



FCC/ISED Test Report

For:
Universal Audio, Inc.

Model:
GPM-GLXY, GPM-DLVRB, GPM-MAX, GPM-OXSTP

Product Description:
Guitar Effects Pedal

FCC ID: 2AXKQ2029
ISED: 26610-2029

Applied Rules and Standards:
47 CFR Parts: 15B, and ICES-003 Issue 7

REPORT #: EMC_UNIVE-021-22001_FCC_15B

DATE: 3-15-2023



A2LA Accredited

IC recognized #
3462B

CETECOM Inc.

411 Dixon Landing Road ♦ Milpitas, CA 95035 ♦ U.S.A.

Phone: + 1 (408) 586 6200 ♦ Fax: + 1 (408) 586 6299 ♦ E-mail: info@cetecom.com ♦ <http://www.cetecom.com>

CETECOM Inc. is a Delaware Corporation with Corporation number: 2905571

TABLE OF CONTENTS

1	ASSESSMENT.....	3
2	ADMINISTRATIVE DATA	4
2.1	IDENTIFICATION OF THE TESTING LABORATORY ISSUING THE EMC TEST REPORT	4
2.2	IDENTIFICATION OF THE CLIENT	4
2.3	IDENTIFICATION OF THE MANUFACTURER.....	4
3	EQUIPMENT UNDER TEST (EUT).....	5
3.1	EUT SPECIFICATIONS	5
3.2	EUT SAMPLE DETAILS	5
3.3	SUPPORT EQUIPMENT (SE) DETAILS	5
3.4	TEST SAMPLE CONFIGURATION	6
4	SUBJECT OF INVESTIGATION	6
4.1	DATE OF TESTING:.....	6
4.2	MEASUREMENT UNCERTAINTY	6
4.3	ENVIRONMENTAL CONDITIONS DURING TESTING:	6
5	MEASUREMENT PROCEDURES	7
5.1	RADIATED MEASUREMENT FOR EUT WITH DIAMETER LESS THAN 60 CM	7
5.2	SAMPLE CALCULATIONS FOR FIELD STRENGTH MEASUREMENTS	8
6	MEASUREMENT RESULTS SUMMARY	9
7	TEST RESULT DATA	9
7.1	RADIATED EMISSIONS MEASUREMENT ACCORDING TO CFR 47 PART 15.109 AND ICES-003 3.2.2.....	9
7.2	AC POWER LINE CONDUCTED EMISSIONS ACCORDING TO CFR 47 PART 15.107 AND ICES-003 3.2.1.....	13
8	TEST SETUP PHOTOS.....	15
9	TEST EQUIPMENT AND ANCILLARIES USED FOR TESTING	15
10	REVISION HISTORY	15

1 Assessment

The following device as further described in section 3 of this report was evaluated against the applicable criteria specified in the Code of Federal Regulations Title 47 parts 15B and ICES-003 Issue 7.

No deficiencies were ascertained.

Company	Description	Model #
Universal Audio, Inc.	Guitar Effects Pedal	GPM-GLXY, GPM-DLVRB, GPM-MAX, GPM-OXSTP

Note: All four models use the same Main PCBA, DC power cable assembly, two footswitch cable assemblies, FFC cable, Top Panel PCB and metal chassis. All models have different firmware, chassis painting, and Top Panel PCBAs with different components installed or not installed for different user functionality. One representative sample was selected for testing.

Responsible for Testing Laboratory:

Arndt Stoecker

3-15-2023

Compliance

(Director of Regulatory Services)

Date	Section	Name	Signature
------	---------	------	-----------

Responsible for the Report:

Kris Lazarov

3-15-2023

Compliance

(Senior EMC Engineer)

Date	Section	Name	Signature
------	---------	------	-----------

The test results of this test report relate exclusively to the test item specified in Section 3.

CETECOM Inc. USA does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of CETECOM Inc. USA.

