



Timco Engineering, Inc., an IIA Company  
849 NW State Road 45, Newberry, Florida 32669  
(352) 472-5500 / testing@timcoengr.com

**Test Report #** TR\_3285-20\_FCC\_PART73\_2

Revision: 2

**Issue Date:** September 15, 2020

**Final Test Date:** August 25, 2020



## Test Report- FCC PART 73 / TBC

### Prepared For: BEI Electronics, LLC

**Approved for Release By:**

**Signature:** Bruno Clavier

**Name & Title:** Bruno Clavier, General Manager

**Date of Signature**

(YYYY-MM-DD): 2020-09-14

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## **1 Customer Information**

**Applicant:** BEI Electronics, LLC  
**Address:** 4100 N 24TH STREET, QUINCY IL 32305 US  
**Contact:** Andy Berry  
**Telephone:** 217-224-9600  
**Email address:** [aberry@bdcast.com](mailto:aberry@bdcast.com)

### **1.1 Test Result Summary**

The following test procedure and guidance were used for measuring Licensed FM Broadcast Stations (TBC); FCC KDB 442401 and ANSI C63.26-2015. Full test results are available in this report.

No additions to the test methods were needed. There were no deviations, or exclusions from the test methods. No test results are from external providers or from the customer. The test results relate only to the items tested. Timco does not offer opinions and interpretations, only a pass/fail statement.

**The Following is for Test item FCC ID: DDEETG3500**

| FCC Clauses                            | Description of the requirements                                                                                                                                | Result<br>(Pass, Fail or N/A) |
|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| <b>Applicable Clauses from Part 2</b>  |                                                                                                                                                                |                               |
| 2.1033 (c)(8)                          | The dc voltages applied to and dc currents into the several elements of the final radio frequency amplifying device for normal operation over the power range. | For Info Only                 |
| 2.202(g)(III)(3)                       | Necessary bandwidth (Sound Broadcasting)                                                                                                                       | Pass                          |
| 2.1046 (a)                             | RF Power Output                                                                                                                                                | Pass                          |
| 2.1047 (a)                             | Modulation characteristics                                                                                                                                     | Pass                          |
| 2.1047 (b)                             | Modulation Limiting                                                                                                                                            | Pass                          |
| 2.1049 (e)(4)                          | FM broadcast transmitters for multiplex operation (SCA)                                                                                                        | Pass                          |
| 2.1049 (e)(5)                          | FM broadcast transmitter for stereophonic operation                                                                                                            | Pass                          |
| 2.202                                  | Bandwidths                                                                                                                                                     | Pass                          |
| 2.1051                                 | Spurious emissions at antenna terminals.                                                                                                                       | Pass                          |
| 2.1053                                 | Field strength of spurious radiation.                                                                                                                          | Pass                          |
| 2.1055                                 | Frequency stability.                                                                                                                                           | Pass                          |
| <b>Applicable Clauses from Part 73</b> |                                                                                                                                                                |                               |
| 73.267                                 | Determining operating power.                                                                                                                                   | Pass                          |
| 73.317                                 | FM transmission system requirements                                                                                                                            | Pass                          |
| 73.840                                 | Operating power and mode tolerances.                                                                                                                           | Pass                          |



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## 2 Location of Testing

### Test Laboratory

Timco Engineering Inc. is a subsidiary of Industrial Inspection & Analysis, Inc. ("IIA").  
Testing was performed at Timco's permanent laboratory located at 849 NW State Road 45,  
Newberry, Florida 32669

FCC test firm # 578780

FCC Designation # US1070

FCC site registration is under A2LA certificate # 0955.01

ISED Canada test site registration # 2056A

EU Notified Body # 1177

For all designations see A2LA scope # 0955.01

### 2.1 Testing was performed, reviewed by:

**Dates of Testing:** August 25, 2020

**Signature:** \_\_\_\_\_

Sr. EMC Engineer  
EMC-003838-NE



**Name & Title:** Tim Royer, EMC Engineer

**Date of Signature**

(YYYY-MM-DD): 2020-09-11

**Signature:** \_\_\_\_\_

**Name & Title:** \_\_\_\_\_

**Date of Signature**

(YYYY-MM-DD):



### 3 Test Sample(s) (EUT/DUT)

The test sample was received: August 25, 2020

#### 3.1 Description of the EUT

A description as well as unambiguous identification of the EUT(s) tested. Where more than one sample is required for technical reasons (such as the use of connected units for the purpose of conducted output power testing where the product units will have integral antennas), each specific test shall identify which unit was tested.

##### Identification

|                   |                                     |
|-------------------|-------------------------------------|
| FCC ID:           | DDEETG3500                          |
| Brief Description | FM Broadcast Station – FCC Part 73G |
| Type of Modular   | N/A                                 |
| Model(s) #        | ETG3500                             |
| Trade name        | FM BROADCAST TRANSMITTER            |
| Firmware version  | 1.16                                |
| Software version  | 3.05                                |
| Serial Number     | 200100821                           |

##### Technical Characteristics

|                              |                                   |
|------------------------------|-----------------------------------|
| Technology                   | Licensed FM Broadcast Transmitter |
| Frequency Range              | 88-108 MHz                        |
| RF O/P Power (Max.)          | 3500                              |
| Modulation                   | FM                                |
| Bandwidth & Emission Class   | 406KF3E                           |
| Duty Cycle                   | 100%                              |
| Antenna Type                 | N/A                               |
| Antenna Gain (for each ant.) | N/A                               |
| Antenna Connector            | N/A                               |
| Voltage Rating (AC or Batt.) | AC 110-120 Vac (50-60 Hz)         |

##### Antenna Characteristics

| Frequency Range | Mode / BW   | Ant Gain 1 | Ant Gain 2 |
|-----------------|-------------|------------|------------|
| 88-108 MHz      | Operational | N/A        |            |
|                 |             |            |            |
|                 |             |            |            |
|                 |             |            |            |



### 3.2 Configuration of EUT

#### Test Modes

| Band      | Modulation | Number of Ant. |
|-----------|------------|----------------|
| 88-108MHz | FM         | 1              |

| Test Frequencies | Number of Ant. |
|------------------|----------------|
| 88,98,108 MHz    | 1              |

#### Operating conditions during Testing:

No modifications of the device under test (including firmware, specific software settings, and input/output signal levels to the EUT).

#### Peripherals used during Testing:

No peripherals used.

### 3.3 Test Setup of EUT

Equipment, antenna, and cable arrangement. The setup of the equipment and cable or wire placement on the test site that produces the highest radiated and the highest ac power-line conducted emissions shall be shown clearly and described. Information on the orientation of portable equipment during testing shall be included. Drawings or photographs may be used for this purpose.

Test Setups are included in the test report.

## 4 Test methods & Applicable Regulatory Limits

### Test methods/Standards/Guidance:

Test procedures and guidance for measuring Licensed FM Broadcast Stations (TBC); FCC KDB 442401 and ANSI C63.26-2015.

- 1) ANSI C63.26-2015;
- 2) FCC KDB 442401

### Limits and Regulatory Limits:

- 1) FCC CFR 47 Part 73

## 5 Measurement Uncertainty

| Parameter                                                                                                                                                      | Uncertainty (dB) |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| Conducted Emissions                                                                                                                                            | 1.42             |
| Radiated Emissions (30 – 200 MHz)                                                                                                                              | 5.49             |
| Radiated Emissions (200 – 1000 MHz)                                                                                                                            | 5.79             |
| Radiated Emissions (1 GHz – 18 GHz)                                                                                                                            | 4.37             |
| The uncertainties provided in this table represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of K=2. |                  |

## 6 Environmental Conditions

### Temperature & Humidity

Measurements performed at the test site did not exceed the following:

|                     |             |
|---------------------|-------------|
| TEMPERATURE         | 23 C +/- 5% |
| HUMIDITY            | 55% +/- 5%  |
| BARAMETRIC PRESSURE | 30.05 inHg  |

**Note:** Specific environmental conditions that are applicable to a specific test are available in the test result section.

## 7 List of Test Equipment and Test Facility

The test equipment used identified by type, manufacturer, serial number, or other identification and the date on which the next calibration or service check is due.

Description of the firmware or software used to operate EUT for testing purposes.

