# TXS Industrial Design Inc.
# d.b.a Brandstand Products

# TEST REPORT

**SCOPE OF WORK**
FCC TESTING–BPEVA2

**REPORT NUMBER**
230703019SZN-001

**ISSUE DATE** **[REVISED DATE]**
21 SEPTEMBER 2023 [----------]

**PAGES**
20

**DOCUMENT CONTROL NUMBER**
FCC ID 209_b

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**TEST REPORT**

Intertek Report No.: 230703019SZN-001

# TXS Industrial Design Inc. d.b.a Brandstand Products

Application
For
Certification

## FCC ID: 2ARD4-BPEVA2

## CubieVia 2.0

## Model: BPEVA2

## Transmitter

Report No.: 230703019SZN-001

We hereby certify that the sample of the above item is considered to comply with the requirements of FCC Part 15, Subpart C for Intentional Radiator, mention 47 CFR [10-1-21]

**Prepared and Checked by:**

**Tenet Cao**
**Assistant Engineer**

**Approved by:**

**Ryan RQ Chen**
**Project Engineer**
**Date: 21 September 2023**

# MEASUREMENT/TECHNICAL REPORT

This report concerns (check one) Original Grant ___X___ Class II Change ____

Equipment Type: DCD - Part 15 Low Power Transmitter Below 1705 kHz

Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? Yes _____ No ___X___

If yes, defer until : _____ date

Company Name agrees to notify the Commission by: _____ date

of the intended date of announcement of the product so that the grant can be issued on that date.

Transition Rules Request per 15.37? Yes _____ No ___X___

If no, assumed Part 15, Subpart C for intentional radiator - the new 47 CFR [10-01-21] Edition] provision.

Report prepared by:

Tenet Cao
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# Table of Contents

## 1.0 Summary of Test Results

Applicant: TXS Industrial Design Inc. d.b.a Brandstand Products
Applicant Address: 1219 Digital Dr. Suite 100 Richardson, Texas 75081

Manufacturer: TXS Industrial Design Inc. d.b.a Brandstand Products
Manufacturer Address: 1219 Digital Dr. Suite 100 Richardson, Texas 75081

**Model: BPEVA2**

**FCC ID: 2ARD4-BPEVA2**

| TEST ITEM | REFERENCE | RESULTS |
|---|---|---|
| Power Line Conducted Emissions | 15.207 | Pass |
| Transmitter Radiated Emissions | 15.209 | Pass |
| Antenna Requirement | 15.203 | Pass (See Notes) |

Notes: The EUT uses an Integral Antenna which in accordance to Section 15.203 is considered sufficient to comply with the provisions of this section.

## 2.0 General Description

### 2.1 Product Description

The Equipment Under Test (EUT) is a CubieVia 2.0 operating at 112-205 kHz.

The EUT is powered by Input: 125V~50/60Hz, 12A MAX, the output of the wireless charger is 10W. And the output of USB-Type-C1: 5.0V⎓3.0A,9.0V⎓2.22A, USB-Type-C2: 5.0V⎓3.0A,9.0V⎓2.22A. For more detailed features description, please refer to the user's manual.

Antenna Type: Integral Antenna(embedded coil antenna)

For electronic filing, the brief circuit description is saved with filename: descri.pdf.

### 2.2 Related Submittal(s) Grants

This is an application for certification of the CubieVia 2.0 portion which has Wireless Charging function.

The related report for FCC SDOC is subjected to report number: 230703019SZN-003

### 2.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.10 (2013). Radiated emission measurement was performed in Semi-anechoic chamber and conducted emission measurement was performed in shield room. For radiated emission measurement, preliminary scans were performed in the semi-anechoic chamber only to determine the worst-case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "Justification Section" of this Application. All other measurements were made in accordance with the procedures in part 2 of CFR 47.

### 2.4 Test Facility

The Semi-Anechoic chamber and shield room used to collect the radiated data and conducted data are Intertek Testing Services Shenzhen Ltd. Longhua Branch and located at 101, 201, Building B, No. 308 Wuhe Avenue, Zhangkengjing Community, GuanHu Subdistrict, LongHua District, ShenZhen. This test facility and site measurement data have been fully placed on file with File Number: CN1188.