2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the EMC Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
Street Address:	411 Dixon Landing Road
City/Zip Code	Milpitas, CA 95035
Country	USA
Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
Director of Regulatory Services:	Arndt Stoecker
Responsible Project Leader:	Palacios, Cathy

2.2 Identification of the Client

Client Firm/Name:	Universal Audio, Inc.
Street Address:	4585 Scotts Valley Drive
City/Zip Code	Scotts Valley, CA 95066
Country	USA

2.3 Identification of the Manufacturer

Manufacturer's Name:	Same as Client
Manufacturers Address:	
City/Zip Code	
Country	

3 Equipment Under Test (EUT)

3.1 EUT Specifications

Model No	GPM-GLXY, GPM-DLVRB, GPM-MAX, GPM-OXSTP
HW Version	10006672,10006673,10006674,10006675
SW Version	1.1.2
FCC-ID	2AXKQ2029
ISED:	26610-2029
Product Description:	Guitar Effects Pedal
Operating Voltage Range	8.55 VDC (min) / 9 VDC (nom) / 9.45 VDC (max)
Operating Temperature Range	Tmin: 0 °C / Tmax: 40 °C
Radios included in the device	Bluetooth 5.0 LE
Sample Revision	<input type="checkbox"/> Prototype <input type="checkbox"/> Production <input checked="" type="checkbox"/> Pre-Production
EUT Dimensions	141mm x 92mm x 65mm
Weight	567 grams
EUT Diameter	<input checked="" type="checkbox"/> < 60 cm <input type="checkbox"/> Other _____

Note: All four models use the same Main PCBA, DC power cable assembly, two footswitch cable assemblies, FFC cable, Top Panel PCB and metal chassis. All models have different firmware, chassis painting, and Top Panel PCBAs with different components installed or not installed for different user functionality. One representative sample was selected for testing.

3.2 EUT Sample details

EUT #	Serial Number	HW Version	SW Version	Comments
1	22382064000111	10006674	1.1.2	MAX

3.3 Support Equipment (SE) details

SE #	Type	Model	Manufacturer	Serial Number
1	Power Supply	PSAC12R-090	Phihong	N/A
2	Mobile Phone	iPod Touch	Apple	N/A
3	100K Audio port load	N/A	Universal Audio	N/A
4	4 Channel Mixer	802VLZ4	Mackie	N/A

3.4 Test Sample Configuration

Set-up #	EUT / AE used for set-up	Comments
1	EUT # 1 + SE # 1 + SE # 2+ SE # 3+ SE # 4	

4 Subject of Investigation

The objective of the measurements done by CETECOM Inc. was to evaluate the compliance of the EUT against the relevant requirements specified in the Code of Federal Regulations Title 47 parts 15B and ICES-003 Issue 7.

4.1 Date of Testing:

11-02-2022

4.2 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus, with 95% confidence interval (in dB delta to result), based on a coverage factor k=2.

Measurement System	EMC 1	EMC 2
Conducted emissions (mains port)	1.12 dB	0.46 dB
Radiated emissions		
(< 30 MHz)	3.66 dB	3.88 dB
(30 MHz – 1GHz)	3.17 dB	3.34 dB
(1 GHz – 3 GHz)	5.01 dB	4.45 dB
(>3 GHz)	4.0 dB	4.79 dB

4.3 Environmental Conditions during Testing:

The following environmental conditions were maintained during the course of testing:

- Ambient Temperature: 20-25°C
- Relative humidity: 40-60%

Deviating test conditions are indicated at individual test description where applicable.