A complete list of all test equipment used shall be included with the test report. The manufacturer's model and serial numbers, and date of last calibration, and calibration interval shall be included. Measurement cable loss, measuring instrument bandwidth and detector function, video bandwidth, if appropriate, and antenna factors shall also be included where applicable.

### List of Test Equipment

| Device                                        | Manufacturer    | Model                         | Serial Number                                | Cal/Char Date | Due Date   |
|-----------------------------------------------|-----------------|-------------------------------|----------------------------------------------|---------------|------------|
| Antenna: Active Loop                          | ETS-Lindgren    | 6502                          | 62529                                        | 12/11/2017    | 12/11/2020 |
| Antenna: Biconical 1057                       | Eaton           | 94455-1                       | 1057                                         | 12/13/2017    | 12/13/2020 |
| Antenna: Log-Periodic 1122                    | Electro-Metrics | LPA-25                        | 1122                                         | 8/26/2017     | 8/26/2020  |
| CHAMBER                                       | Panashield      | 3M                            | N/A                                          | 3/15/2019     | 3/15/2021  |
| EMI Test Receiver R & S ESU 40 Chamber        | Rohde & Schwarz | ESU 40                        | 100320                                       | 08/28/18      | 08/28/2021 |
| Software: Field Strength Program              | Timco           | N/A                           | Version 4.10.7.0                             | N/A           | N/A        |
| Antenna: Double-Ridged Horn/ETS Horn 2        | ETS-Lindgren    | 3117                          | 41534                                        | 9/1/2017      | 9/1/2020   |
| Bore-sight Antenna Positioning Tower          | Sunol Sciences  | TLT2                          | N/A                                          | N/A           | N/A        |
| Coaxial Cable #103 - KMKM-0180-01 Aqua        | Micro-Coax      | UFB142A-0-0720-200200         | 225363-002 (#103)                            | 4/12/2019     | 4/12/2021  |
| Coaxial Cable - Chamber 3 cable set (Primary) | Micro-Coax      | Chamber 3 cable set (Primary) | KMKM-0244-01<br>KMKM-0670-00<br>KFKF-0198-01 | 4/12/2019     | 4/12/2021  |
| Band Reject Filter 2.4 GHz                    | Micro-Tronics   | BRM50702-02                   | 0                                            | 4/12/2019     | 4/12/2021  |
| Pre-amp                                       | RF-LAMBDA       | RLNA00M45GA                   | N/A                                          | 2/27/2019     | 2/27/2021  |
| Antenna: Double-Ridged Horn 18-40 GHz         | EMCO            | 3116                          | 9011-2145                                    | 12/8/2017     | 12/8/2020  |
| Attenuator SMA 30dB 5W DC-18G                 | Pasternack      | PE7013-30                     | #23                                          | 11/19/2017    | 11/19/2020 |

## 8 Test Results

The results of the test are usually indicated in the form of tables, spectrum analyzer plots, charts, sample calculations, as appropriate for each test procedure.

A description and/or a block diagram of the test setup is usually provided.

The measurement results, along with the appropriate limits for comparison, may be presented in tabular or graphical form. In addition, any variation in the measurement environment may be reported if applicable (e.g., a significant change of temperature that could affect the cable loss and amplifier response).

### Units of measurement

Unless noted otherwise in the referenced standard, the measurements of **ac power-line conducted emissions and conducted power output** will be reported in units of dBμV. Unless noted otherwise in the referenced standard, the measurements of **radiated emissions** will be reported in units of decibels, referenced to one microvolt per meter (dBμV/m) for electric fields, or to one ampere per meter (dBA/m) for magnetic fields, at the distance specified in the appropriate standards or requirements. The measurements of antenna-conducted power for receivers may be reported in units of dBμV if the impedance of the measuring instrument is also reported. Otherwise, antenna-conducted power will be reported in units of decibels referenced to one milliwatt (dBm). All formulas for data conversions and conversion factors, if used, will be included in this measurement report.

### 8.1. Necessary bandwidth (Sound Broadcasting)

Requirement from Test procedures and guidance for measuring Licensed FM Broadcast Stations (TBC); FCC KDB 442401 and ANSI C63.26-2015.

Type of Emission: 406KF3E

$$B_n = 2M + 2DK$$

$$M = 3000$$

$$D = 200 \text{ KHz (Peak Deviation)}$$

$$K = 1$$

$$B_n = 2(3K) + 2(200K)(1) = 406K$$

Where:

$$M = 10 \text{ (Modulation Frequency, kHz)}$$

$$D = 75 \text{ (Peak Deviation, kHz)}$$

$$K = 1 \text{ (constant value)}$$



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## 8.2 RF Power Output

Requirement from FCC KDB 442401 and ANSI C63.26-2015.

**Method of Measurement:** RF power was measured by Indirect Method as described in the standard listed above.

**Test Method:**

$$\text{Transmitter output power} = E_p \times I_p \times F$$

Where:

$E_p$  = DC input voltage of final radio stage.

$I_p$  = Total DC input current of final radio stage.

$F$  = Efficiency factor.

### Test Data: RF Output Power

**OUTPUT POWER:** 3500 Watts

**Part 2.1033 (C) (8) DC Input into the final amplifier**

**POWER SETTING INPUT POWER:** (230.0V) (21.3) = **4899 Watts**

## 8.3 Modulation characteristics

Limits from FCC Part 2.1047 (a) and test procedure from ANSI C63.26-2015

### Setup

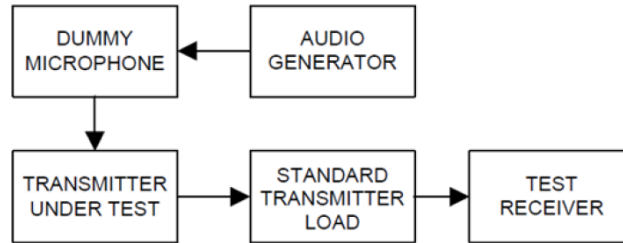
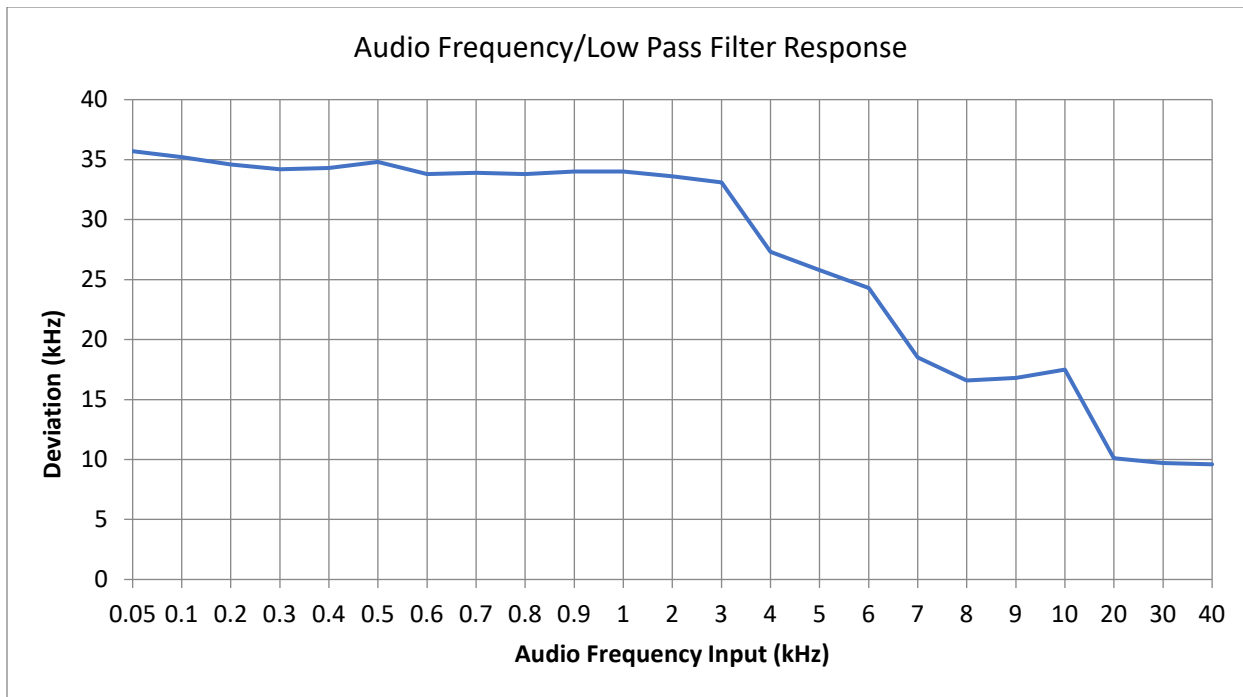