## 3.0 System Test Configuration

### 3.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in ANSI C63.10 (2013).

The EUT was powered by 125V~50/60Hz, 12A MAX input during the test. The test system was pre-scanning tested based on the consideration of following EUT operation mode. and 128.5kHz was the worst case frequency. Only the worst-case data was shown in this report.

| Pertest mode | Description |
|---|---|
| Mode 1 | Standby mode |
| Mode 2 | Mobile phone is charging at 1% battery power |
| Mode 3 | Mobile phone is charging at 50% battery power |
| Mode 4 | Mobile phone is charging at 99% battery power |

For maximizing emissions below 30 MHz, the EUT was rotated through 360°, the bottom of the loop antenna was placed 1 meter above the ground, and the antenna polarization was changed. For maximizing emission at and above 30 MHz, the EUT was rotated through 360°, the antenna height was varied from 1 meter to 4 meters above the ground plane, and the antenna polarization was changed. This step by step procedure for maximizing emissions led to the data report in Section 4.0.

The rear of unit shall be flushed with the rear of the table.

The equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). The EUT was mounted to a plastic stand if necessary and placed on the styrene turntable, which enabled the engineer to maximize emissions through its placement in the three orthogonal axes.

### 3.2 EUT Exercising Software

N/A

### 3.3 Special Accessories

There is no special accessories necessary for compliance of this product.

### 3.4 Equipment Modification

Any modifications installed previous to testing by TXS Industrial Design Inc. d.b.a Brandstand Products will be incorporated in each production model sold / leased in the United States.

No modifications were installed by Intertek Testing Services Shenzhen Ltd. Longhua Branch.

## 3.5 Measurement Uncertainty

When determining of the test conclusion, the Measurement Uncertainty of test has been considered.

| Measurement Uncertainty | Uncertainty |
|---|---|
| Channel Bandwidth | ±3.46% |
| Radiated emission (Up to 1GHz) | ±4.8dB |
| AC Conducted emission | ±3.6 dB |
| Temperature | ±1°C |
| Humidity | ±5% |

## 3.6 Support Equipment List and Description

This product was tested in the following configuration:

| Description | Manufacturer | Detail |
|---|---|---|
| Mobile Phone (Provided by Intertek) | Apple Inc. | iphone Xs Max |
| Clip line (Provided by Intertek) | N/A | Unshielded, Length: 40cm |
| C to C cable (Provided by Intertek) | N/A | Unshielded, Length: 10cm |
| Cement resistor*2 (Provided by Intertek) | N/A | 2.5Ω |
| Bulb (Provided by Intertek) | N/A | 40W |
| Port A to port C conversion board (Provided by Intertek) | LX-CMTPD | N/A |

## 4.0 Measurement Results

### 4.1 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

FS = RA + AF + CF – AG + PD + AV

where FS = Field Strength in dBμV/m
RA = Receiver Amplitude (including preamplifier) in dBμV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB/m
AG = Amplifier Gain in dB
PD = Pulse Desensitization in dB
AV = Average Factor in –dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

FS = RA + AF + CF – AG + PD + AV

Example

Assume a receiver reading of 62.0dBμV is obtained. The antenna factor of 7.4dB and cable factor of 1.6dB is added. The amplifier gain of 29dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0dB, and the resultant average factor was –10dB. The net field strength for comparison to the appropriate emission limit is 32dBμV/m. This value in dBμV/m was converted to its corresponding level in μV/m.

RA = 62.0dBμV
AF = 7.4 dB/m
CF = 1.6dB
AG = 29.0dB
PD = 0dB

AV = –10dB

FS = 62 + 7.4 + 1.6 – 29 + 0 + (–10) = 32dBμV/m

Level in μV/m = Common Antilogarithm [(32dBμV/m)/20] = 39.8μV/m

## 4.2 Radiated Emission Configuration Photograph

For electronic filing, the worst case radiated emission configuration photographs are saved with filename: radiated photos.pdf.

