849 NW STATE ROAD 45
NEWBERRY, FL 32669 USA

PHONE: 888.472.2424 OR 352.472.5500
EMAIL: INFO@TIMCOENGR.COM
WEB: HTTP://WWW.TIMCOENGR.COM

TIMCO ENGINEERING, Inc.

**An IIA Company**

# RF Exposure Evaluation Report

| | |
|---|---|
| **APPLICANT** | BEI ELECTRONICS, LLC |
| **ADDRESS** | 4100 N 24TH STREET P.O. BOX 3606<br>QUINCY, IL 62305 |
| **FCC ID** | DDEETG500 |
| **IC** | 131A-ETG500 |
| **MODEL NUMBER** | ETG500 |
| **PRODUCT DESCRIPTION** | FM BROADCAST TRANSMITTER |
| **DATE SAMPLE RECEIVED** | 12/31/2018 |
| **FINAL TEST DATE** | 02/20/2019 |
| **PREPARED BY** | Tim Royer |
| **TEST RESULTS** | ☒ PASS ☐ FAIL |

| Report Number | Report Version | Description | Issue Date |
|---|---|---|---|
| 212UT20 MPE_TestReport_ | Rev1 | Initial Issue | 3/5/2020 |
| 212UT20 MPE_TestReport_ | Rev2 | Updated frequency range | 03/11/2020 |

# TABLE OF CONTENTS

## GENERAL REMARKS

### Summary

The device under test does:

☒ Fulfill the general approval requirements as identified in this test report and was selected by the customer.

☐ Not fulfill the general approval requirements as identified in this test report

### Attestations

This equipment has been tested in accordance with the standards identified in this test report. To the best of my knowledge and belief, these tests were performed using the measurement procedures described in this report.

All instrumentation and accessories used to test products for compliance to the indicated standards are calibrated regularly in accordance with ISO 17025 requirements.

I attest that the necessary measurements were made at:

**Timco Engineering Inc.**
**849 NW State Road 45**
**Newberry, FL 32669**
**Designation #: US1070**

**Prepared by:**


| | |
|---|---|
| **Name and Title** | Tim Royer, Project Manager / EMC Testing Engineer |
| **Date** | 03.05/2020 |

## GENERAL INFORMATION

| | | | |
|---|---|---|---|
| **EUT Description** | FM BROADCAST TRANSMITTER | | |
| **Model Number** | ETG500 | | |
| **EUT Power Source** | ☒110–120Vac, 50–60Hz | ☐ DC Power | ☐ Battery Operated |
| **Test Item** | ☐ Engineering Prototype | ☒ Pre-Production | ☐ Production |
| **Type of Equipment** | ☒ Fixed | ☐ Mobile | ☐ Portable |
| **Antenna Connector** | External N Type | | |
| **Test Conditions** | The temperature was 26ºC<br>Relative humidity of 50%. | | |
| **Modification to the EUT** | No Modification to EUT. | | |
| **Applicable Standards** | FCC CFR 47 Part 2.1091, RSS-GEN, RSS-102 Issue 5 | | |
| **Test Facility** | Timco Engineering Inc. at 849 NW State Road 45 Newberry, FL 32669 USA. Designation #: US1070, IC: IC2056A | | |

## ANTENNA INFORMATION

| Manufacturer Provides Antenna | Type | Max Gain (dBi) |
|---|---|---|
| No | Unspecified | **0 dBi** |

## POWER OUTPUT OF EUT

| Frequency (MHz) | Rated Output Power (W) |
|---|---|
| 88 | 346 |

## MPE CALCULATION

The minimum separation distance is calculated as follows:

$$E(V/m) = \frac{\sqrt{30 \times P \times G}}{d} \qquad \text{Power density: } P_d(mW/cm^2) = \frac{E^2}{3770}$$

