT cables were being moved and rearranged on the EUT table for maximum emissions. Figures and photographs showing the final worst case configuration of the EUT are contained in Appendix A.

Conducted Emissions Testing

For conducted emissions testing, a 30 to 50 second sweep time was used for automated measurements in the frequency bands of 150 kHz to 1.705 MHz , 1.705 MHz to 3 MHz and 3 MHz to 30 MHz. All readings within 20 dB of the limit were recorded. At frequencies where the recorded emissions were close to the limit, further investigation was performed manually at a slower sweep rate.

Tables 1 and 2 show the corrected values of the six highest readings obtained for the EUT.

Sample Calculations

An example of how the basic spectrum analyzer reading is converted using correction factors is given for the six highest emissions readings in Table 1 and 2. For radiated emissions in dBuV/m, the spectrum analyzer reading in dBuV is corrected by using the following formula:

$$\begin{aligned} &\text{Meter reading (dBuV)} \\ &+ \text{Antenna Factor (dB)} \\ &+ \text{Cable Loss (dB)} \\ &- \text{Distance Correction (dB)} \\ &- \text{Pre-amplifier Gain (dB)} \\ &= \text{Corrected Reading (dBuV/m)} \end{aligned}$$

This reading is then compared to the applicable specification limit to determine compliance. For conducted emissions, no corrections factors are needed when 50 uH, LISN's are used.

EUT SET-UP: Immunity

In general, the equipment under test (EUT) and the peripherals listed in the EUT description and peripheral devices tables were setup in a manner that represented their normal use. Any special conditions required for the EUT to operate normally are identified in the comments that accompany the Table for Electrostatic Discharge (Direct & Indirect), the Table for Radiated Immunity and the Table for Electrical Fast Transient Burst (EFTB) on the Power Cord & I/O Cable. Additionally, a complete description of all ports and I/O cables is included on the information sheets contained in Appendix A.

During radiated immunity and EFTB testing the EUT was mounted on a nonconductive, table 1 meter above the conductive grid. The nonconductive table dimensions were 1 meter by 1.5 meters. This configuration is typical for radiated Immunity testing of table top devices.

During Electrostatic Discharge testing the EUT was located on a test bench measuring 1 meter high, 1 meter deep, and 2 meters in length. A conductive metal sheet 2 square meters in size was placed on the top of the table. The EUT was then placed on top of the conductive sheet and separated from the sheet by a 1mm thick insulating material. The ground reference plane was electrically bonded by wire braid to the earth reference floor or the ground on the electrical outlet service. The ESD generator (ESD gun) was grounded to the metal ground reference plane on the floor. The ESD generator was located on the ground reference plane.

The AC power line and I/O cables were routed consistent with the typical application. Interface cables were connected to the available I/O ports of the test unit. This configuration was precisely noted in the test report. I/O cables were of the type and length specified in the individual requirements.

If the ITE consisted of several pieces of equipment, and the manufacturer did not provide specifications on their spacing, the interval between different pieces of equipment was about 10 centimeters.

If the length of cable between pieces of equipment was longer than necessary, all excess interconnecting cable was bundled in 30-40 cm. bundles. If the cable could not be bundled in this fashion, it was arranged around the ITE. For more detail on the disposition of the cables during the test, refer to the "Cable Information Sheet" and the photographs contained in Appendix A

DETERMINATION OF PASS FAIL CRITERION.

During all immunity tests the EUT, did not deviate or change greater than the permissible variation as indicated in the test report and by consultation with Electrosmith.

MONITORING OF OPERATING PARAMETERS

The device was monitored during the tests by means of a visual check whereby the essential parameters were displayed.

TEST METHODS

Electrostatic Discharge Test.

Electrostatic Discharges were applied to the EUT, at points and surfaces which are normally accessible to the operator. The voltage levels were increased gradually at a minimum of 1 second intervals until the maximum severity level selected was applied.

Discharges to objects placed or installed near to the EUT, were simulated by applying discharges of the ESD generator to the metal coupling plane. During this test the ESD generator was positioned at least 0.1 meter from the EUT and pointed to the metal coupling plane. At least 10 single shot discharges were applied to the metal coupling plane on each accessible side of the EUT. The EUT was tested in accordance with EN55103-2 and EN61000-4-2 and meets Performance Criterion B.

Radiated Immunity Test.

A field of 3V/m was established from 27 MHz to 1000 MHz. This frequency range was modulated with a 1kHz sine wave at 80%. The signal generators provided the modulated frequency at a sweep rate of .0015 decades/second to the RF amplifiers. The RF amplifiers provided the necessary power to the antennas to establish the field levels as monitored by the field probes. The antennas were positioned 3 meters from all four faces of the EUT. The E/H field antenna was used from 27-300 MHz in vertical and horizontal polarizations and the log periodic antenna was used from 300-1000 MHz in both polarizations. The EUT, was tested in accordance with EN55103-2 and EN61000-4-3 and meets Performance Criterion B at a field strength of 3 V/m.