Figure 3—Equipment set-up audio frequency response (constant input)

### Results



## 8.4 Modulation Limiting

Limits from FCC Part 2.1047 (b) and test procedure from ANSI C63.26-2015

### Setup

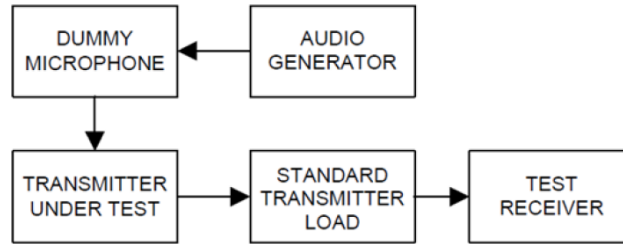
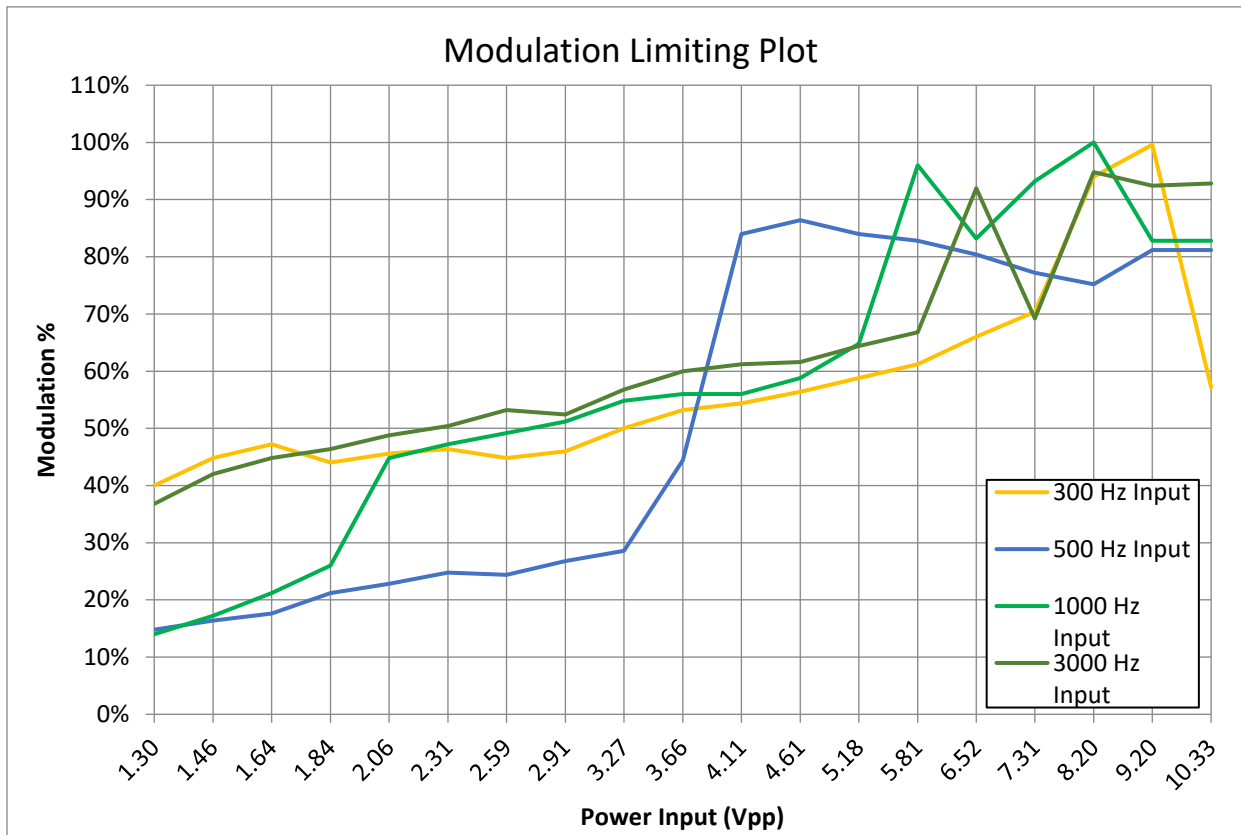


Figure 3—Equipment set-up audio frequency response (constant input)

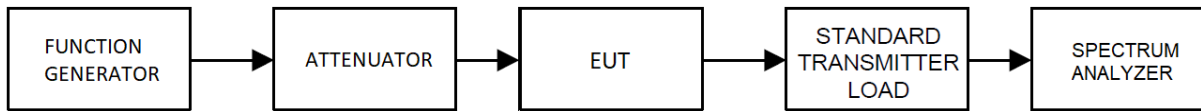
### Test Data / Spectrum Plots



## 8.5 OCCUPIED BANDWIDTH & EMISSION MASK

Limits from FCC Part 2.1049 (e)(3) – (5), Part 73.317(b), (c) and test procedure from ANSI C63.26-2015

### Setup

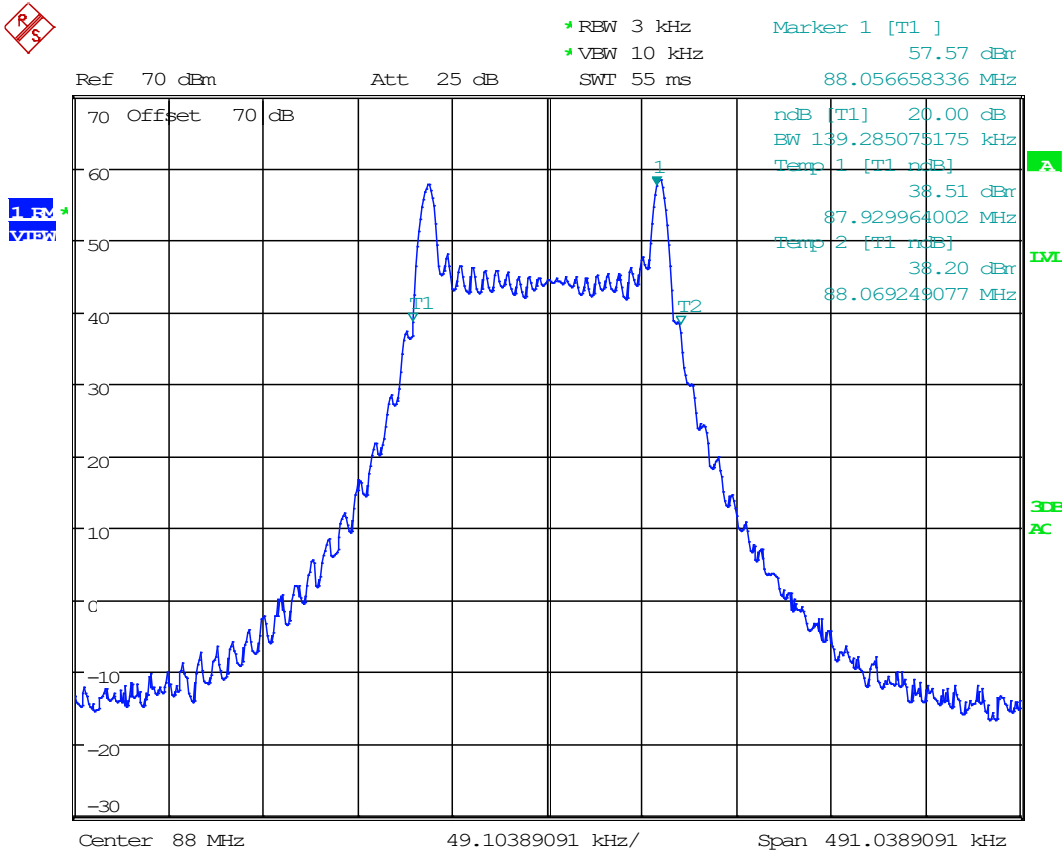


### Test Data / Spectrum Plots

| Frequency (MHz) | 20dB OBW (kHz) |
|-----------------|----------------|
| 88              | 139.28         |
| 98              | 144.79         |
| 108             | 140.85         |