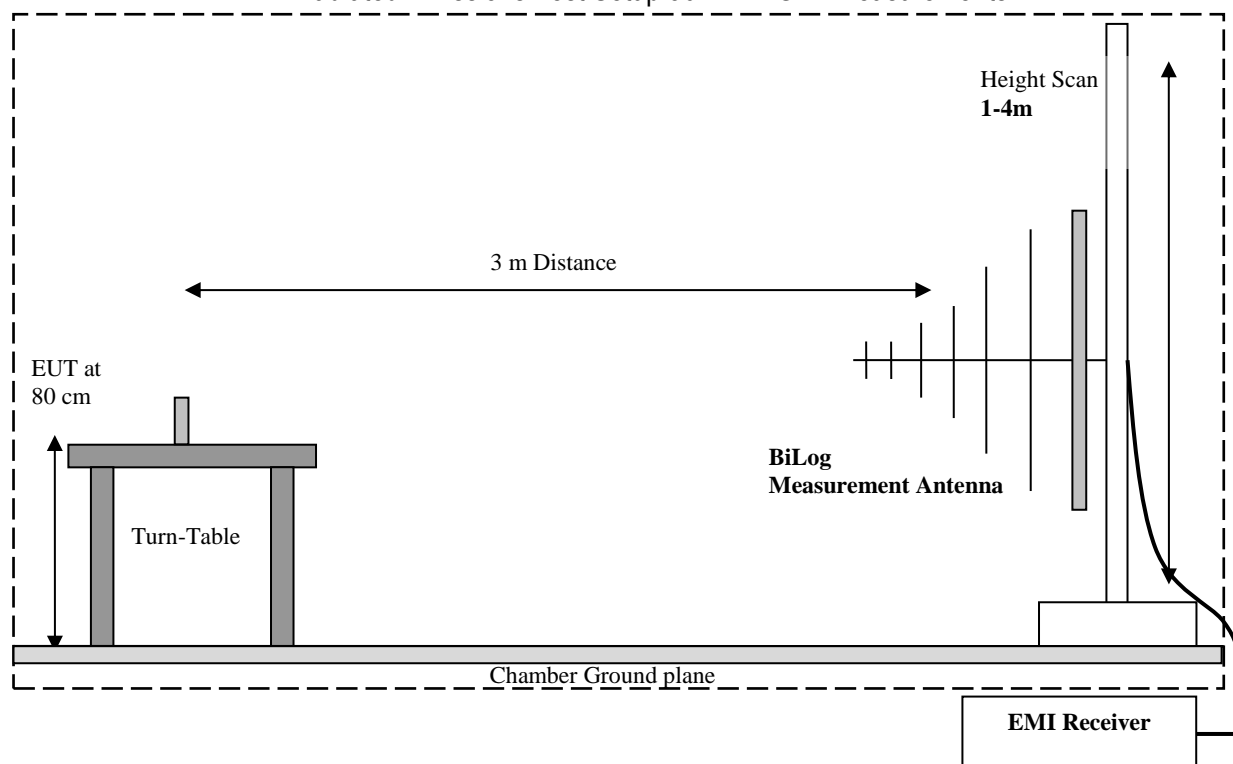
5 Measurement Procedures

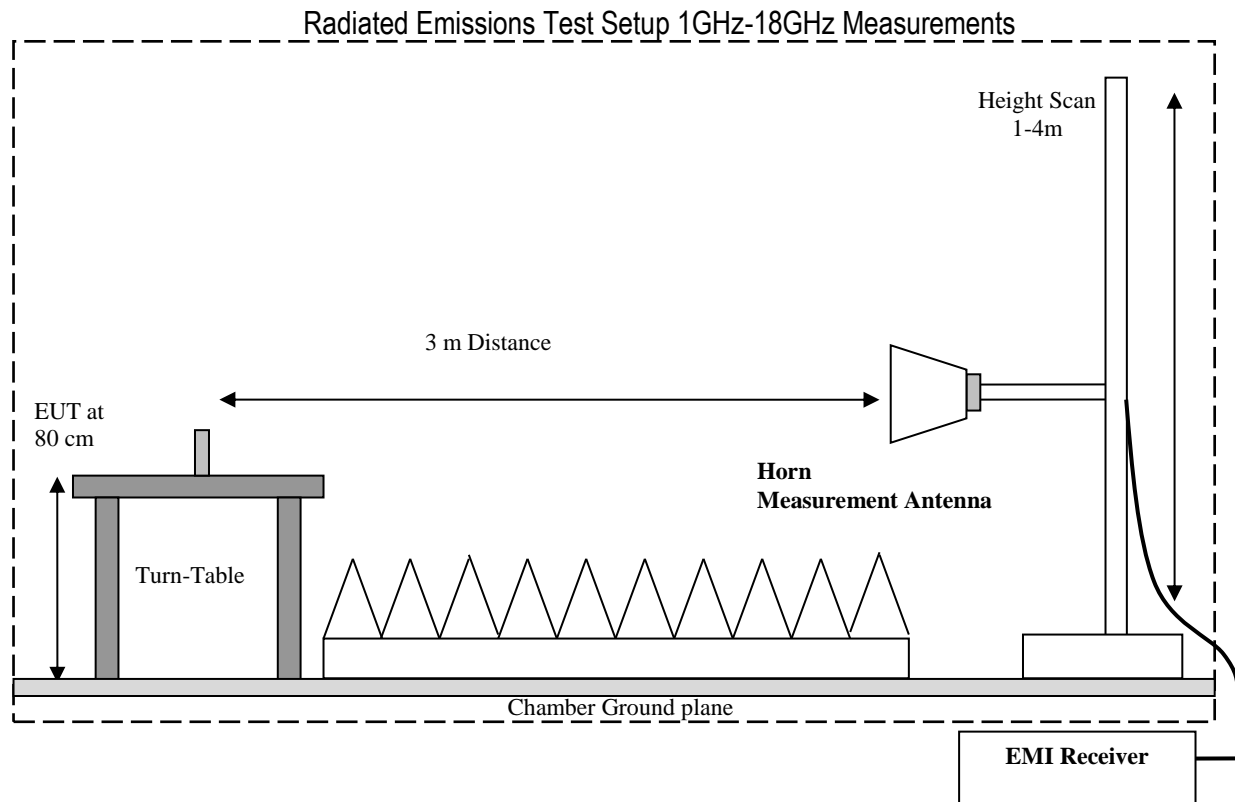
Testing is performed according to the guidelines provided in ANSI C63.4-2014 American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