Electrical Fast Transient Burst Test

Test voltages of up to 1kV in (+) and (-) polarities were applied to the A/C power cords. The test voltages were at a 5kHz pulse repetition frequency and were applied for 60 seconds between ground and each EUT terminal and between ground and protective earth. The EUT, was tested in accordance with EN55103-2 and EN61000-4-4 and meets Performance Criterion B.

Surge Test

Test voltages of up to 4kV common mode and 2kV differential mode in (+) and (-) polarities were applied to the EUT power cords. Characteristics of the test voltage were 1.2us rise time and 50us pulse width. These surges were synchronized to the 0, 90 and 270 degree phase angles of the power frequency. The EUT was tested in accordance with EN55103-2 and EN61000-4-5 and meets Performance Criterion B.

Conducted Immunity Test

A 10 Vrms level was established from 150kHz to 80 MHz. This frequency range was modulated with 1kHz sine wave at 80%. The signal generators provided the modulated frequency at a sweep rate of 0.0015 decades/second to the RF Amplifiers. The RF amplifiers provided the necessary power to the injection probe to establish the 10 volt level as monitored by the CDN. The injection probe was positioned 0.3 meters from the rear of the EUT. The injection probe was around all cables of the EUT. The EUT was tested in accordance with EN55103-2 and meets Performance Criterion A at 3 Vrms.

Magnetic Immunity Test

A magnetic field of 3 A/m was set up using a programmable 50 Hz source and a one meter square wire attached to a square frame. This frame with its associated magnetic field was then passed over the EUT in each of the orthographic planes. The EUT was tested in accordance with EN55103-2 and EN61000-4-8 and meets Performance Criterion A.

Voltage Dips and Interrupts Test

Power to the EUT was supplied by a programmable power supply. This power supply produced the following voltage dips and interrupts: a 30% reduction in voltage for 10 ms, a 60% reduction in voltage for 100 ms, and a greater than 95% reduction in voltage for 5 seconds. The EUT was tested in accordance with EN55103-2 and EN61000-4-11 and meets Performance Criterion B for 30% reduction, Criterion C for a 60% reduction and Criterion C for a >95% reduction in voltage.

APPENDIX A
INFORMATION ABOUT THE EQUIPMENT UNDER TEST

INFORMATION ABOUT THE EQUIPMENT UNDER TEST

The EUT is placed on the turn table, connected to support devices via the connection below

- A) 10' shielded audio cable ¼" to 1/8" TS phone jack
- B) 18" shielded audio cable XLR
- C) 12" shielded audio cable ¼" TS phono jack
- D) 2' speaker wires shielded

REQUIRED EUT CHANGES TO COMPLY:

NONE

CABLE INFORMATION

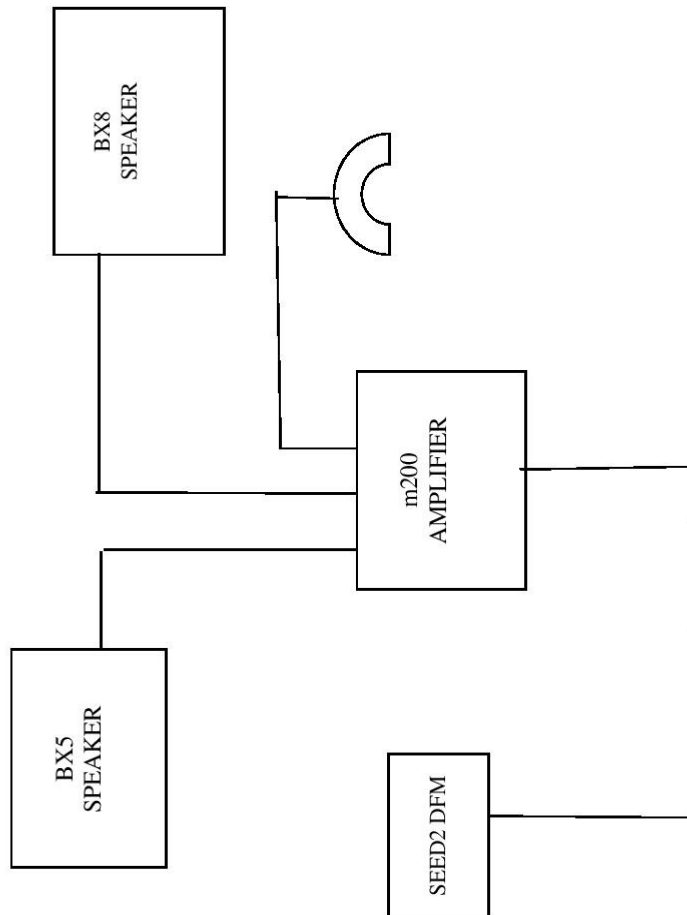
Power Cords:

- 1) Unit: m200 Amplifier
MFG: Generic
Shielded (Y/N): N
Length: 6 ft.
- 2) Unit: SEED2 DFM
MFG: Adaptor
Shielded (Y/N): N
Length: 6 ft.
- 3) Unit: BX8 Powered Speaker
MFG: Generic
Shielded (Y/N): N
Length: 6 ft.