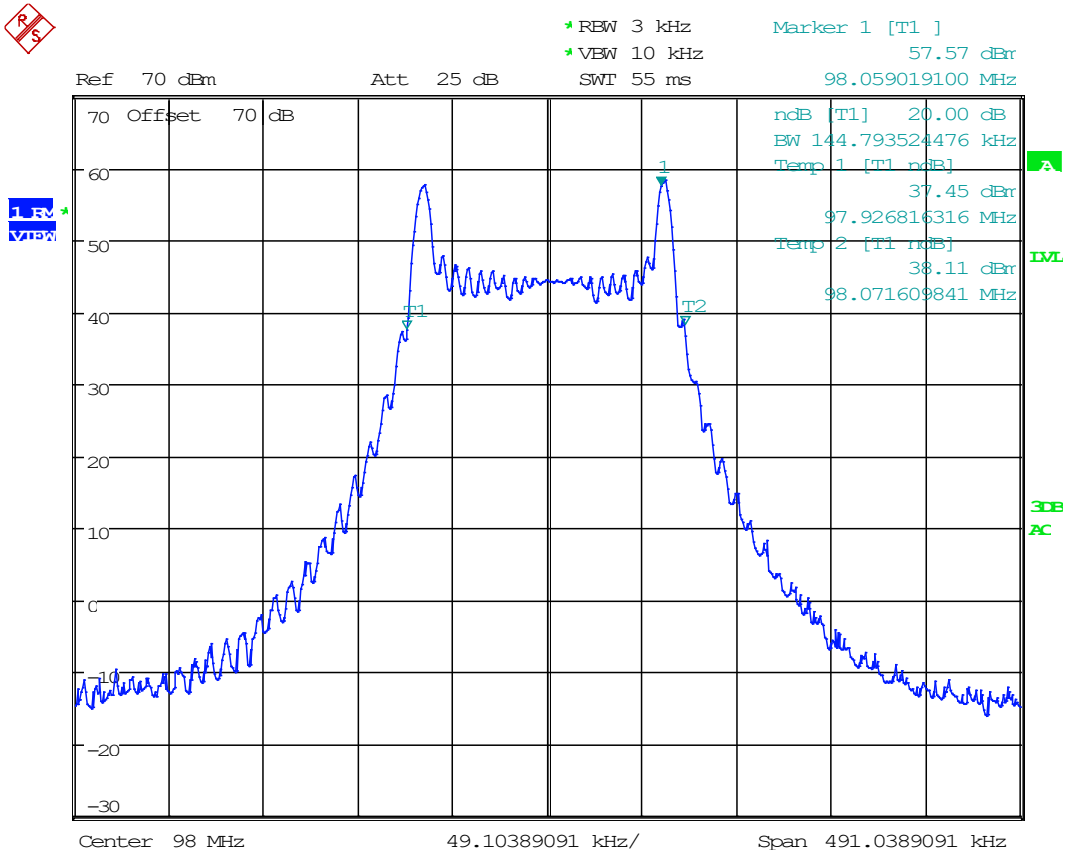


## 20dB OCCUPIED BANDWIDTH PLOT Low End of band



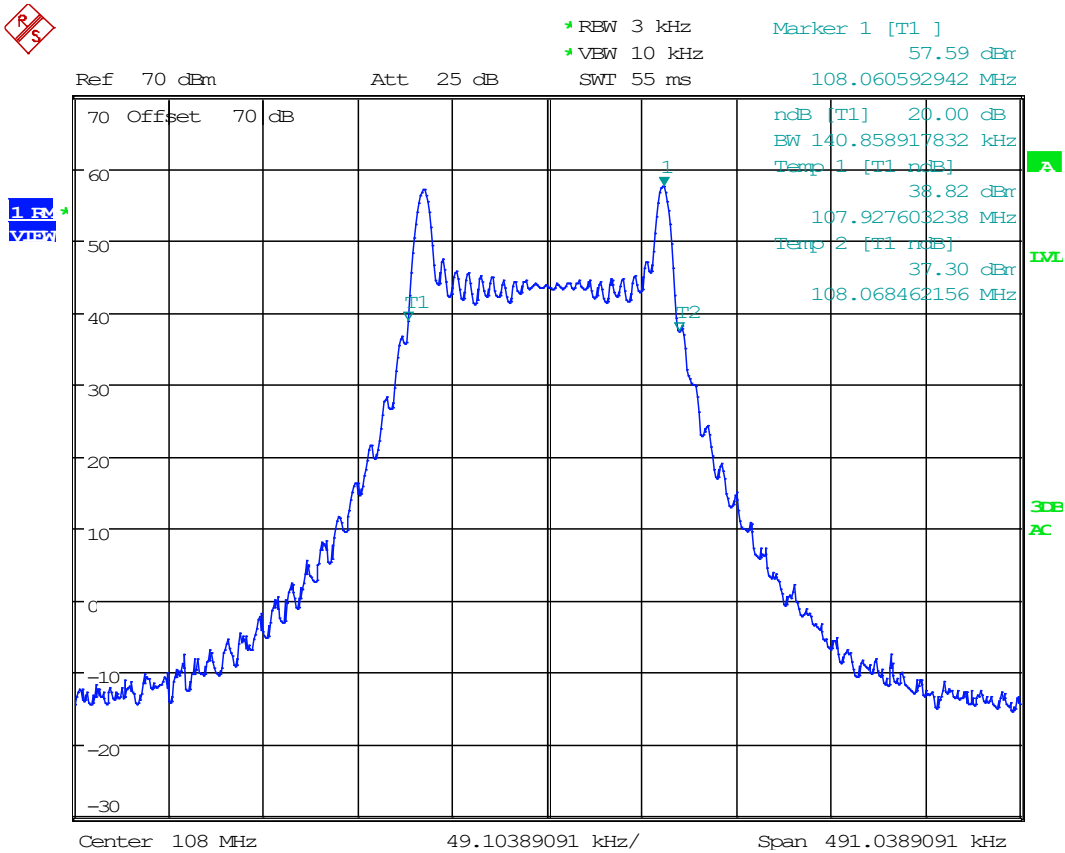
Date: 8.SEP.2020 13:24:37

## 20dB OCCUPIED BANDWIDTH PLOT Middle of band



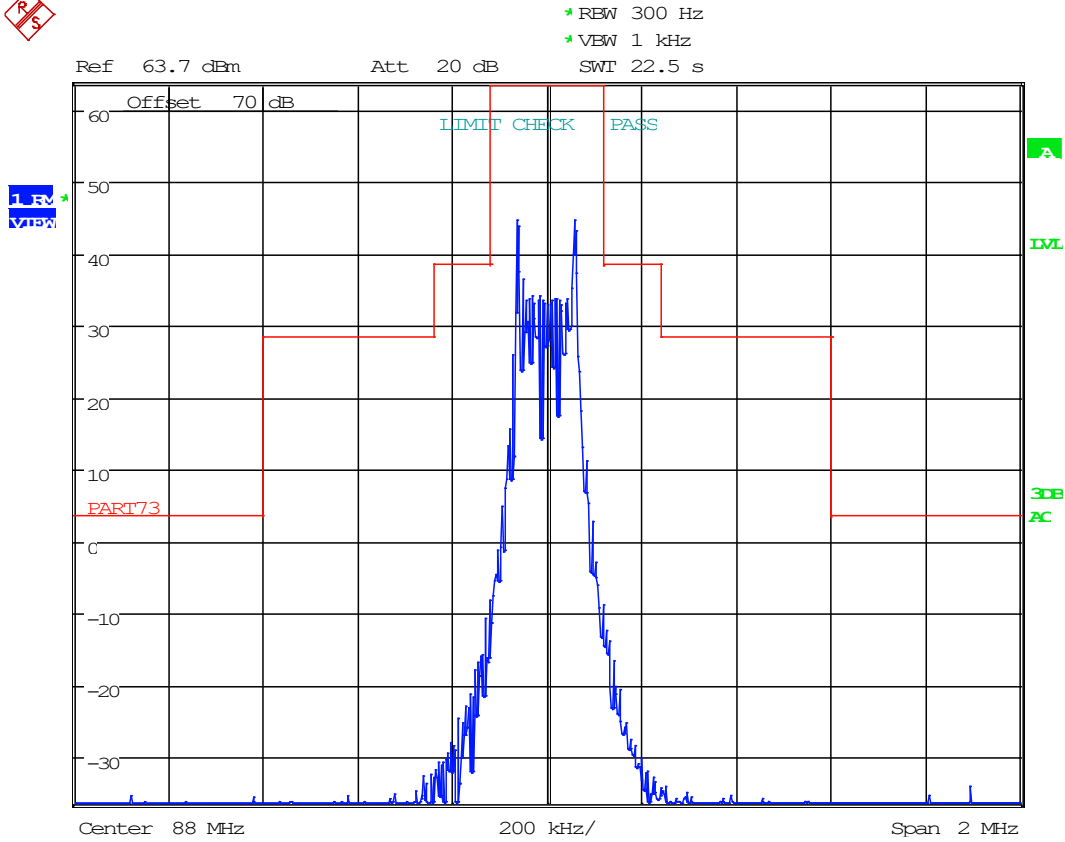
Date: 8.SEP.2020 13:26:09

## 20dB OCCUPIED BANDWIDTH PLOT High End of band



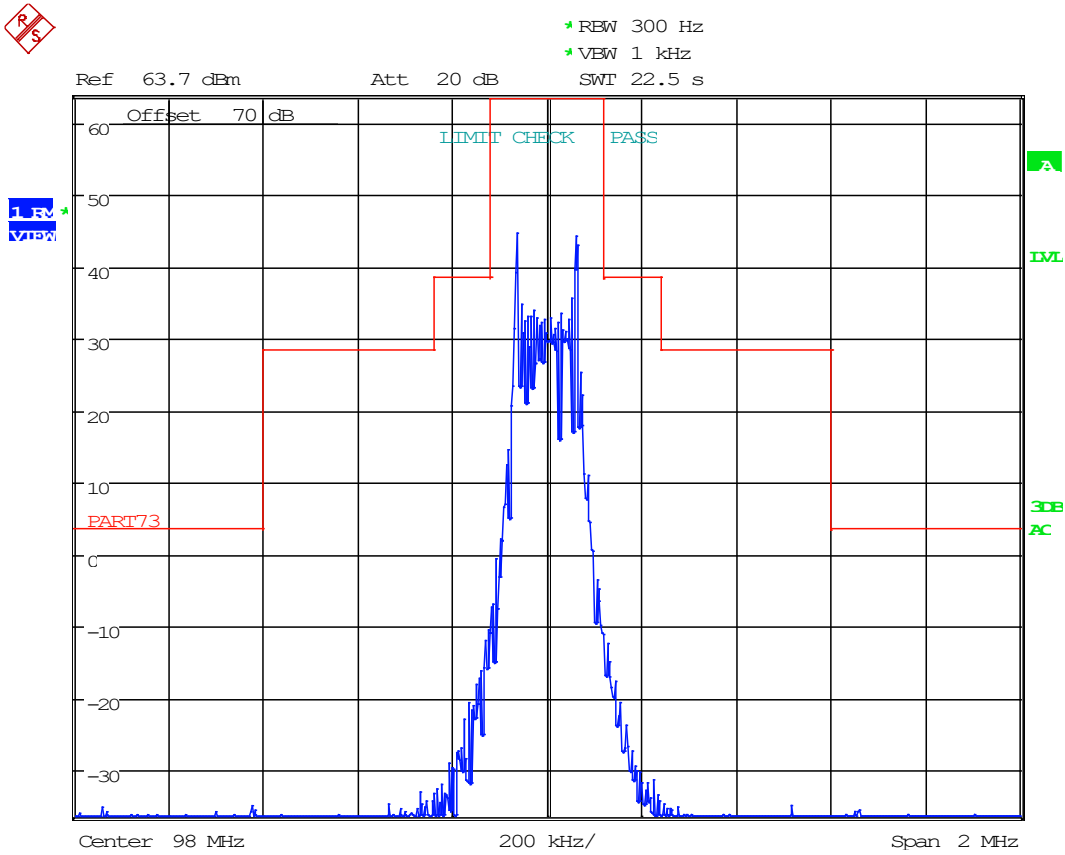
Date: 8.SEP.2020 13:27:03

## EMISSION MASK PLOT Low End of band



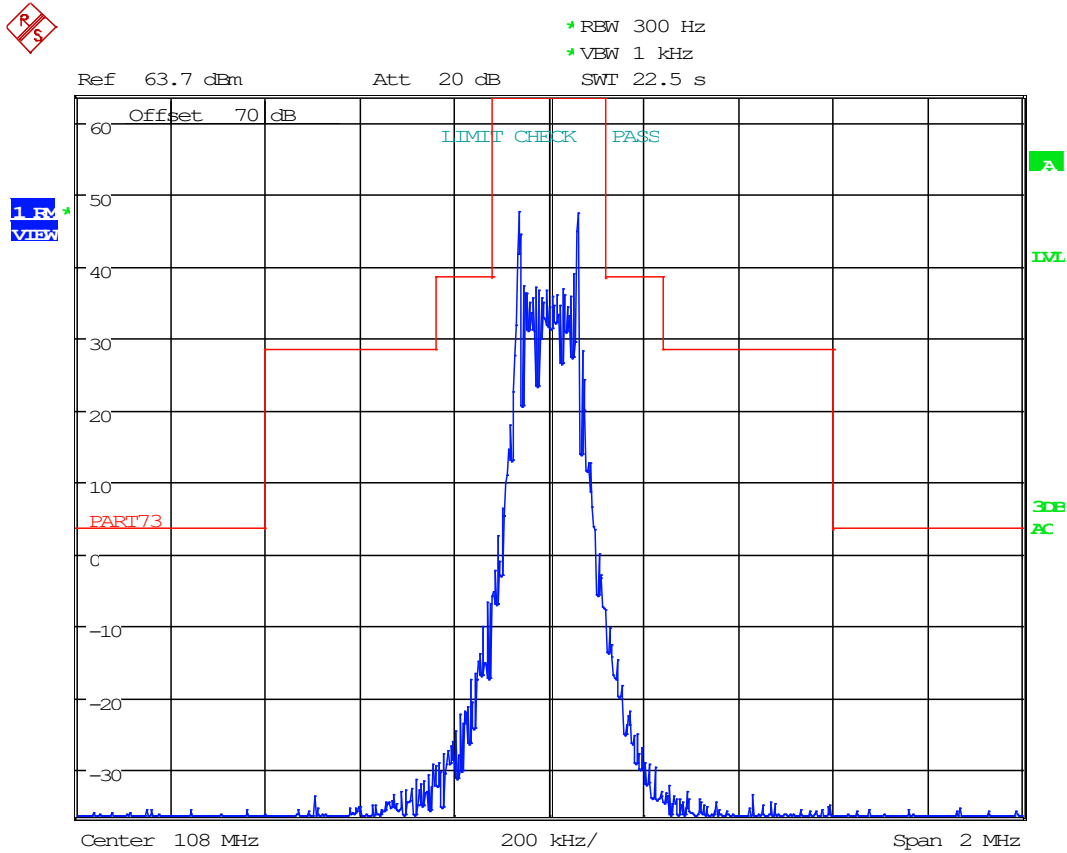
Date: 8.SEP.2020 13:32:28

## EMISSION MASK PLOT Middle of band



Date: 8.SEP.2020 13:31:07

### EMISSION MASK PLOT High End of band

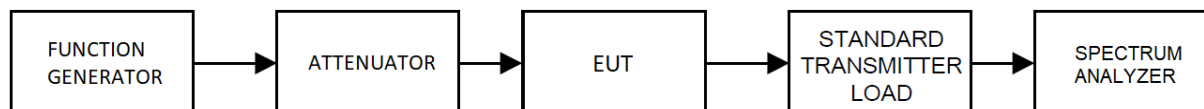


Date: 8.SEP.2020 13:29:59

## 8.6 SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED)

Limits from FCC Part 2.1051 & 73.317(d) and test procedure from ANSI C63.26-2015

### Setup



### Test Data: Low Frequency

|                       | (dBm) | (Watts) | Limit (dBc) |
|-----------------------|-------|---------|-------------|
| Mean High Power (dBm) | 65.44 | 3499.45 | 78.44       |

|               |   |         | High Power |             |
|---------------|---|---------|------------|-------------|
| Frequency     |   |         | Peak (dBm) | Margin (dB) |
| (fundamental) |   | 88.000  | 0.00       | 0.00        |
| 2nd Harmonic  |   | 176.000 | -13.40     | 0.40        |
| 3rd Harmonic  |   | 264.000 | -16.73     | 3.73        |
| 4th Harmonic  | * | 352.000 | -16.30     | 3.30        |
| 5th Harmonic  |   | 440.000 | -17.78     | 4.78        |
| 6th Harmonic  |   | 528.000 | -18.04     | 5.04        |
| 7th Harmonic  |   | 616.000 | -17.48     | 4.48        |
| 8th Harmonic  | * | 704.000 | -17.75     | 4.75        |
| 9th Harmonic  | * | 792.000 | -17.91     | 4.91        |
| 10th Harmonic | * | 880.000 | -16.67     | 3.67        |