5.1 Radiated Measurement for EUT with diameter less than 60 cm

- The exploratory measurement is accomplished by running a matrix of 16 sweeps over the required frequency range with R&S Test-SW EMC32 for 4 positions of the turntable, two orthogonal positions of the EUT and both antenna polarizations. This procedure exceeds the requirement of the above standards to cover the 3 orthogonal axis of the EUT. A max peak detector is utilized during the exploratory measurement. The Test-SW creates an overall maximum trace for all 12 sweeps and saves the settings for each point of this trace. The maximum trace is part of the test report.
- The 10 highest emissions are selected with an automatic algorithm of EMC32 searching for peaks in the noise floor and ensuring that broadband signals are not selected multiple times.
- The maxima are then put through the final measurement and again maximized in a 90deg range of the turntable, fine search in frequency domain and height scan between 1m and 4m.
- The above procedure is repeated for all possible ways of power supply to EUT and for all supported modulations.
- In case there are no emissions above noise floor level only the maximum trace is reported as described above.
- The results are split up into up to 4 frequency ranges due to antenna bandwidth restrictions. A magnetic loop is used from 9 kHz to 30 MHz, a Biconilog antenna is used from 30 MHz to 1 GHz, and two different horn antennas are used to cover frequencies up to 18 GHz.

Radiated Emissions Test Setup 30MHz-1GHz Measurements





5.2 Sample Calculations for Field Strength Measurements

Field Strength is calculated from the Spectrum Analyzer/ Receiver readings, taking into account the following parameters:

- Measured reading in dB μ V
- Cable Loss between the receiving antenna and SA in dB and
- Antenna Factor in dB/m

All radiated measurement plots in this report are taken from a test SW that calculates the Field Strength based on the following equation:

$$FS \text{ (dB}\mu\text{V/m)} = \text{Measured Value on SA (dB}\mu\text{V)} + \text{Cable Loss (dB)} + \text{Antenna Factor (dB/m)}$$

Example:

Frequency (MHz)	Measured SA (dB μ V)	Cable Loss (dB)	Antenna Factor Correction (dB)	Field Strength Result (dB μ V/m)
1000	80.5	3.5	14	98.0

6 Measurement Results Summary

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	Fail	NA	NP	Result
FCC §15.109 ICES-003, §6.2	Radiated Emissions	Nominal	RX Mode	■	□	□	□	Complies
FCC §15.107 ICES-003, §6.1	Conducted Emissions	Nominal	RX Mode	■	□	□	□	Complies

Note 1: NA= Not Applicable; NP= Not Performed.