I/O Cables – External Connections:

- 1) SEED2 DFM to m200 AMPLIFIER (1/4" to 1/8" TS phonojack)
Shielded (Y/N): Y
MFG: Generic
Length: 10 ft
- 2) SEED2 DFM to SEED2 DFM (1/4" TS phonojack) (3)
Shielded (Y/N): Y
MFG: Generic
Length: 12 IN
- 3) m200 to BX8 (XLR)
Shielded (Y/N): Y
MFG: Generic
Length: 18 in
- 4) m200 to BX5
Shielded (Y/N): Y
MFG: Generic
Length: 2 ft
- 5) m200 to SONY Headphones
Shielded (Y/N): Y
MFG: Generic
Length: 4 ft

CABLE CONNECTION DIAGRAM



PHOTOGRAPH SHOWING RADIATED EMISSIONS TEST (FRONT)



PHOTOGRAPH SHOWING RADIATED EMISSIONS TEST (REAR)



PHOTOGRAPH SHOWING CONDUCTED EMISSIONS TEST (FRONT)



PHOTOGRAPH SHOWING CONDUCTED EMISSIONS TEST (REAR)



APPENDIX B
MEASUREMENT DATA SHEETS

Test Location: CKC Laboratories, Inc • 110 N. Olinda Place • Brea, CA • 714 993 6112
 Customer: **Electrosmith**
 Specification: **CISPR 32 Radiated Emissions Class A (3m)**
 Work Order #: **108026** Date: 2/1/2023
 Test Type: **Radiated Scan** Time: 13:48:51
 Tested By: E. Wong Sequence#: 1
 Software: EMITest 5.03.20

Equipment Tested:

Device	Manufacturer	Model #	S/N
SEED2 DFM	Electrosmith	NA	NA
Amplifier	Darkglass Electronics	M200	NNTE34CK333

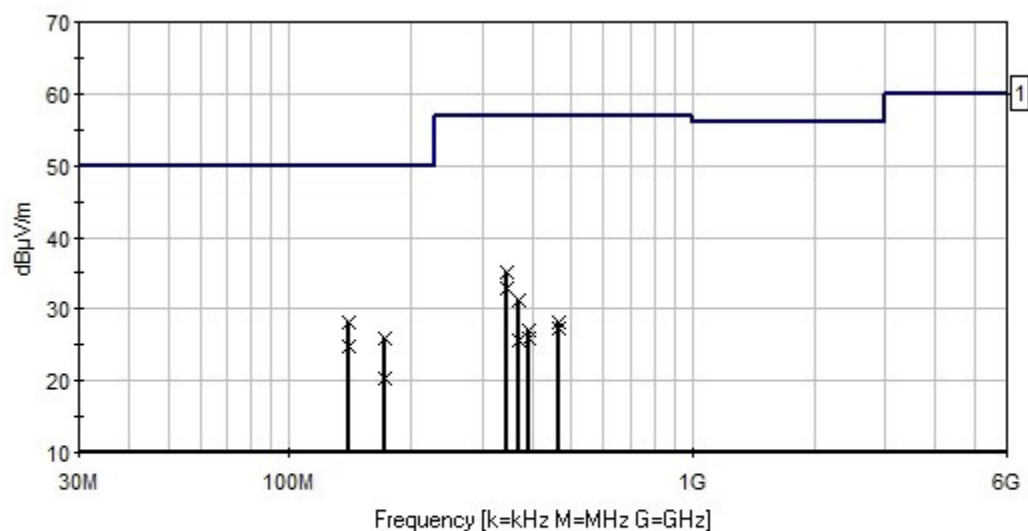
Support Equipment:

Device	Manufacturer	Model #	S/N
Headphone	Sony	NA	NA
Powered Speaker	M-Audio	BX 8 Studiophile	NA
Non Powered Speaker	M-Audio	BX 6	

Test Conditions / Notes:

The EUT is placed on the turn table, connected to support devices via the connection below

- A) 10' shielded audio cable ¼" to 1/8" TS phone jack
- B) 18" shielded audio cable XLR
- C) 12" shielded audio cable ¼" TS phono jack
- D) 2' speaker wires shielded