\* Indicates Noise Floor of Measurement

**Test Data: Middle Frequency**

|                       | (dBm) | (Watts) | Limit (dBc) |
|-----------------------|-------|---------|-------------|
| Mean High Power (dBm) | 65.44 | 3499.45 | 78.44       |

| Frequency     |   |         | Peak (dBm) | Margin (dB) |
|---------------|---|---------|------------|-------------|
| (fundamental) |   | 98.000  | 0.00       | 0.00        |
| 2nd Harmonic  |   | 196.000 | -13.45     | 0.45        |
| 3rd Harmonic  |   | 294.000 | -16.00     | 3.00        |
| 4th Harmonic  | * | 392.000 | -17.58     | 4.58        |
| 5th Harmonic  |   | 490.000 | -17.78     | 4.78        |
| 6th Harmonic  | * | 588.000 | -18.28     | 5.28        |
| 7th Harmonic  |   | 686.000 | -17.08     | 4.08        |
| 8th Harmonic  | * | 784.000 | -18.09     | 5.09        |
| 9th Harmonic  | * | 882.000 | -15.60     | 2.60        |
| 10th Harmonic | * | 980.000 | -17.90     | 4.90        |

\* Indicates Noise Floor of Measurement

**Test Data: High Frequency**

|                       |   |          | (dBm)      | (Watts)     | Limit (dBc) |
|-----------------------|---|----------|------------|-------------|-------------|
| Mean High Power (dBm) |   |          | 65.44      | 3499.45     | 78.44       |
|                       |   |          |            | High Power  |             |
| Frequency             |   |          | Peak (dBm) | Margin (dB) |             |
| (fundamental)         |   | 108.000  | 0.00       | 0.00        |             |
| 2nd Harmonic          |   | 216.000  | -17.17     | 4.17        |             |
| 3rd Harmonic          |   | 324.000  | -18.22     | 5.22        |             |
| 4th Harmonic          |   | 432.000  | -19.80     | 6.80        |             |
| 5th Harmonic          | * | 540.000  | -19.33     | 6.33        |             |
| 6th Harmonic          |   | 648.000  | -18.15     | 5.15        |             |
| 7th Harmonic          | * | 756.000  | -17.01     | 4.01        |             |
| 8th Harmonic          | * | 864.000  | -19.30     | 6.30        |             |
| 9th Harmonic          | * | 972.000  | -18.15     | 5.15        |             |
| 10th Harmonic         |   | 1080.000 | -14.47     | 1.47        |             |

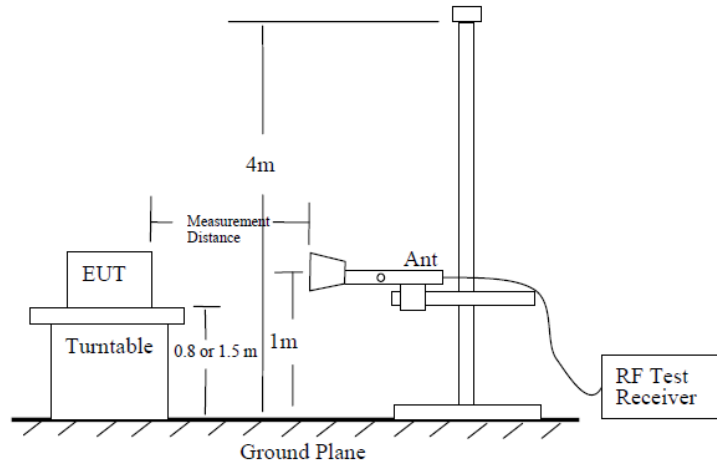
\* Indicates Noise Floor of Measurement

## 8.7 FIELD STRENGTH OF SPURIOUS EMISSIONS

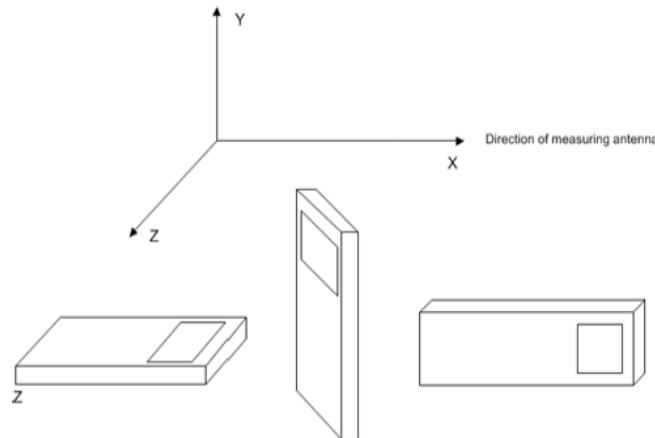
Limits from FCC Part 2.1051 & 73.317(d) and test procedure from ANSI C63.26-2015

### Setup

#### Test Site Setup:



#### EUT Orientation(s):





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(352) 472-5500 / testing@timcoengr.com

