

Page: 1 of 32

# ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

# INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT

OF

**Product Name: Headrest monitor with DVD-player** 

**Brand Name:** Myron & Davis

**Model Name:** MD9

**Model Differences:** N/A

FCC ID: VEIMD9

Report No.: E2/2015/A0059

**FCC Rule Part:** §15.239

**Issue Date:** Nov. 16, 2015

CENEC CORP.

**Prepared for:** 4F, NO. 122, Qiaohe Rd., Zhonghe Dist.,

**New Taipei City, Taiwan** 

SGS Taiwan Ltd.

**Electronics & Communication Laboratory** Prepared by:

No.2, Keji 1st Rd., Guishan District,

**Taoyuan City, Taiwan 333** 





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Page: 2 of 32

# VERIFICATION OF COMPLIANCE

CENEC CORP. Applicant:

4F, NO. 122, Qiaohe Rd., Zhonghe Dist., New Taipei City,

Taiwan

**Equipment Under Test:** Headrest monitor with DVD-player

**Brand Name:** Myron & Davis

MD9 Model No.: N/A **Model Difference:** 

FCC ID: VEIMD9

File Number: E2/2015/A0059

Nov. 04, 2015 ~ Nov. 09, 2015 Date of test:

Nov. 04, 2015 Date of EUT Received:

# We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. Electronics & Communication Laboratory The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10:2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits.

The test results of this report relate only to the tested sample identified in this report.

| Test By:     | Pony Chen                | Date       | Nov. 16, 2015 |
|--------------|--------------------------|------------|---------------|
| _            | Pony Chen / Engineer     | - <u>-</u> |               |
| Prepared By: | Vroletta Tang            | Date       | Nov. 16, 2015 |
|              | Violetta Tang / Clerk    | _          |               |
| Approved By: | Tim Chang                | Date _     | Nov. 16, 2015 |
|              | Jim Chang /Asst. Manager |            |               |

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Page: 3 of 32

# **Revision History**

| Report Number | Revision | Description                  | Issue Date    |
|---------------|----------|------------------------------|---------------|
| E2/2015/A0059 | Rev.00   | Initial creation of document | Nov. 16, 2015 |
|               |          |                              |               |
|               |          |                              |               |

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Page: 4 of 32

# **Contents**

| 1.  | GENERAL INFORMATION                                  | 5  |
|-----|--|----|
| 1.1 | PRODUCT DESCRIPTION                                  |    |
| 1.2 | TEST METHODOLOGY OF APPLIED STANDARDS                | 6  |
| 1.3 | TEST FACILITY  | 6  |
| 1.4 | SPECIAL ACCESSORIES                                  | 6  |
| 1.5 | EQUIPMENT MODIFICATIONS                              |    |
| 2.  | SYSTEM TEST CONFIGURATION                            | 7  |
| 2.1 | EUT CONFIGURATION                                    | 7  |
| 2.2 | EUT Exercise   | 7  |
| 2.3 | TEST PROCEDURE                                       | 7  |
| 2.4 | LIMITATION   |    |
| 2.5 | CONFIGURATION OF TESTED SYSTEM                       | 10 |
| 3.  | SUMMARY OF TEST RESULTS                              | 11 |
| 4.  | DESCRIPTION OF TEST MODES                            | 11 |
| 4.1 | OPERATED IN 88.1 ~ 107.9MHz BAND                     | 11 |
| 4.2 | THE WORST TEST MODES AND CHANNEL DETAILS             | 11 |
| 5.  | MEASUREMENT UNCERTAINTY                              | 12 |
| 6.  | CONDUCTED EMISSIONS TEST                             | 13 |
| 6.1 | STANDARD APPLICABLE                                  |    |
| 6.2 | MEASUREMENT EQUIPMENT USED:                          |    |
| 6.3 | EUT SETUP  |    |
| 6.4 | TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)         | 14 |
| 6.5 | MEASUREMENT PROCEDURE                                |    |
| 6.6 | MEASUREMENT RESULT:                                  | 14 |
| 7.  | RADIATED EMISSION TEST                               | 15 |
| 7.1 | MEASUREMENT PROCEDURE                                | 15 |
| 7.2 | TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)         | 15 |
| 7.3 | MEASUREMENT EQUIPMENT USED:                          |    |
| 7.4 | FIELD STRENGTH CALCULATION                           |    |
| 7.5 | RADIATED SPURIOUS EMISSION MEASUREMENT RESULT (MAIN) |    |
| 7.6 | RADIATED SPURIOUS EMISSION MEASUREMENT RESULT (TX)   | 23 |
| 8.  | 20DB OCCUPIED BANDWIDTH                              | 29 |
| 8.1 | MEASUREMENT PROCEDURE                                | 29 |
| 8.2 | TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)         |    |
| 8.3 | MEASUREMENT EQUIPMENT USED:                          | 29 |
| 8.4 | MEASUREMENT RESULTS                                  |    |
| 9.  | ANTENNA REQUIREMENT                                  | 32 |
| 9.1 | STANDARD APPLICABLE                                  |    |
| 9.2 | ANTENNA CONNECTED CONSTRUCTION                       | 32 |