7 Test Result Data

7.1 Radiated Emissions Measurement according to CFR 47 Part 15.109 and ICES-003 3.2.2

Spectrum Analyzer settings		
Sweep Frequency Range	30 MHz – 1 GHz	1 GHz – 40 GHz
Resolution Bandwidth	120 kHz	1 MHz
Detector (Exploratory Measurements)	Peak	Peak, Average
Detector (Final Measurements)	Quasi-Peak	Peak, Average
Trace Mode	Max Hold	Max Hold
Step Size	40 kHz	800 kHz
Measurement Time (Exploratory Measurements)	2 ms	2 ms
Measurement Time (Final Measurements)	100 ms	100 ms

7.1.1 Limits:

Class B Limits		
Frequency of emission (MHz)	Field Strength @ 3 m (μV/m)	Field Strength @ 3 m (dBμV/m)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

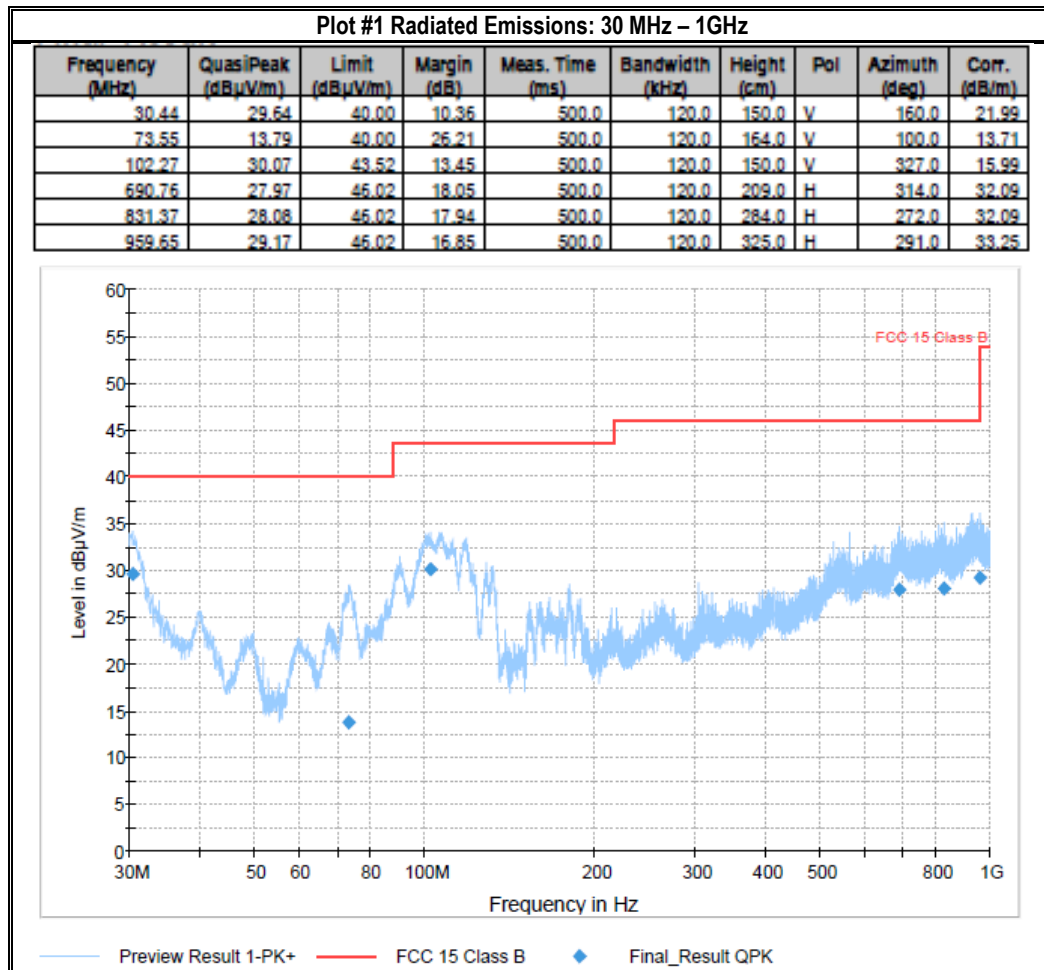
Note: For measurements below 1 GHz, the limits above use a quasi-peak detector. For measurements above 1 GHz, the limits above use an average detector.