## FIELD STRENGTH OF SPURIOUS EMISSIONS

### Test Data: Low Frequency

| Tuned Frequency (MHz) | Emission Frequency (MHz) | Detector | Meter Reading (dBm) | Antenna Polarity | Coax Loss (dB) | Antenna Correction Factor (dB/m) | Distance (m) | Field Strength (dBμV/m) | ERP (dBm) | Spurious Limit (dBm) | Margin (dBm) |
|-----------------------|--------------------------|----------|---------------------|------------------|----------------|----------------------------------|--------------|-------------------------|-----------|----------------------|--------------|
| 88.00                 | 31.71                    | PK       | 36.62               | V                | 0.64           | 13.14                            | 3.00         | 50.40                   | -46.97    | -13.00               | 33.97        |
| 88.00                 | 41.50                    | PK       | 41.88               | V                | 0.72           | 13.15                            | 3.00         | 55.75                   | -41.63    | -13.00               | 28.63        |
| 88.00                 | 61.14                    | PK       | 44.28               | V                | 0.92           | 7.16                             | 3.00         | 52.36                   | -45.02    | -13.00               | 32.02        |
| 88.00                 | 65.00                    | PK       | 36.56               | H                | 0.95           | 6.20                             | 3.00         | 43.71                   | -53.67    | -13.00               | 40.67        |
| 88.00                 | 69.04                    | PK       | 48.62               | V                | 0.98           | 5.90                             | 3.00         | 55.51                   | -41.87    | -13.00               | 28.87        |
| 88.00                 | 176.00                   | PK       | 50.46               | H                | 1.54           | 14.40                            | 3.00         | 66.40                   | -30.97    | -13.00               | 17.97        |
| 88.00                 | 176.00                   | PK       | 42.53               | V                | 1.54           | 14.40                            | 3.00         | 58.47                   | -38.90    | -13.00               | 25.90        |
| 88.00                 | 264.00                   | PK       | 60.90               | H                | 2.03           | 11.88                            | 3.00         | 74.81                   | -22.56    | -13.00               | 9.56         |
| 88.00                 | 264.00                   | PK       | 54.47               | V                | 2.03           | 11.88                            | 3.00         | 68.38                   | -28.99    | -13.00               | 15.99        |
| 88.00                 | 352.00                   | PK       | 51.80               | H                | 2.12           | 14.16                            | 3.00         | 68.08                   | -29.30    | -13.00               | 16.30        |
| 88.00                 | 352.00                   | PK       | 63.70               | V                | 2.12           | 14.16                            | 3.00         | 79.98                   | -17.40    | -13.00               | 4.40         |
| 88.00                 | 440.00                   | PK       | 36.74               | H                | 2.40           | 15.70                            | 3.00         | 54.84                   | -42.54    | -13.00               | 29.54        |
| 88.00                 | 440.00                   | PK       | 49.73               | V                | 2.40           | 15.70                            | 3.00         | 67.83                   | -29.55    | -13.00               | 16.55        |
| 88.00                 | 528.00                   | PK       | 38.16               | H                | 2.76           | 16.94                            | 3.00         | 57.86                   | -39.52    | -13.00               | 26.52        |
| 88.00                 | 528.00                   | PK       | 42.27               | V                | 2.76           | 16.94                            | 3.00         | 61.97                   | -35.41    | -13.00               | 22.41        |
| 88.00                 | 616.00                   | PK       | 44.27               | H                | 2.90           | 18.72                            | 3.00         | 65.89                   | -31.49    | -13.00               | 18.49        |
| 88.00                 | 616.00                   | PK       | 52.21               | V                | 2.90           | 18.72                            | 3.00         | 73.83                   | -23.55    | -13.00               | 10.55        |
| 88.00                 | 704.00                   | PK       | 38.55               | H                | 3.11           | 20.60                            | 3.00         | 62.26                   | -35.12    | -13.00               | 22.12        |
| 88.00                 | 704.00                   | PK       | 47.16               | V                | 3.11           | 20.60                            | 3.00         | 70.87                   | -26.51    | -13.00               | 13.51        |
| 88.00                 | 792.00                   | PK       | 48.80               | H                | 3.32           | 20.68                            | 3.00         | 72.80                   | -24.58    | -13.00               | 11.58        |
| 88.00                 | 792.00                   | PK       | 36.21               | V                | 3.32           | 20.68                            | 3.00         | 60.21                   | -37.17    | -13.00               | 24.17        |
| 88.00                 | 880.00                   | PK       | 39.08               | H                | 3.54           | 22.60                            | 3.00         | 65.22                   | -32.16    | -13.00               | 19.16        |
| 88.00                 | 880.00                   | PK       | 43.83               | V                | 3.54           | 22.60                            | 3.00         | 69.97                   | -27.41    | -13.00               | 14.41        |

### Test Data: Middle Frequency

| Tuned Frequency (MHz) | Emission Frequency (MHz) | Detector | Meter Reading (dBm) | Antenna Polarity | Coax Loss (dB) | Antenna Correction Factor (dB/m) | Distance (m) | Field Strength (dBμV/m) | ERP (dBm) | Spurious Limit (dBm) | Margin (dBm) |
|-----------------------|--------------------------|----------|---------------------|------------------|----------------|----------------------------------|--------------|-------------------------|-----------|----------------------|--------------|
| 98.00                 | 31.29                    | PK       | 37.10               | V                | 0.64           | 13.06                            | 3.00         | 50.80                   | -46.58    | -13.00               | 33.58        |
| 98.00                 | 40.55                    | PK       | 42.00               | V                | 0.71           | 13.25                            | 3.00         | 55.95                   | -41.43    | -13.00               | 28.43        |
| 98.00                 | 60.99                    | PK       | 43.85               | V                | 0.92           | 7.20                             | 3.00         | 51.97                   | -45.41    | -13.00               | 32.41        |
| 98.00                 | 68.61                    | PK       | 47.27               | V                | 0.98           | 5.90                             | 3.00         | 54.15                   | -43.23    | -13.00               | 30.23        |
| 98.00                 | 65.62                    | PK       | 37.77               | H                | 0.95           | 6.14                             | 3.00         | 44.86                   | -52.51    | -13.00               | 39.51        |
| 98.00                 | 196.00                   | PK       | 47.20               | H                | 1.61           | 15.40                            | 3.00         | 64.21                   | -33.17    | -13.00               | 20.17        |
| 98.00                 | 196.00                   | PK       | 49.50               | V                | 1.61           | 15.40                            | 3.00         | 66.51                   | -30.87    | -13.00               | 17.87        |
| 98.00                 | 294.00                   | PK       | 44.36               | H                | 2.08           | 13.12                            | 3.00         | 59.56                   | -37.82    | -13.00               | 24.82        |
| 98.00                 | 294.00                   | PK       | 62.89               | V                | 2.08           | 13.12                            | 3.00         | 78.09                   | -19.29    | -13.00               | 6.29         |
| 98.00                 | 392.00                   | PK       | 47.36               | H                | 2.27           | 14.60                            | 3.00         | 64.23                   | -33.15    | -13.00               | 20.15        |
| 98.00                 | 392.00                   | PK       | 58.17               | V                | 2.27           | 14.60                            | 3.00         | 75.04                   | -22.34    | -13.00               | 9.34         |
| 98.00                 | 490.00                   | PK       | 40.91               | H                | 2.62           | 16.80                            | 3.00         | 60.33                   | -37.05    | -13.00               | 24.05        |
| 98.00                 | 490.00                   | PK       | 34.27               | V                | 2.62           | 16.80                            | 3.00         | 53.69                   | -43.69    | -13.00               | 30.69        |
| 98.00                 | 588.00                   | PK       | 45.02               | H                | 2.87           | 18.48                            | 3.00         | 66.37                   | -31.01    | -13.00               | 18.01        |
| 98.00                 | 588.00                   | PK       | 51.41               | V                | 2.87           | 18.48                            | 3.00         | 72.76                   | -24.62    | -13.00               | 11.62        |
| 98.00                 | 686.00                   | PK       | 33.09               | H                | 3.06           | 20.64                            | 3.00         | 56.79                   | -40.59    | -13.00               | 27.59        |
| 98.00                 | 686.00                   | PK       | 40.46               | V                | 3.06           | 20.64                            | 3.00         | 64.16                   | -33.22    | -13.00               | 20.22        |
| 98.00                 | 784.00                   | PK       | 40.63               | H                | 3.30           | 21.68                            | 3.00         | 65.61                   | -31.76    | -13.00               | 18.76        |
| 98.00                 | 784.00                   | PK       | 37.94               | V                | 3.30           | 21.68                            | 3.00         | 62.92                   | -34.45    | -13.00               | 21.45        |
| 98.00                 | 882.00                   | PK       | 33.73               | H                | 3.54           | 22.44                            | 3.00         | 59.71                   | -37.66    | -13.00               | 24.66        |
| 98.00                 | 882.00                   | PK       | 36.58               | V                | 3.54           | 22.44                            | 3.00         | 62.56                   | -34.81    | -13.00               | 21.81        |
| 98.00                 | 980.00                   | PK       | 46.38               | H                | 3.69           | 22.50                            | 3.00         | 72.57                   | -24.81    | -13.00               | 11.81        |
| 98.00                 | 980.00                   | PK       | 47.53               | V                | 3.69           | 22.50                            | 3.00         | 73.72                   | -23.66    | -13.00               | 10.66        |