— Readings
 — 1 - CISPR 32 Radiated Emissions Class A (3m)
 × Peak Readings
 Software Version: 5.03.20

Test Equipment:

ID	Asset #/Serial #	Description	Model	Calibration Date	Cal Due Date
	AN02869	Spectrum Analyzer	E4440A	12/13/2022	12/13/2023
T1	AN00851	Biconilog Antenna	CBL6111C	4/21/2022	4/21/2024
T2	ANP05198	Cable-Amplitude +15C to +45C (dB)	8268	12/31/2022	12/31/2024
T3	AN00309	Preamp	8447D	12/13/2021	12/13/2023
T4	ANP05050	Cable	RG223/U	12/31/2022	12/31/2024

Measurement Data: Reading listed by order taken. Test Distance: 3 Meters

#	Freq MHz	Rdng dB μ V	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dB μ V/m	Spec dB μ V/m	Margin dB	Polar Ant
1	140.629M	33.1	+17.4	+2.1	-28.0	+0.2	+0.0	24.8	50.0	-25.2	Vert
2	172.103M	35.9	+15.5	+2.3	-28.0	+0.2	+0.0	25.9	50.0	-24.1	Vert
3	344.215M	36.6	+20.5	+3.4	-27.9	+0.3	+0.0	32.9	57.0	-24.1	Vert
4	368.750M	28.7	+21.0	+3.5	-27.9	+0.3	+0.0	25.6	57.0	-31.4	Vert
5	393.200M	28.2	+21.6	+3.7	-27.9	+0.3	+0.0	25.9	57.0	-31.1	Vert
6	466.600M	28.1	+23.6	+4.0	-27.9	+0.3	+0.0	28.1	57.0	-28.9	Vert
7	140.600M	36.4	+17.4	+2.1	-28.0	+0.2	+0.0	28.1	50.0	-21.9	Horiz
8	172.102M	30.4	+15.5	+2.3	-28.0	+0.2	+0.0	20.4	50.0	-29.6	Horiz
9	344.185M	38.7	+20.5	+3.4	-27.9	+0.3	+0.0	35.0	57.0	-22.0	Horiz
10	368.762M	34.3	+21.0	+3.5	-27.9	+0.3	+0.0	31.2	57.0	-25.8	Horiz
11	393.198M	29.4	+21.6	+3.7	-27.9	+0.3	+0.0	27.1	57.0	-29.9	Horiz
12	466.598M	27.4	+23.6	+4.0	-27.9	+0.3	+0.0	27.4	57.0	-29.6	Horiz

Test Location: CKC Laboratories, Inc • 110 N. Olinda Place • Brea, CA • 714 993 6112
 Customer: **Electrosmith**
 Specification: **CISPR 32 AC Mains Class A - Average**
 Work Order #: **108026**
 Test Type: **Conducted Emissions**
 Tested By: E. Wong
 Software: EMITest 5.03.20

Date: 2/1/2023
 Time: 2:17:26 PM
 Sequence#: 5
 120/60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
SEED2 DFM	Electrosmith	NA	NA

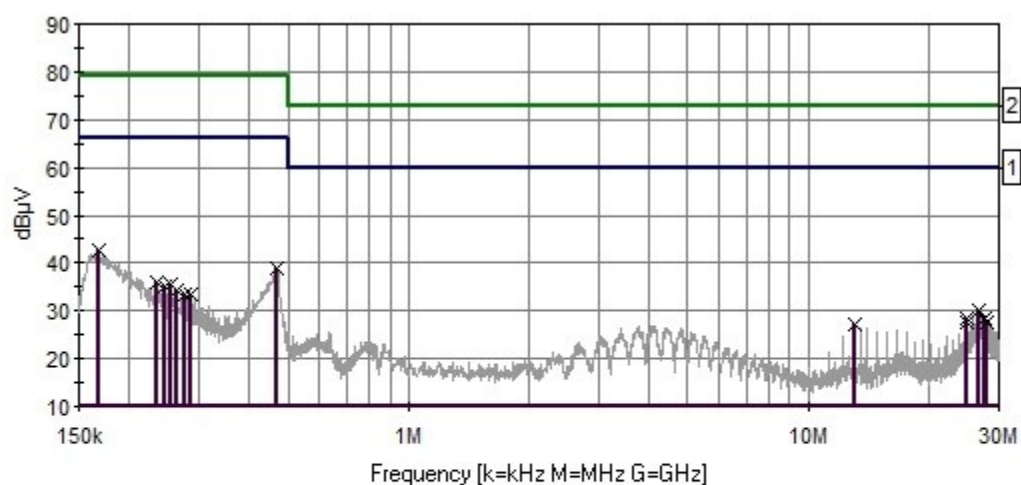
Support Equipment:

Device	Manufacturer	Model #	S/N
Headphone	Sony	NA	NA
Powered Speaker	M-Audio	BX 8 Studiophile	NA
Non Powered Speaker	M-Audio	BX 6	
Amplifier	Darkglass Electronics	M200	NNTE34CK333

Test Conditions / Notes:

The EUT is placed on the turn table, connected to support devices via the connection below

- A) 10' shielded audio cable ¼" to 1/8" TS phone jack
- B) 18" shielded audio cable XLR
- C) 12" shielded audio cable ¼" TS phono jack
- D) 2' speaker wires shielded



— Sweep Data
 — 1 - CISPR 32 AC Mains Class A - Average
 — 2 - CISPR 32 AC Mains Class A - Quasi-peak
 — Readings
 X Peak Readings
 Software Version: 5.03.20

Test Equipment:

ID	Asset #/Serial #	Description	Model	Calibration Date	Cal Due Date
	AN02869	Spectrum Analyzer	E4440A	12/13/2022	12/13/2023
T1	AN02343	High Pass Filter	HE9615-150K-50-720B	1/2/2023	1/2/2025
T2	ANP07338	Cable	2249-Y-240	1/3/2022	1/3/2024
T3	ANP08007	Attenuator	SA18N10W-06	10/24/2022	10/24/2024
T4	AN00969A	50uH LISN-Line (dB)	3816/2NM	10/16/2022	10/16/2024
	AN00969A	50uH LISN-Return (dB)	3816/2NM	10/16/2022	10/16/2024

Measurement Data:

Reading listed by margin.

Test Lead: L1-Line

#	Freq MHz	Rdng dB μ V	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dB μ V	Spec dB μ V	Margin dB	Polar Ant
1	167.453k	36.4	+0.3	+0.0	+5.8	+0.1	+0.0	42.6	66.0	-23.4	L1-Li
2	467.789k	32.9	+0.2	+0.0	+5.8	+0.1	+0.0	39.0	66.0	-27.0	L1-Li
3	26.780M	23.1	+0.2	+0.4	+5.8	+0.8	+0.0	30.3	60.0	-29.7	L1-Li
4	235.083k	30.0	+0.2	+0.0	+5.8	+0.1	+0.0	36.1	66.0	-29.9	L1-Li
5	253.991k	29.4	+0.2	+0.0	+5.8	+0.1	+0.0	35.5	66.0	-30.5	L1-Li
6	247.446k	29.0	+0.2	+0.0	+5.8	+0.1	+0.0	35.1	66.0	-30.9	L1-Li
7	24.998M	21.5	+0.2	+0.4	+5.8	+0.7	+0.0	28.6	60.0	-31.4	L1-Li
8	27.780M	21.2	+0.2	+0.4	+5.8	+0.8	+0.0	28.4	60.0	-31.6	L1-Li
9	262.717k	28.0	+0.2	+0.0	+5.8	+0.1	+0.0	34.1	66.0	-31.9	L1-Li
10	24.820M	20.7	+0.2	+0.4	+5.8	+0.7	+0.0	27.8	60.0	-32.2	L1-Li
11	28.123M	20.6	+0.2	+0.4	+5.8	+0.8	+0.0	27.8	60.0	-32.2	L1-Li
12	277.261k	27.6	+0.1	+0.0	+5.8	+0.1	+0.0	33.6	66.0	-32.4	L1-Li
13	27.985M	20.4	+0.2	+0.4	+5.8	+0.8	+0.0	27.6	60.0	-32.4	L1-Li
14	284.533k	27.5	+0.1	+0.0	+5.8	+0.1	+0.0	33.5	66.0	-32.5	L1-Li
15	13.085M	20.5	+0.2	+0.3	+5.8	+0.4	+0.0	27.2	60.0	-32.8	L1-Li

Test Location: CKC Laboratories, Inc • 110 N. Olinda Place • Brea, CA • 714 993 6112
 Customer: **Electrosmith**
 Specification: **CISPR 32 AC Mains Class A - Average**
 Work Order #: **108026**
 Test Type: **Conducted Emissions**
 Tested By: E. Wong
 Software: EMITest 5.03.20

Date: 2/1/2023
 Time: 2:13:08 PM
 Sequence#: 4
 120/60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
SEED2 DFM	Electrosmith	NA	NA