## 4.3 Radiated Spurious Emission

Worst Case Radiated Spurious Emission
at
703.147667MHz

Judgement: Passed by 14.8dB margin

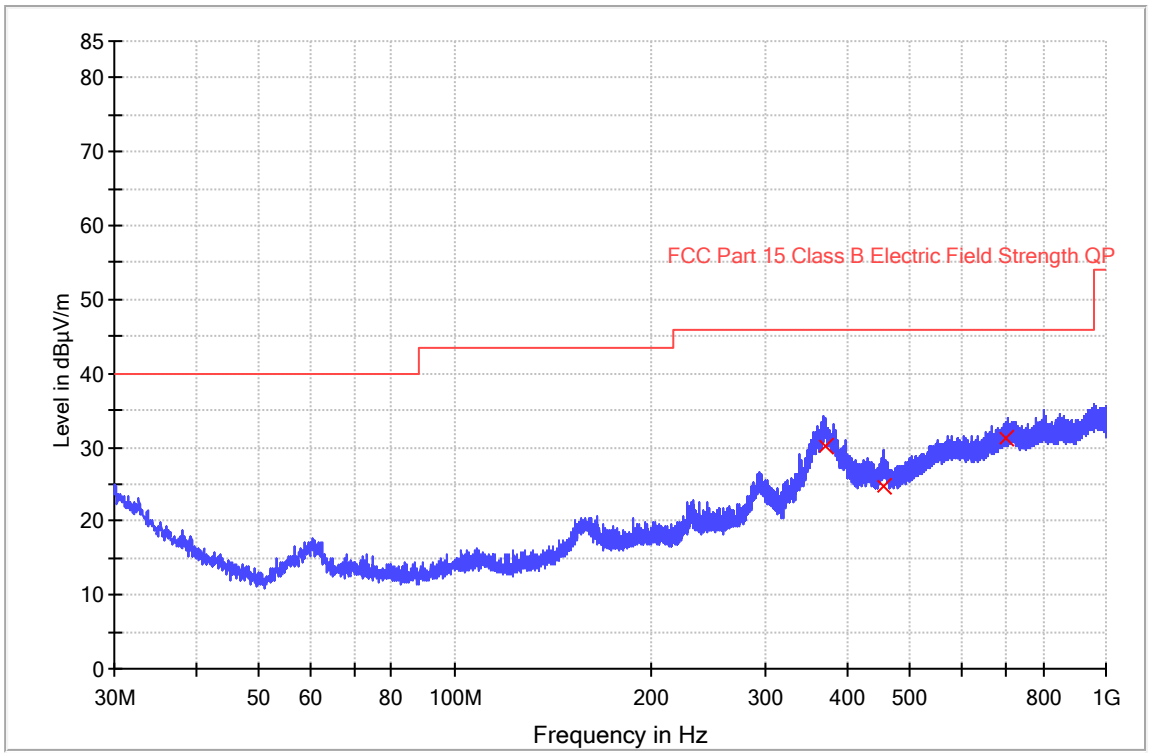
Note:Negative value in the margin column shows emission above limit.

For the electronic filing, the worst case radiated emission configuration photographs are saved with filename: radiated photos.pdf.

Applicant: TXS Industrial Design Inc. d.b.a Brandstand Products
Date of Test: 25 July 2023 Model: BPEVA2
Worst Case Operating Mode: Mode 2