7.1.2 Test Summary:

Environmental Conditions	
Ambient Temperature:	20°C
Relative Humidity:	45%
Atmospheric Pressure:	1010 mbar

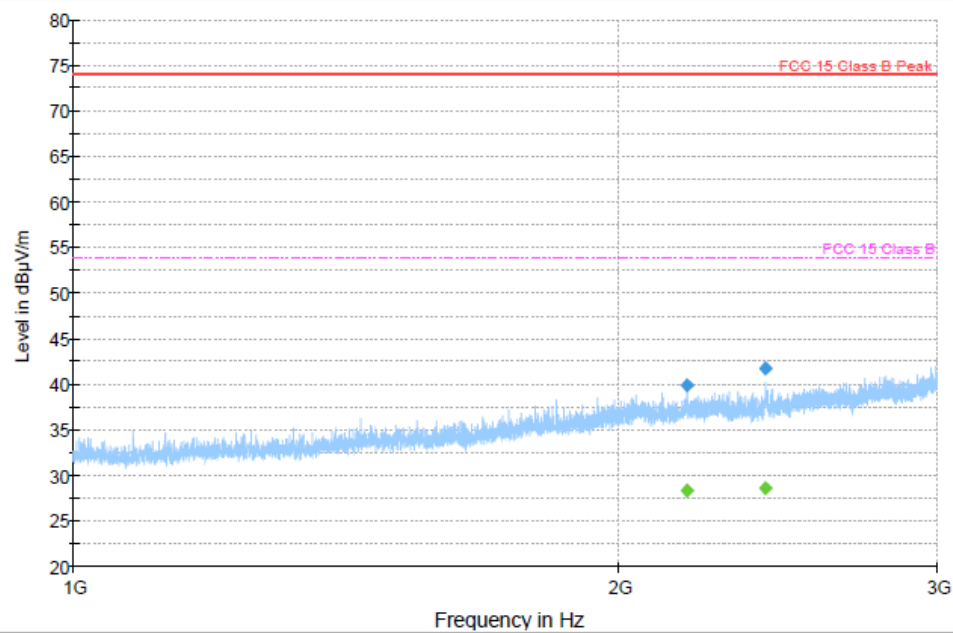
Test Results						
Plot #	EUT Set-Up #	EUT operating mode	Scan Frequency	Power Supply Input	Comments	Result
1 - 3	1	RX Mode	30 MHz – 18 GHz	120V AC	Final measurement	Pass

7.1.3 Measurement Plots:



Plot # 2 Radiated Emissions: 1-3 GHz

Frequency (MHz)	MaxPeak (dBμV/m)	RMS (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2184.00	39.92	---	73.98	34.06	500.0	1000.0	275.0	V	321.0	-1.31
2184.00	---	28.30	53.98	25.68	500.0	1000.0	275.0	V	321.0	-1.31
2412.25	41.77	---	73.98	32.21	500.0	1000.0	318.0	H	38.0	-0.63
2412.25	---	28.61	53.98	25.37	500.0	1000.0	318.0	H	38.0	-0.63



◆ Preview Result 1-PK+ — FCC 15 Class B Peak --- FCC 15 Class B
◆ Final_Result RMS ◆ Final_Result RMS