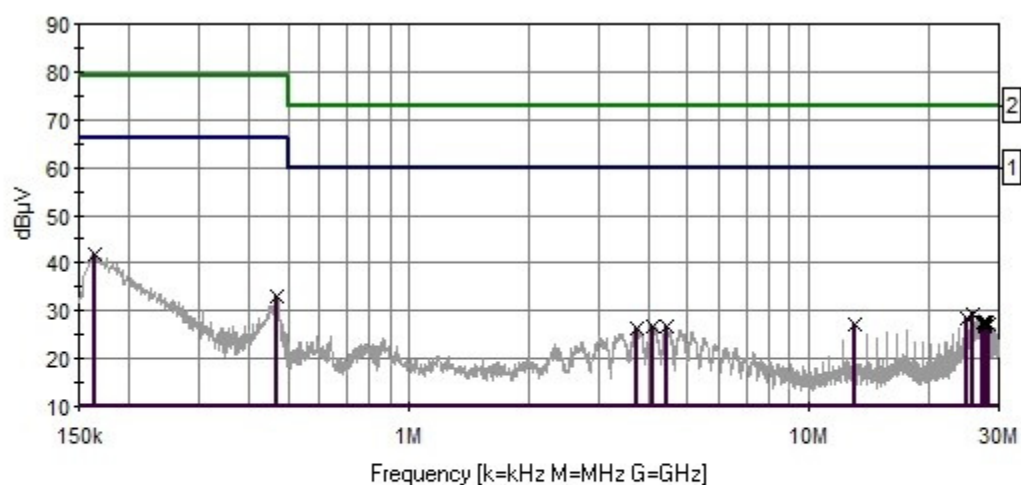
Support Equipment:

Device	Manufacturer	Model #	S/N
Headphone	Sony	NA	NA
Powered Speaker	M-Audio	BX 8 Studiophile	NA
Non Powered Speaker	M-Audio	BX 6	
Amplifier	Darkglass Electronics	M200	NNTE34CK333

Test Conditions / Notes:

The EUT is placed on the turn table, connected to support devices via the connection below

- A) 10' shielded audio cable ¼" to 1/8" TS phone jack
- B) 18" shielded audio cable XLR
- C) 12" shielded audio cable ¼" TS phono jack
- D) 2' speaker wires shielded



— Sweep Data
 — 1 - CISPR 32 AC Mains Class A - Average
 — 2 - CISPR 32 AC Mains Class A - Quasi-peak
 — Readings
 x Peak Readings
 Software Version: 5.03.20

Test Equipment:

ID	Asset #/Serial #	Description	Model	Calibration Date	Cal Due Date
	AN02869	Spectrum Analyzer	E4440A	12/13/2022	12/13/2023
T1	AN02343	High Pass Filter	HE9615-150K-50-720B	1/2/2023	1/2/2025
T2	ANP07338	Cable	2249-Y-240	1/3/2022	1/3/2024
T3	ANP08007	Attenuator	SA18N10W-06	10/24/2022	10/24/2024
	AN00969A	50uH LISN-Line (dB)	3816/2NM	10/16/2022	10/16/2024
T4	AN00969A	50uH LISN-Return (dB)	3816/2NM	10/16/2022	10/16/2024

Measurement Data:

Reading listed by margin.

Test Lead: L2-Neutral

#	Freq MHz	Rdng dB μ V	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dB μ V	Spec dB μ V	Margin dB	Polar Ant
1	164.544k	35.4	+0.4	+0.0	+5.8	+0.1	+0.0	41.7	66.0	-24.3	L2-Ne
2	25.717M	22.1	+0.2	+0.4	+5.8	+0.9	+0.0	29.4	60.0	-30.6	L2-Ne
3	24.998M	21.3	+0.2	+0.4	+5.8	+0.9	+0.0	28.6	60.0	-31.4	L2-Ne
4	27.437M	20.5	+0.2	+0.4	+5.8	+0.9	+0.0	27.8	60.0	-32.2	L2-Ne
5	27.526M	20.3	+0.2	+0.4	+5.8	+0.9	+0.0	27.6	60.0	-32.4	L2-Ne
6	27.972M	20.3	+0.2	+0.4	+5.8	+0.9	+0.0	27.6	60.0	-32.4	L2-Ne
7	13.085M	20.5	+0.2	+0.3	+5.8	+0.5	+0.0	27.3	60.0	-32.7	L2-Ne
8	28.383M	20.0	+0.2	+0.4	+5.8	+0.9	+0.0	27.3	60.0	-32.7	L2-Ne
9	469.971k	27.1	+0.2	+0.0	+5.8	+0.1	+0.0	33.2	66.0	-32.8	L2-Ne
10	27.780M	19.9	+0.2	+0.4	+5.8	+0.9	+0.0	27.2	60.0	-32.8	L2-Ne
11	27.574M	19.7	+0.2	+0.4	+5.8	+0.9	+0.0	27.0	60.0	-33.0	L2-Ne
12	4.092M	20.5	+0.1	+0.2	+5.8	+0.2	+0.0	26.8	60.0	-33.2	L2-Ne
13	4.441M	20.5	+0.1	+0.2	+5.8	+0.2	+0.0	26.8	60.0	-33.2	L2-Ne
14	27.835M	19.4	+0.2	+0.4	+5.8	+0.9	+0.0	26.7	60.0	-33.3	L2-Ne
15	3.727M	20.3	+0.1	+0.1	+5.8	+0.2	+0.0	26.5	60.0	-33.5	L2-Ne