## Radiated Emissions (30MHz – 1000MHz)

ANT Polarity: Horizontal

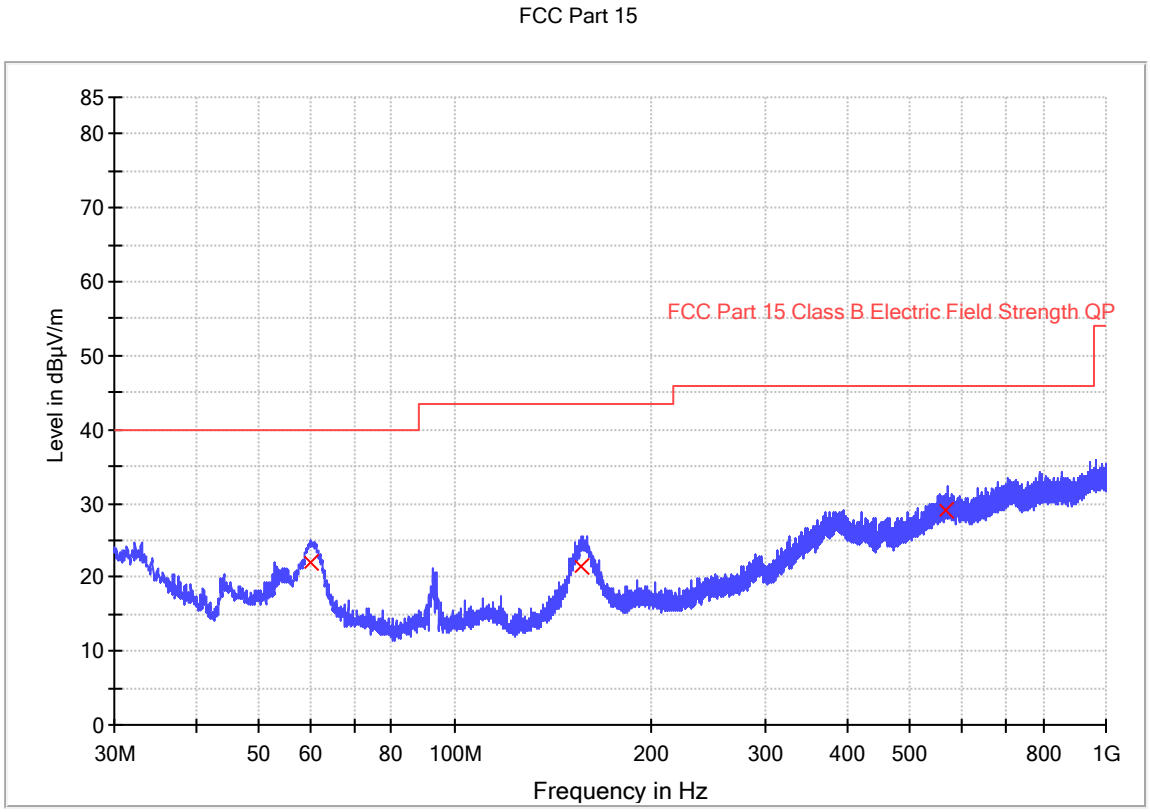



| Frequency (MHz) | QuasiPeak (dBuV/m) | Meas. Time (ms) | Bandwidth (kHz) | Polarization | Corr. (dB/m) | Margin - QPK (dB) | Limit - QPK (dBuV/m) |
|---|---|---|---|---|---|---|---|
| 371.407667 | 30.1 | 1000.0 | 120.000 | H | 23.9 | 15.9 | 46.0 |
| 456.573667 | 24.8 | 1000.0 | 120.000 | H | 25.4 | 21.2 | 46.0 |
| 703.147667 | 31.2 | 1000.0 | 120.000 | H | 30.9 | 14.8 | 46.0 |

Remark:
1. Corr. (dB/m)= Antenna Factor (dB/m) + Cable Loss (dB)
2. QuasiPeak (dBµV/m)= Corr. (dB/m)+ Read Level (dBµV)
3. Margin (dB) = Limit Line(dBµV/m) – Level (dBµV/m)

Applicant: TXS Industrial Design Inc. d.b.a Brandstand Products
Date of Test: 25 July 2023 Model: BPEVA2
Worst Case Operating Mode: Mode 2

ANT Polarity: Vertical




| Frequency (MHz) | QuasiPeak (dBuV/m) | Meas. Time (ms) | Bandwidth (kHz) | Polarization | Corr. (dB/m) | Margin - QPK (dB) | Limit - QPK (dBuV/m) |
|---|---|---|---|---|---|---|---|
| 59.880000 | 22.1 | 1000.0 | 120.000 | V | 13.4 | 17.9 | 40.0 |
| 156.000000 | 21.5 | 1000.0 | 120.000 | V | 16.8 | 22.0 | 43.5 |
| 568.920000 | 29.1 | 1000.0 | 120.000 | V | 29.0 | 16.9 | 46.0 |

Remark:
1. Corr. (dB/m) = Antenna Factor (dB/m) + Cable Loss (dB)
2. QuasiPeak (dBµV/m)= Corr. (dB/m)+ Read Level (dBµV)
3. Margin (dB) = Limit Line(dBµV/m) – Level (dBµV/m)

Applicant: TXS Industrial Design Inc. d.b.a Brandstand Products
Date of Test: 25 July 2023 Model: BPEVA2
Worst Case Operating Mode: Mode 2

## Fundamental & Spurious Emission Below 30MHz

| Polarization | Frequency (MHz) | Reading (dBµV) | Pre-Amp Gain (dB) | Antenna Factor (dB) | Net at 3m (dBµV/m) | Distance Factor (-dB) | Calulated at 300m (dBµV/m) | Limit at 300m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|
| Horizontal | 0.128507 | 82.3 | 0.0 | 17.1 | 99.4 | 80 | 19.4 | 25.426 | 6.026 |
| Horizontal | 0.384200 | 58.8 | 0.0 | 17.1 | 75.9 | 80 | -4.1 | 15.913 | 20.013 |

Notes:
1. The specified limits of frequency band 9~90 kHz, 110~490 kHz are in average and measurements are made with peak detectors. Quasi-Peak detector is used for other frequency band.