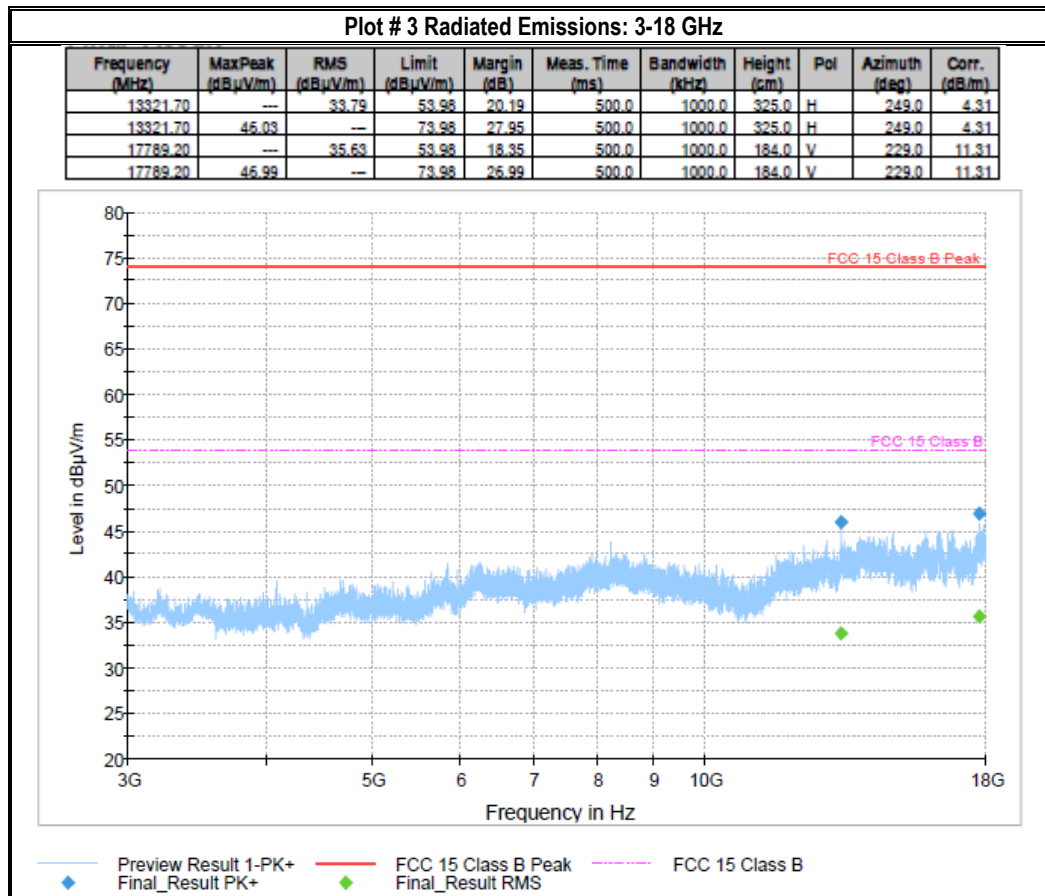
Test Report #: EMC_UNIVE-021-22001_FCC_15B

FCC ID: 2AXKQ2029

Date of Report 3-15-2023

Page 12 of 15

ISED: 26610-2029



7.2 AC Power line Conducted Emissions according to CFR 47 Part 15.107 and ICES-003 3.2.1

Spectrum Analyzer Setting	
Frequency band	150 kHz – 30 MHz
Resolution Bandwidth	9 kHz
Detector (Exploratory Measurements)	Peak, Average
Detector (Final Measurements)	Quasi-Peak, Average
Trace Mode	Max Hold
Step Size	4 kHz
Measurement Time	20 ms

7.2.1 Measurement Procedure:

- The EUT and accessories are placed on a non-conducting table 80 cm above the horizontal ground plane and 40 cm from the vertical ground plane.
- Cables that hang closer than 40 cm to the ground plane are gathered into a 30 cm to 40 cm long bundle.
- The power cable of the EUT is connected to the LISN.
- The 6 highest emissions within 20 dB of the limit are noted.

7.2.2 Limits:

Class B Limits		
Frequency of emission (MHz)	Conducted Limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