**EN61000-3-2
HARMONICS CURRENTS
And
EN61000-3-3
FLICKER TESTING**

Test	Result	EUT condition
Fluctuating Harmonics #1	Pass	
Fluctuating Harmonics #2	Pass	
Fluctuating Harmonics Repeatability	Pass	
Flicker	Pass	Normal Steady State

EN55103-2 (2009)

EN61000-4-3

Radiated Immunity at 3V/m with 80% 1kHz AM

Frequency Range MHz	Test Distance	Front V/H	Back V/H	Left Side V/H	Right Side V/H	Performance Criterion
80-1000	3	NA	Pass	NA	NA	A

EN55103-2 (2009)

EN61000-4-6

Conducted Immunity at 3Vrms with 80% 1kHz AM

Cable Tested	Frequency Range	Pass/fail	Performance Criterion
AC Power Line	.15-80MHz	Pass	A
Signal Lines	.15-80MHz	Pass	A

KeyTek CEWare Sequence List Report

Sequence File: C:\KEYTEK_CEWARE32

LIST REPEATS: 1

SEED2 DFM

SEQUENCE	TYPE	REPEATS	SEQUENCE DESCRIPTION			
ESD	Standard	10	Air 8 kV			
	Pause/Msg	Voltage	Tip Type	Mode	Rep. Rate	Pulses
		-8000V	Air	Normal	1 pps	10
		8000V	Air	Normal	1 pps	10

SEQUENCE	TYPE	REPEATS	SEQUENCE DESCRIPTION			
ESD	Standard	10	Contact 4 kV			
	Pause/Msg	Voltage	Tip Type	Mode	Rep. Rate	Pulses
		-4000V	Contact	Normal	1 pps	10
		4000V	Contact	Normal	1 pps	10

SEQUENCE	TYPE	REPEATS	SEQUENCE DESCRIPTION			
EFT	Standard	1	Class2			
	Pause/Msg	Frequency	Voltage	Output:LC	Duration	
		5.0 kHz	-1000V	MAINS:L1	60 sec.	
		5.0 kHz	1000V	MAINS:L1	60 sec.	
		5.0 kHz	-1000V	MAINS:L2	60 sec.	
		5.0 kHz	1000V	MAINS:L2	60 sec.	
		5.0 kHz	-1000V	MAINS:PE	60 sec.	
		5.0 kHz	1000V	MAINS:PE	60 sec.	

SEQUENCE	TYPE	REPEATS	SEQUENCE DESCRIPTION					
Srg 1.2/50	Standard	1	Class 3 Full					
	Pause/Msg	Waveform	Voltage	Output:LC	Phs Ref	Phs Ang	Tests	Delay
		12 Ohm	-500V	MAINS:L1/PE	L1	0 deg.	5	60 sec.
		12 Ohm	-500V	MAINS:L1/PE	L1	90 deg.	5	60 sec.
		12 Ohm	-500V	MAINS:L1/PE	L1	270 deg.	5	60 sec.
		12 Ohm	500V	MAINS:L1/PE	L1	0 deg.	5	60 sec.
		12 Ohm	500V	MAINS:L1/PE	L1	90 deg.	5	60 sec.
		12 Ohm	500V	MAINS:L1/PE	L1	270 deg.	5	60 sec.
		12 Ohm	-500V	MAINS:L2/PE	L1	0 deg.	5	60 sec.
		12 Ohm	-500V	MAINS:L2/PE	L1	90 deg.	5	60 sec.
		12 Ohm	-500V	MAINS:L2/PE	L1	270 deg.	5	60 sec.
		12 Ohm	500V	MAINS:L2/PE	L1	0 deg.	5	60 sec.
		12 Ohm	500V	MAINS:L2/PE	L1	90 deg.	5	60 sec.
		12 Ohm	500V	MAINS:L2/PE	L1	270 deg.	5	60 sec.
		2 Ohm	-250V	MAINS:L1/L2	L1	0 deg.	5	60 sec.
		2 Ohm	-250V	MAINS:L1/L2	L1	90 deg.	5	60 sec.
		2 Ohm	-250V	MAINS:L1/L2	L1	270 deg.	5	60 sec.
		2 Ohm	250V	MAINS:L1/L2	L1	0 deg.	5	60 sec.