2. All measurements were made at 3 meter. Harmonic emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission above limit.

4. Loop antenna is used for the emission under 30MHz.

5. Horizontal and Vertical polarization were tested and Only the worst Case data is shown.

## 4.4 Conducted Emission Configuration Photograph

For electronic filing, the worst case radiated emission configuration photographs are saved with filename: conducted photos.pdf.

## 4.5 Conducted Emission

Worst Case Conducted Configuration
at
0.390000MHz

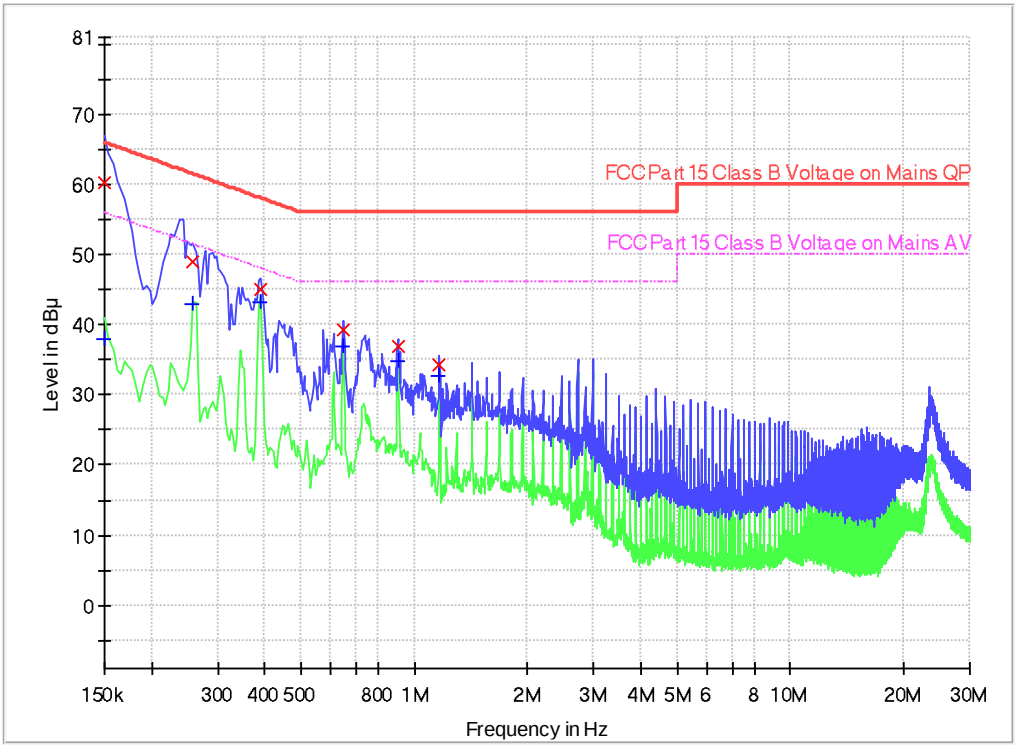
Judgement: Passed by 5.0dB margin

Note: Negative value in the margin column shows emission above limit.

Applicant: TXS Industrial Design Inc. d.b.a Brandstand Products
Date of Test: 25 July 2023 Model: BPEVA2
Worst Case Operating Mode Mode 2
Test Voltage: 120V/60Hz Phase: Live

# Graphic / Data Table

## Conducted Emissions
## Pursuant to FCC 15.207: Emissions Requirement




## Limit and Margin QP

| Frequency (MHz) | QuasiPeak (dBuV) | Bandwidth (kHz) | Line | Corr. (dB) | Margin (dB) | Limit (dBuV) |
|---|---|---|---|---|---|---|
| 0.150000 | 60.2 | 9.000 | L1 | 9.6 | 5.8 | 66.0 |
| 0.258000 | 49.0 | 9.000 | L1 | 9.6 | 12.5 | 61.5 |
| 0.390000 | 45.0 | 9.000 | L1 | 9.7 | 13.1 | 58.1 |
| 0.646000 | 39.3 | 9.000 | L1 | 9.7 | 16.7 | 56.0 |
| 0.906000 | 36.9 | 9.000 | L1 | 9.7 | 19.1 | 56.0 |
| 1.166000 | 34.3 | 9.000 | L1 | 9.7 | 21.7 | 56.0 |