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**Test Data: High Frequency**

| Tuned Frequency (MHz) | Emission Frequency (MHz) | Detector | Meter Reading (dBm) | Antenna Polarity | Coax Loss (dB) | Antenna Correction Factor (dB/m) | Distance (m) | Field Strength (dBμV/m) | ERP (dBm) | Spurious Limit (dBm) | Margin (dBm) |
|-----------------------|--------------------------|----------|---------------------|------------------|----------------|----------------------------------|--------------|-------------------------|-----------|----------------------|--------------|
| 108.00                | 31.29                    | PK       | 37.10               | V                | 0.64           | 13.06                            | 3.00         | 50.80                   | -46.58    | -13.00               | 33.58        |
| 108.00                | 40.55                    | PK       | 42.00               | v                | 0.71           | 13.25                            | 3.00         | 55.95                   | -41.43    | -13.00               | 28.43        |
| 108.00                | 60.99                    | PK       | 43.85               | V                | 0.92           | 7.20                             | 3.00         | 51.97                   | -45.41    | -13.00               | 32.41        |
| 108.00                | 68.61                    | PK       | 47.27               | V                | 0.98           | 5.90                             | 3.00         | 54.15                   | -43.23    | -13.00               | 30.23        |
| 108.00                | 216.00                   | PK       | 62.41               | H                | 1.67           | 10.38                            | 3.00         | 74.46                   | -22.92    | -13.00               | 9.92         |
| 108.00                | 216.00                   | PK       | 66.98               | V                | 1.67           | 10.38                            | 3.00         | 79.03                   | -18.35    | -13.00               | 5.35         |
| 108.00                | 324.00                   | PK       | 63.07               | H                | 2.09           | 13.74                            | 3.00         | 78.90                   | -18.48    | -13.00               | 5.48         |
| 108.00                | 324.00                   | PK       | 62.98               | V                | 2.09           | 13.74                            | 3.00         | 78.81                   | -18.57    | -13.00               | 5.57         |
| 108.00                | 432.00                   | PK       | 40.12               | H                | 2.38           | 15.88                            | 3.00         | 58.38                   | -38.99    | -13.00               | 25.99        |
| 108.00                | 432.00                   | PK       | 46.23               | V                | 2.38           | 15.88                            | 3.00         | 64.49                   | -32.88    | -13.00               | 19.88        |
| 108.00                | 540.00                   | PK       | 39.13               | H                | 2.78           | 17.40                            | 3.00         | 59.31                   | -38.07    | -13.00               | 25.07        |
| 108.00                | 540.00                   | PK       | 47.57               | V                | 2.78           | 17.40                            | 3.00         | 67.75                   | -29.63    | -13.00               | 16.63        |
| 108.00                | 648.00                   | PK       | 48.07               | H                | 2.96           | 19.72                            | 3.00         | 70.75                   | -26.63    | -13.00               | 13.63        |
| 108.00                | 648.00                   | PK       | 47.09               | V                | 2.96           | 19.72                            | 3.00         | 69.77                   | -27.61    | -13.00               | 14.61        |
| 108.00                | 756.00                   | PK       | 55.69               | H                | 3.23           | 20.98                            | 3.00         | 79.90                   | -17.48    | -13.00               | 4.48         |
| 108.00                | 756.00                   | PK       | 35.03               | V                | 3.23           | 20.98                            | 3.00         | 59.24                   | -38.14    | -13.00               | 25.14        |
| 108.00                | 864.00                   | PK       | 35.67               | H                | 3.50           | 22.36                            | 3.00         | 61.53                   | -35.85    | -13.00               | 22.85        |
| 108.00                | 864.00                   | PK       | 34.88               | V                | 3.50           | 22.36                            | 3.00         | 60.74                   | -36.64    | -13.00               | 23.64        |
| 108.00                | 972.00                   | PK       | 34.37               | H                | 3.66           | 22.72                            | 3.00         | 60.75                   | -36.63    | -13.00               | 23.63        |
| 108.00                | 972.00                   | PK       | 42.36               | V                | 3.66           | 22.72                            | 3.00         | 68.74                   | -28.64    | -13.00               | 15.64        |
| 108.00                | 1080.00                  | PK       | 37.92               | H                | 3.82           | 27.00                            | 3.00         | 68.75                   | -28.63    | -13.00               | 15.63        |
| 108.00                | 1080.00                  | PK       | 40.15               | V                | 3.82           | 27.00                            | 3.00         | 70.98                   | -26.40    | -13.00               | 13.40        |

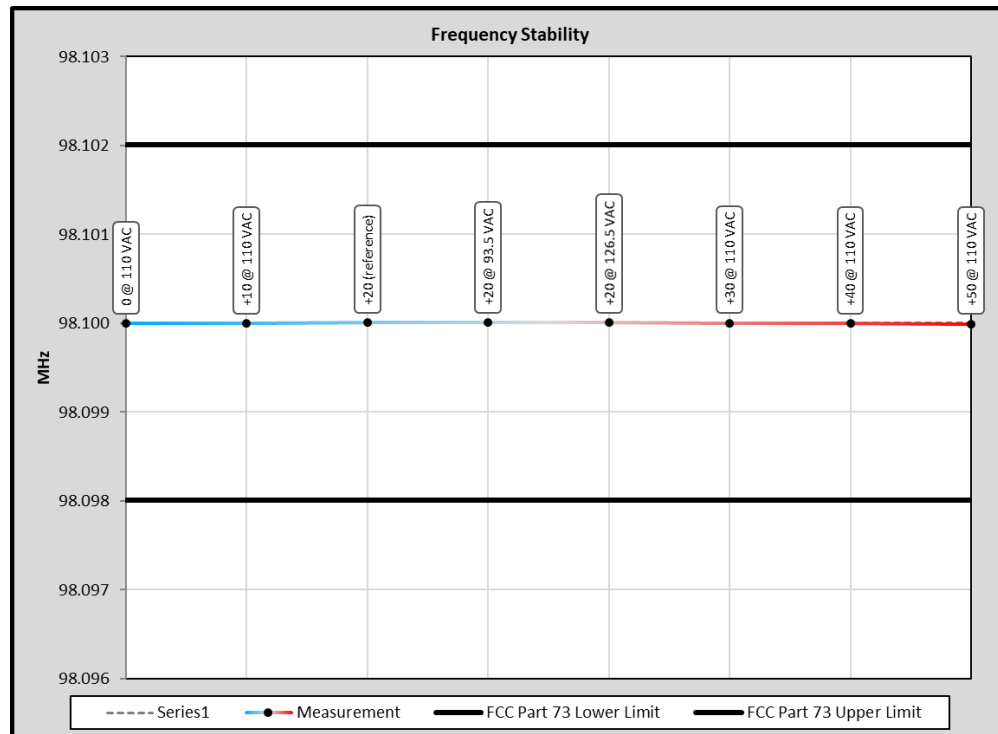
## 8.8 FREQUENCY STABILITY

Limits from FCC Part 2.1055(a)(3), Part 73.1545(b) and test procedure from ANSI C63.26-2015

**Test Data: FCC Frequency Stability Table**

|                                 |                      |                                                              |                 |
|---------------------------------|----------------------|--------------------------------------------------------------|-----------------|
| FCC Part 73 Limit               | 2                    | +/- kHz                                                      |                 |
| FCC Part 73 Lower Limit         | 98.098008            | MHz                                                          |                 |
| FCC Part 73 Upper Limit         | 98.102008            | MHz                                                          |                 |
| Rated Supply Voltage            | 110.0                | <input checked="" type="radio"/> AC <input type="radio"/> DC |                 |
| Temperature / Voltage Variation |                      |                                                              |                 |
| Temperature (°C)                | Supplied Voltage (V) | Frequency (MHz)                                              | Deviation (kHz) |
| 0                               | 110.0                | 98.099995                                                    | 0.013           |
| +10                             | 110.0                | 98.099997                                                    | 0.011           |
| +20 (reference)                 | 110.0                | 98.100008                                                    | 0.000           |
| +20                             | 93.5                 | 98.100008                                                    | 0.000           |
| +20                             | 126.5                | 98.100008                                                    | 0.000           |
| +30                             | 110.0                | 98.100004                                                    | 0.004           |
| +40                             | 110.0                | 98.099996                                                    | 0.012           |
| +50                             | 110.0                | 98.099991                                                    | 0.017           |

**Test Data: FCC Frequency Stability Plot**





## 9 ANNEX-A - Photographs of the EUT

Photographs of the EUT and any manufacturer supplied accessories to be used with the EUT  
Are in a separate supplementary ANNEX-A document.

## 10 ANNEX-B – Test Setup Photographs

Test setup photographs are located in a separate supplementary ANNEX-B document.

## 11 History of Test Report Changes

| Test Report #           | Revision # | Description            | Date of Issue      |
|-------------------------|------------|------------------------|--------------------|
| TR_3285-20_FCC_PART73_1 | 1          | Initial release        | September 16, 2020 |
| TR_3285-20_FCC_PART73_2 | 2          | Clerical Update Page 7 | October 20, 2020   |
|                         |            |                        |                    |
|                         |            |                        |                    |



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**END of Test Report**

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