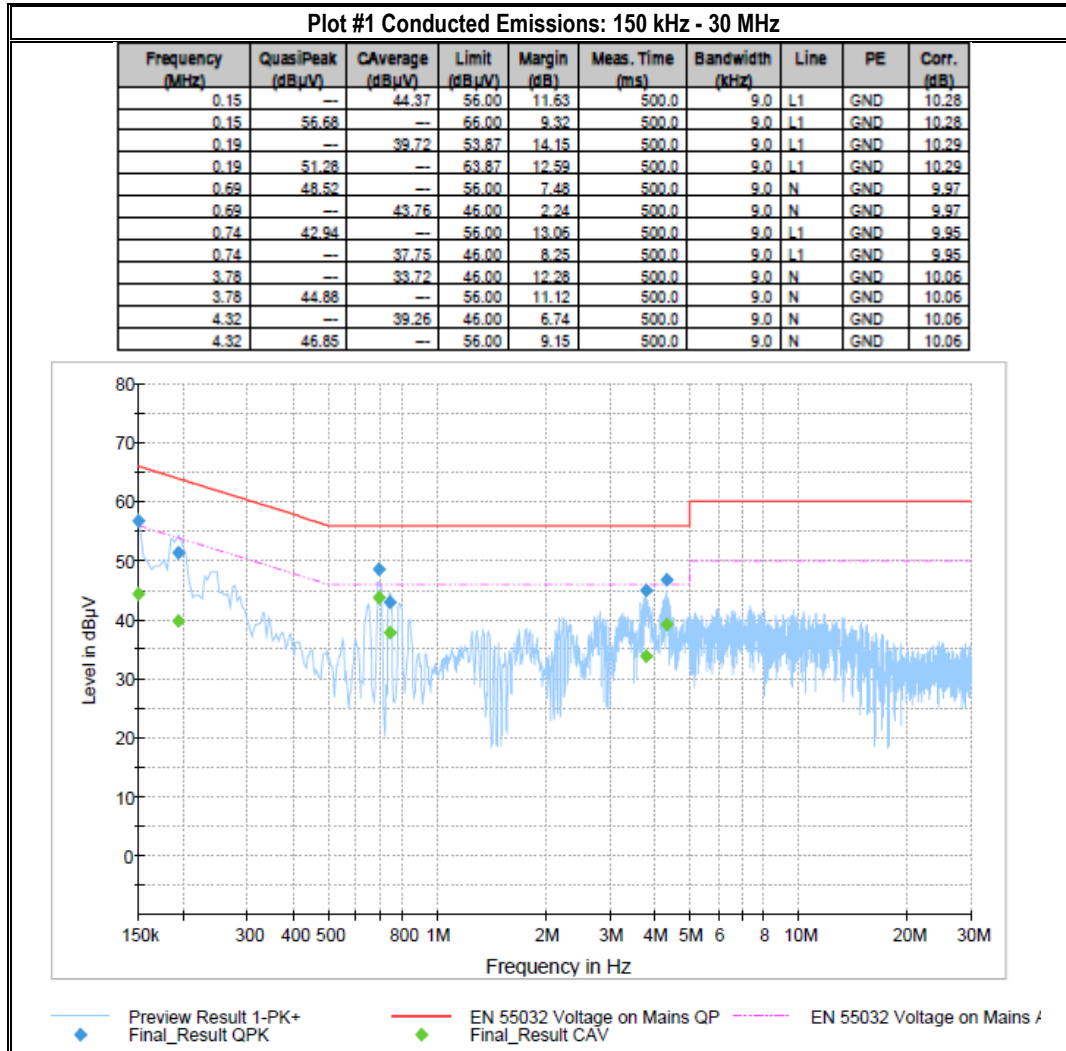
*Decreases with the logarithm of the frequency

7.2.3 Test Summary:

Environmental Conditions	
Ambient Temperature:	20°C
Relative Humidity:	45%
Atmospheric Pressure:	1010 mbar

Test Results							
Plot #	EUT Set-Up #	EUT operating mode	Detector (Peak / AVG / QP)	Line Under Test	Power Supply Input	Comments	Result
1	1	RX Mode	Peak & AVG	Line & Neutral	120V AC	Final measurement	Pass

7.2.4 Measurement Plots:



8 Test setup photos

Setup photos are included in supporting file name: "EMC_UNIVE-021-22001_FCC_15B_Setup_Photos"

9 Test Equipment And Ancillaries Used For Testing

Equipment Name/Type	Manufacturer	Model	Serial #	Calibration Cycle	Last Calibration Date
EMI Receiver	Rohde & Schwarz	ESU 40	100251	3 Years	9/13/2021
Biconilog Antenna	ETS Lindgren	3142E	166067	3 years	03/20/2020
Horn Antenna	ETS Lindgren	3115	35114	3 years	10/10/2020
Horn Antenna	ETS Lindgren	3117-PA	215984	3 years	08/08/2020
LISN	FCC	FCC-LISN-50-25-2-08	8014	3 years	8/31/2021
20db Pulse Limiter	Rohde & Schwarz	ESH3-Z2	102473	3 Years	8/25/2020
Thermometer Humidity Monitor	Dickson	TM320	5280063	3 years	11/02/2020

Note: Equipment used meets the measurement uncertainty requirements as required per applicable standards for 95% confidence levels. Calibration due dates, unless defined specifically, falls on the last day of the month. Items indicated "N/A" for cal status either do not specifically require calibration or is internally characterized before use.

10 Revision History

Date	Template Revision	Changes to report	Prepared by
3-15-2023	EMC_UNIVE-021-22001_FCC_15B	Initial Version	Kris Lazarov

<<< The End >>>