KeyTek CEWare Sequence List Report

Sequence File: C:\KEYTEK_CEWARE32_\

2 Ohm	250V	MAINS:L1/L2	L1	90 deg.	5	60 sec.
2 Ohm	250V	MAINS:L1/L2	L1	270 deg.	5	60 sec.
12 Ohm	-1000V	MAINS:L1/PE	L1	0 deg.	5	60 sec.
12 Ohm	-1000V	MAINS:L1/PE	L1	90 deg.	5	60 sec.
12 Ohm	-1000V	MAINS:L1/PE	L1	270 deg.	5	60 sec.
12 Ohm	1000V	MAINS:L1/PE	L1	0 deg.	5	60 sec.
12 Ohm	1000V	MAINS:L1/PE	L1	90 deg.	5	60 sec.
12 Ohm	1000V	MAINS:L1/PE	L1	270 deg.	5	60 sec.
12 Ohm	-1000V	MAINS:L2/PE	L1	0 deg.	5	60 sec.
12 Ohm	-1000V	MAINS:L2/PE	L1	90 deg.	5	60 sec.
12 Ohm	-1000V	MAINS:L2/PE	L1	270 deg.	5	60 sec.
12 Ohm	1000V	MAINS:L2/PE	L1	0 deg.	5	60 sec.
12 Ohm	1000V	MAINS:L2/PE	L1	90 deg.	5	60 sec.
12 Ohm	1000V	MAINS:L2/PE	L1	270 deg.	5	60 sec.
2 Ohm	-500V	MAINS:L1/L2	L1	0 deg.	5	60 sec.
2 Ohm	-500V	MAINS:L1/L2	L1	90 deg.	5	60 sec.
2 Ohm	-500V	MAINS:L1/L2	L1	270 deg.	5	60 sec.
2 Ohm	500V	MAINS:L1/L2	L1	0 deg.	5	60 sec.
2 Ohm	500V	MAINS:L1/L2	L1	90 deg.	5	60 sec.
2 Ohm	500V	MAINS:L1/L2	L1	270 deg.	5	60 sec.
12 Ohm	-2000V	MAINS:L1/PE	L1	0 deg.	5	60 sec.
12 Ohm	-2000V	MAINS:L1/PE	L1	90 deg.	5	60 sec.
12 Ohm	-2000V	MAINS:L1/PE	L1	270 deg.	5	60 sec.
12 Ohm	2000V	MAINS:L1/PE	L1	0 deg.	5	60 sec.
12 Ohm	2000V	MAINS:L1/PE	L1	90 deg.	5	60 sec.
12 Ohm	2000V	MAINS:L1/PE	L1	270 deg.	5	60 sec.
12 Ohm	-2000V	MAINS:L2/PE	L1	0 deg.	5	60 sec.
12 Ohm	-2000V	MAINS:L2/PE	L1	90 deg.	5	60 sec.
12 Ohm	-2000V	MAINS:L2/PE	L1	270 deg.	5	60 sec.
12 Ohm	2000V	MAINS:L2/PE	L1	0 deg.	5	60 sec.
12 Ohm	2000V	MAINS:L2/PE	L1	90 deg.	5	60 sec.
12 Ohm	2000V	MAINS:L2/PE	L1	270 deg.	5	60 sec.
2 Ohm	-1000V	MAINS:L1/L2	L1	0 deg.	5	60 sec.
2 Ohm	-1000V	MAINS:L1/L2	L1	90 deg.	5	60 sec.
2 Ohm	-1000V	MAINS:L1/L2	L1	270 deg.	5	60 sec.
2 Ohm	1000V	MAINS:L1/L2	L1	0 deg.	5	60 sec.
2 Ohm	1000V	MAINS:L1/L2	L1	90 deg.	5	60 sec.
2 Ohm	1000V	MAINS:L1/L2	L1	270 deg.	5	60 sec.

SEQUENCE	TYPE	REPEATS	SEQUENCE DESCRIPTION
HPower	User Defined	1	User Defined
Pause/Msg	Coil Factor	Field Str.	Line
	0.87	3.00 A/m	50 Hz
			Duration
			30 sec.

SEQUENCE	TYPE	REPEATS	SEQUENCE DESCRIPTION
PQF	Standard	1	Combination
Pause/Msg	Test Level	Phs Ang	Dur. Value
	70% Dip	0 deg.	0.01
			Duration
			sec
			Tests
			3
			Delay
			10 sec.

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KeyTek CEWare Sequence List Report

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Sequence File: C__KEYTEK_CEWARE32_

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70% Dip	180	0.01	sec	3	10 sec.
40% Dip	0	0.10	sec	3	10 sec.
0% Short	0	5.00	sec	3	10 sec.
0% Open	0	5.00	sec	3	10 sec.