## MPE Limits, Uncontrolled Environment

**Table 4: RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)**

| Frequency Range (MHz) | Electric Field (V/m rms) | Magnetic Field (A/m rms) | Power Density ($W/m^2$) | Reference Period (minutes) |
|---|---|---|---|---|
| 0.003-10[21] | 83 | 90 | - | Instantaneous* |
| 0.1-10 | - | $0.73/f$ | - | 6** |
| 1.1-10 | $87/f^{0.5}$ | - | - | 6** |
| 10-20 | 27.46 | 0.0728 | -2 | 6 |
| 20-48 | $58.07/f^{0.25}$ | $0.1540/f^{0.25}$ | $8.944/f^{0.5}$ | 6 |
| 48-300 | 22.06 | 0.05852 | 1.291 | 6 |
| 300-6000 | $3.142\ f^{0.3417}$ | $0.008335\ f^{0.3417}$ | $0.02619\ f^{0.6834}$ | 6 |
| 6000-15000 | 61.4 | 0.163 | 10 | 6 |
| 15000-150000 | 61.4 | 0.163 | 10 | $616000/f^{1.2}$ |
| 150000-300000 | $0.158\ f^{0.5}$ | $4.21 \times 10^{-4}\ f^{0.5}$ | $6.67 \times 10^{-5}\ f$ | $616000/f^{1.2}$ |

**Note:** $f$ is frequency in MHz.
* Based on nerve stimulation (NS).
** Based on specific absorption rate (SAR).

## MPE Limits, Controlled Environment

| Table 6: RF Field Strength Limits for Controlled Use Devices (Controlled Environment) | | | | |
|---|---|---|---|---|
| **Frequency Range (MHz)** | **Electric Field (V/m rms)** | **Magnetic Field (A/m rms)** | **Power Density ($W/m^2$)** | **Reference Period (minutes)** |
| 0.003-10[23] | 170 | 180 | - | Instantaneous* |
| 0.1-10 | - | $1.6/f$ | - | 6** |
| 1.29-10 | $193/f^{0.5}$ | - | - | 6** |
| 10-20 | 61.4 | 0.163 | -10 | 6 |
| 20-48 | $129.8/f^{0.25}$ | $0.3444/f^{0.25}$ | $44.72/f^{0.5}$ | 6 |
| 48-100 | 49.33 | 0.1309 | 6.455 | 6 |
| 100-6000 | $15.60\ f^{0.25}$ | $0.04138\ f^{0.25}$ | $0.6455f^{0.5}$ | 6 |
| 6000-15000 | 137 | 0.364 | 50 | 6 |
| 15000-150000 | 137 | 0.364 | 50 | $616000/f^{1.2}$ |
| 150000-300000 | $0.354\ f^{0.5}$ | $9.40 \times 10^{-4}\ f^{0.5}$ | $3.33 \times 10^{-4}\ f$ | $616000/f^{1.2}$ |