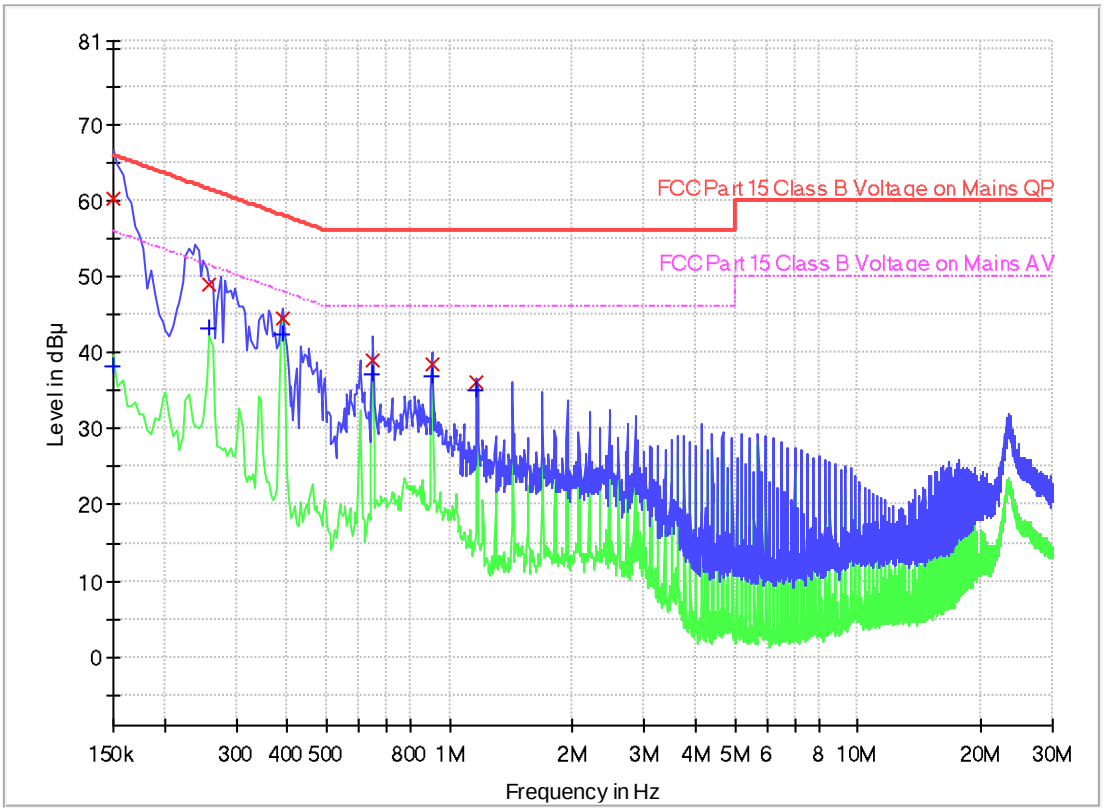
## Limit and Margin AV

| Frequency (MHz) | Average (dBuV) | Bandwidth (kHz) | Line | Corr. (dB) | Margin (dB) | Limit (dBuV) |
|---|---|---|---|---|---|---|
| 0.150000 | 37.9 | 9.000 | L1 | 9.6 | 18.1 | 56.0 |
| 0.258000 | 42.9 | 9.000 | L1 | 9.6 | 8.6 | 51.5 |
| 0.390000 | 43.1 | 9.000 | L1 | 9.7 | 5.0 | 48.1 |
| 0.646000 | 37.0 | 9.000 | L1 | 9.7 | 9.0 | 46.0 |
| 0.906000 | 34.9 | 9.000 | L1 | 9.7 | 11.1 | 46.0 |
| 1.166000 | 32.7 | 9.000 | L1 | 9.7 | 13.3 | 46.0 |

Applicant: TXS Industrial Design Inc. d.b.a Brandstand Products
Date of Test: 25 July 2023 Model: BPEVA2
Worst Case Operating Mode Mode 2
Test Voltage: 120V/60Hz Phase: Neutral