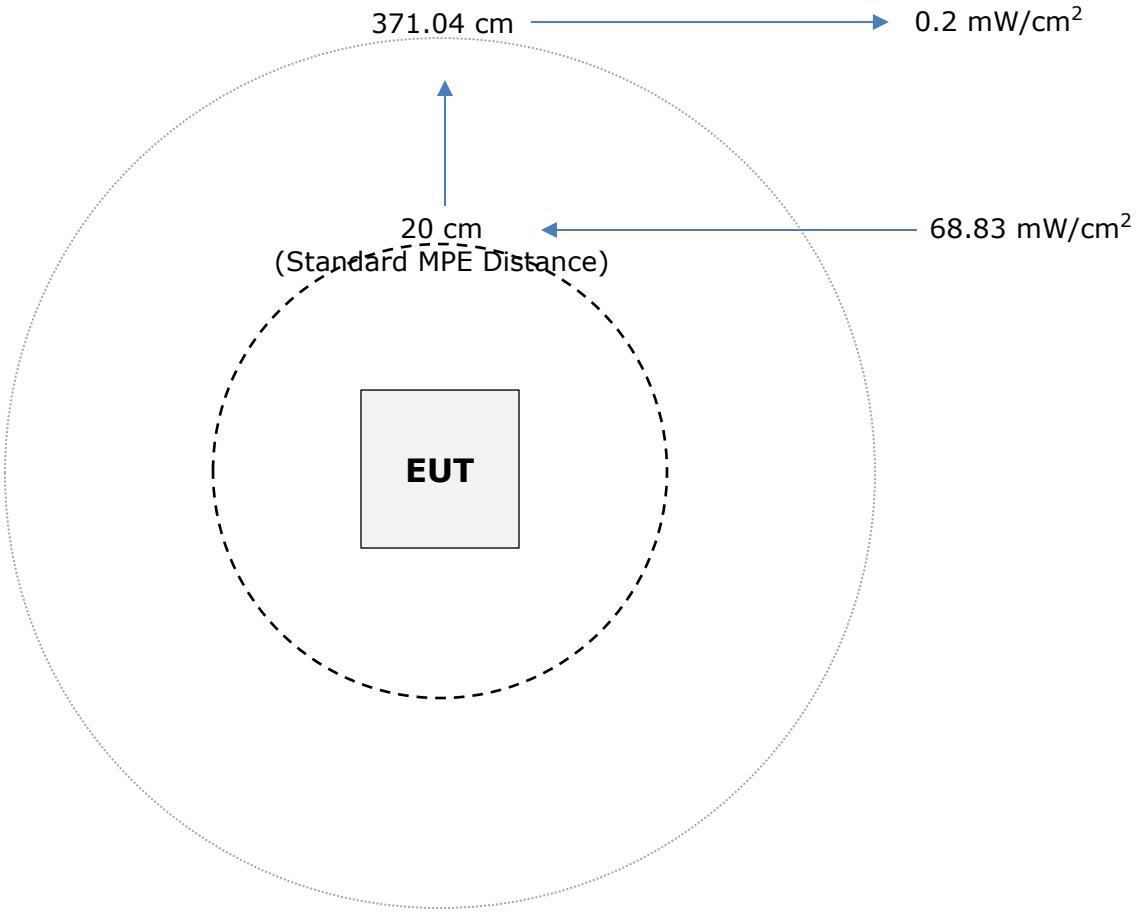
**Note:** $f$ is frequency in MHz.
* Based on nerve stimulation (NS).
** Based on specific absorption rate (SAR).

## MPE Table

### General Uncontrolled Exposure

The limit for General Uncontrolled Exposure Environment is calculated as shown in FCC Pt. 1.1310, Table B:

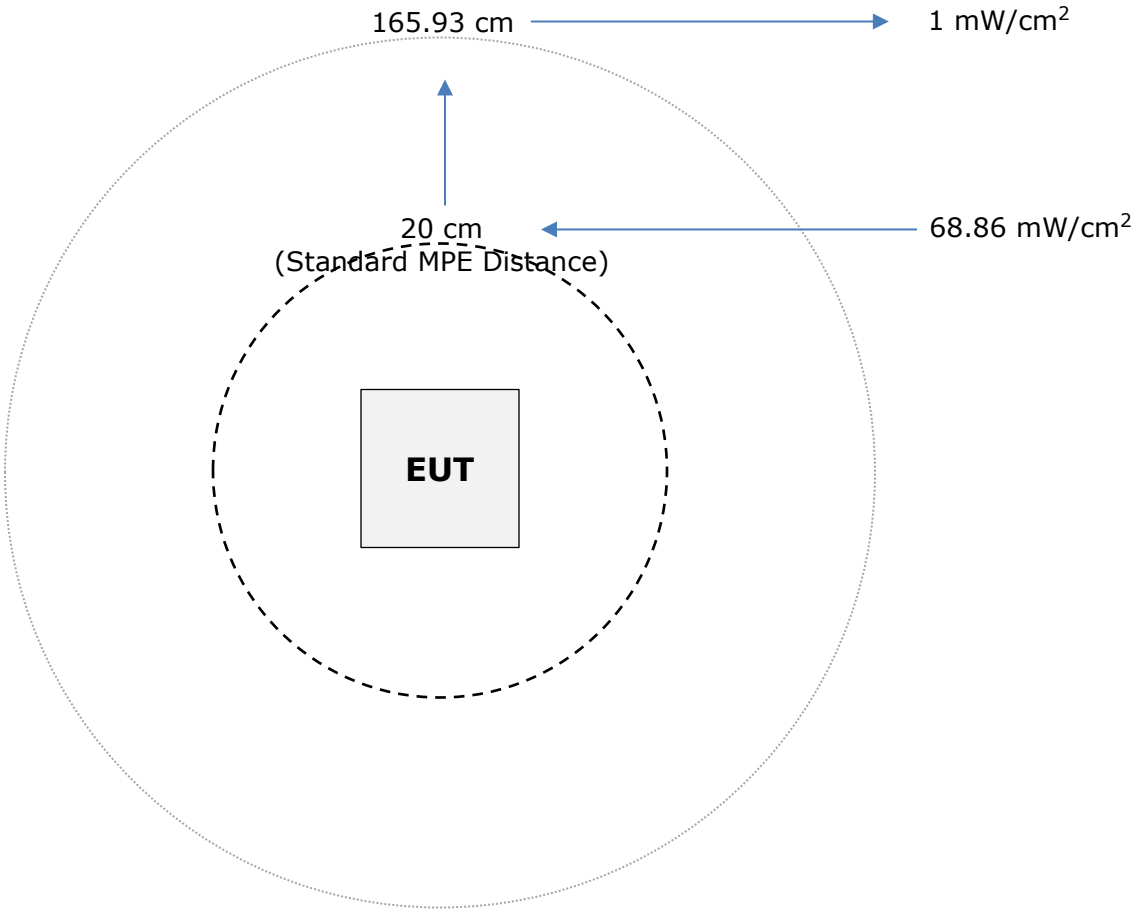
| Variable | Value |
|---|---|
| Max Power | 346 W |
| Frequency Range | 88.0 – 108 MHz |
| Duty Cycle (at full power) | 100% |
| Max Antenna Gain | 0 dB |
| Coax Loss | 0 dB |
| Power Density | 0.2 mW/cm$^2$ |
| Minimum Separation Distance | 371.04 cm |



**General Controlled Exposure**

The limit for General Controlled Exposure Environment is calculated as shown in FCC Pt. 1.1310, Table A:

| Variable | Value |
|---|---|
| Max Power | 346 W |
| Frequency Range | 88.0 – 108 MHz |
| Duty Cycle (at full power) | 100% |
| Max Antenna Gain | 0 dB |
| Coax Loss | 0 dB |
| Power Density | 1 $mW/cm^2$ |
| Minimum Separation Distance | 165.93 cm |



## MPE Table

### General Uncontrolled Exposure

The limit for General Uncontrolled Exposure Environment is calculated as shown in RSS-102 Issue 5, Table 4:

| Variable | Value |
|---|---|
| Max Power | 346 W |
| Frequency Range | 88.0 – 108 MHz |
| Duty Cycle (at full power) | 100% |
| Max Antenna Gain | 0 dB |
| Coax Loss | 0 dB |
| Power Density | 1.291 $W/m^2$ |
| Minimum Separation Distance | 46.45 cm |

### General Controlled Exposure

The limit for General Controlled Exposure Environment is calculated as shown in RSS-102 Issue 5, Table 6:

| Variable | Value |
|---|---|
| Max Power | 346 W |
| Frequency Range | 88.0 – 108 MHz |
| Duty Cycle (at full power) | 100% |
| Max Antenna Gain | 0 dB |
| Coax Loss | 0 dB |
| Power Density | 6.455 $W/m^2$ |
| Minimum Separation Distance | 20.77 cm |

## IC MPE Exposure Diagram