# Graphic / Data Table

## Conducted Emissions
## Pursuant to FCC 15.207: Emissions Requirement




## Limit and Margin QP

| Frequency (MHz) | QuasiPeak (dBuV) | Bandwidth (kHz) | Line | Corr. (dB) | Margin (dB) | Limit (dBuV) |
|---|---|---|---|---|---|---|
| 0.150000 | 60.2 | 9.000 | N | 9.6 | 5.8 | 66.0 |
| 0.258000 | 48.9 | 9.000 | N | 9.6 | 12.6 | 61.5 |
| 0.390000 | 44.5 | 9.000 | N | 9.6 | 13.6 | 58.1 |
| 0.650000 | 39.0 | 9.000 | N | 9.6 | 17.0 | 56.0 |
| 0.906000 | 38.4 | 9.000 | N | 9.7 | 17.6 | 56.0 |
| 1.166000 | 36.1 | 9.000 | N | 9.7 | 19.9 | 56.0 |

## Limit and Margin AV

| Frequency (MHz) | Average (dBuV) | Bandwidth (kHz) | Line | Corr. (dB) | Margin (dB) | Limit (dBuV) |
|---|---|---|---|---|---|---|
| 0.150000 | 38.2 | 9.000 | N | 9.6 | 17.8 | 56.0 |
| 0.258000 | 43.2 | 9.000 | N | 9.6 | 8.3 | 51.5 |
| 0.390000 | 42.5 | 9.000 | N | 9.6 | 5.6 | 48.1 |
| 0.650000 | 37.2 | 9.000 | N | 9.6 | 8.8 | 46.0 |
| 0.906000 | 36.9 | 9.000 | N | 9.7 | 9.1 | 46.0 |
| 1.166000 | 35.2 | 9.000 | N | 9.7 | 10.8 | 46.0 |

## 5.0 Equipment Photographs

For electronic filing, the photographs are saved with filename: external photos.pdf & internal photos.pdf.

## 6.0 Product Labeling

For electronic filing, the FCC ID label artwork and location is saved with filename: label.pdf.

## 7.0 Technical Specifications

For electronic filing, the block diagram and circuit diagram are saved with filename: block.pdf and circuit.pdf respectively.

## 8.0 Instruction Manual

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: manual.pdf.

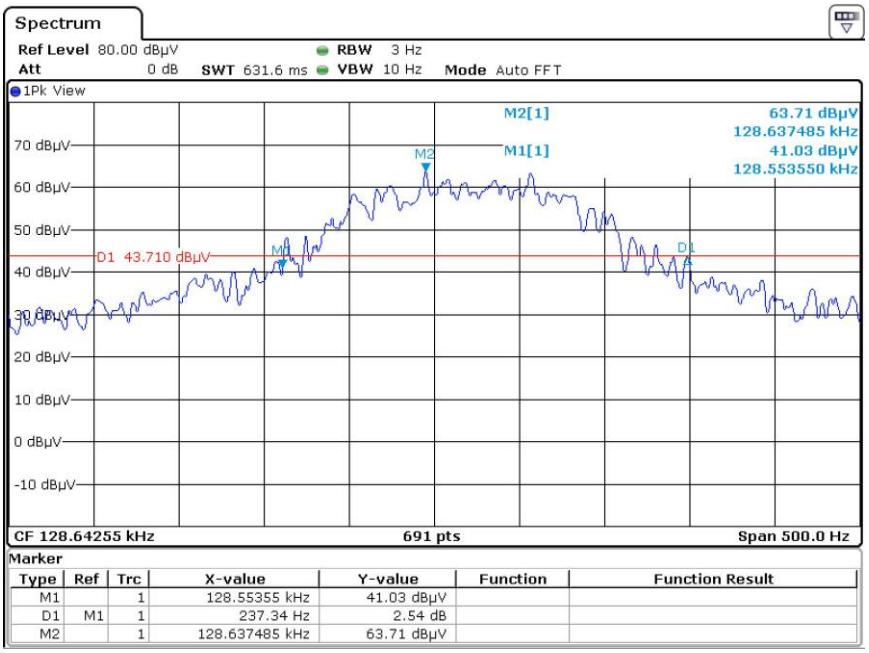
This manual will be provided to the end-user with each unit sold/leased in the United States.

## 9.0 Miscellaneous Information

This miscellaneous information includes 20dB bandwidth and emission measuring procedure.

### 9.1 20dB bandwidth

Pursuant to FCC part 15 Section 15.215(c), the 20dB bandwidth of the emission was contained within the frequency band designated (mentioned as above) which the EUT operated. The effects, if any, from frequency sweeping, frequency hopping, other modulation techniques and frequency stability over excepted variations in temperature and supply voltage were considered. The test plots are reported as below.



## 9.2 Emissions Test Procedures

The following is a description of the test procedure used by Intertek Testing Services in the measurements of transmitters operating under Part 15, Subpart C rules.

The test set-up and procedures described below are designed to meet the requirements of ANSI C63.10 - 2013.

The transmitting equipment under test (EUT) is placed on a styrene turntable which is four feet in diameter and approximately 0.8 meter in height above the ground plane. During the radiated emissions test, the turntable is rotated and any cables leaving the EUT are manipulated to find the configuration resulting in maximum emissions. The EUT is adjusted through all three orthogonal axes to obtain maximum emission levels. The antenna height and polarization are varied during the testing to search for maximum signal levels.

Average detector is used for 9–90 KHz, 110–490 KHz and Quasi-Peak detector is used for other frequency band. The IF bandwidth used for measurement of radiated signal strength was 10 KHz for emission below 30 MHz and 120 KHz for emission from 30 MHz to 1000 MHz.

The frequency range scanned is from the lowest radio frequency signal generated in the device which is greater than 9 kHz up to the 1GHz. For line-conducted emissions, the range scanned is 150kHz to 30MHz.

9.2 Emissions Test Procedures (cont'd)

The EUT is warmed up for 15 minutes prior to the test.

AC power to the unit is varied from 85% to 115% nominal and variation in the fundamental emission field strength is recorded. If battery powered, a new, fully charged battery is used.

Conducted measurements are made as described in ANSI C63.10 - 2013.

The IF bandwidth used for measurement of radiated signal strength was 10 kHz for emission below 30 MHz and 120 kHz for emission from 30 MHz to 1000 MHz. Where pulsed transmissions of short enough pulse duration warrant, a greater bandwidth is selected according to the recommendations of Hewlett Packard Application Note 150-2. A discussion of whether pulse desensitivity is applicable to this unit is included in this report.

Transmitter measurements are normally conducted at a measurement distance of three meters. However, to assure low enough noise floor in the restricted bands, signals are acquired at a distance of one meter or less. All measurements are extrapolated to three meters using inverse scaling, but those measurements taken at a closer distance are so marked.

## 10.0 Test Equipment List

| Equipment No. | Equipment | Manufacturer | Model No. | Serial No. | Cal. Date | Due Date |
|---|---|---|---|---|---|---|
| SZ061-12 | BiConiLog Antenna | ETS | 3142E | 00166158 | 2021-08-04 | 2024-08-04 |
| SZ061-06 | Active Loop Antenna | Electro-Metrics | EM-6876 | 217 | 2021-05-18 | 2024-05-18 |
| SZ056-03 | Spectrum Analyzer | R&S | FSP 30 | 101148 | 2023-04-27 | 2024-04-27 |
| SZ056-06 | Signal Analyzer | R&S | FSV 40 | 101101 | 2022-12-19 | 2023-12-19 |
| SZ188-01 | Anechoic Chamber | ETS | RFD-F/A-100 | 4102 | 2021-12-12 | 2024-12-12 |
| SZ062-02 | RF Cable | RADIALL | RG 213U | -- | 2023-05-15 | 2023-11-15 |
| SZ062-05 | RF Cable | RADIALL | 0.04-26.5GHz | -- | 2023-05-15 | 2023-11-15 |
| SZ062-12 | RF Cable | RADIALL | 0.04-26.5GHz | -- | 2023-05-15 | 2023-11-15 |
| SZ185-02 | EMI Test Receiver | R&S | ESCI | 100692 | 2022-07-08<br>2023-07-11 | 2023-07-08<br>2024-07-11 |
| SZ187-02 | Two-Line V-Network | R&S | ENV216 | 100073 | 2023-04-27 | 2024-04-27 |
| SZ188-03 | Shielding Room | ETS | RFD-100 | 4100 | 2022-12-20 | 2025-12-20 |
| SZ062-16 | RF Cable | HUBER+SUHNER | CBL2-BN-1m | 110127-2231000 | 2022-07-18<br>2023-07-11 | 2023-07-18<br>2024-07-11 |

**********End of Report**********