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Page: 5 of 32

### 1. GENERAL INFORMATION

### 1.1 Product Description

#### General:

| i liciai.         |                                  |
|-------------------|----------------------------------|
| Product Name      | Headrest monitor with DVD-player |
| Brand Name        | Myron & Davis                    |
| Model Name        | MD9                              |
| Model Difference  | N/A                              |
| Hardware Version: | N/A                              |
| Software Version: | N/A                              |
| USB Cable:        | Model No.: N/A, Supplier: N/A    |
| HDMI Cable:       | Model No.: N/A, Supplier: N/A    |
| Power Supply      | 12Vdc                            |

#### FM Transmitter:

| Operating Frequency  | 88.1 – 107.9MHz           |
|----------------------|---------------------------|
| Transmit Power       | 35.21dBuV/m               |
| Modulation Technique | Frequency Modulation      |
| Number of Channels   | 199, channel step: 0.1MHz |
| Operating Mode       | Point-to-Point            |
| Antenna Type         | Wire Antenna              |

The EUT is compliance with FM 88.1MHz -107.9MHz Standard. This test report applies for FM transmitter.

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Page: 6 of 32

### 1.2 Test Methodology of Applied Standards

FCC Part 15, Subpart C §15.239 ANSI C63.10:2013

#### Note:

- 1. All test items have been performed and record as per the above standards.
- 2. The composite system is compliance with FCC Subpart B is authorized under a DoC procedure.

### 1.3 Test Facility

SGS Taiwan Ltd. Electronics & Communication Laboratory No.2, Keji 1<sup>st</sup> Rd., Guishan District, Taoyuan City, Taiwan. (TAF code 0513)

FCC Registration Numbers are: 628985 Canada Registration Number: 4620A-5.

### 1.4 Special Accessories

Not available for this EUT intended for grant.

### 1.5 Equipment Modifications

There was no modification incorporated into the EUT.

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Page: 7 of 32

### 2. System Test Configuration

### 2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

#### 2.2 EUT Exercise

The Transmitter was operated in the normal operating mode. the Tx frequency was fixed which was for the purpose of the measurements.

#### 2.3 Test Procedure

#### 2.3.1 Conducted Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. According to the requirements in Section 7 and 13 of ANSI C63.10: 2013. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and Average detector mode.

#### 2.3.2 Radiated Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna. according to the requirements in Section 8 and 13 and Subclause 8.3.1.2 of ANSI C63.10: 2013.

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Page: 8 of 32

#### Limitation 2.4

### (1) Conducted Emission

According to section 15.207(a) Conducted Emission Limits is as following.

| Frequency range | Limits<br>dB(uV) |          |
|-----------------|------------------|----------|
| MHz             | Quasi-peak       | Average  |
| 0.15 to 0.50    | 66 to 56         | 56 to 46 |
| 0.50 to 5       | 56               | 46       |
| 5 to 30         | 60               | 50       |

#### Note

- 1. The lower limit shall apply at the transition frequencies
- 2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

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Page: 9 of 32

### (2) Radiated Emission

- a. Emission from the intentional radiator shall be confined with a band 200kHz wide centered on the operation frequency. The 200kHz band shall lie wholly within the frequency range of 88-108 MHz.
- b. The field strength of any emission within the permitted 200kHz band shall not exceed 250 micro volts/meter at 3 meters. (48dBuV at 3m) The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in section 15.35 for limiting peak emissions apply.
- c. The field strength of any emissions radiated on any frequency outside of the specified 200kHz band shall not exceed the general radiated emission limits in section Part 15.209 Table 2 (Intentional Radiators general limit).as below.

| Frequency<br>(MHz) | Field strength<br>μV/m | Distance (m) | Field strength at 3m dB <sub>μ</sub> V/m |
|--------------------|------------------------|--------------|--|
| 1.705-30           | 30                     | 30           | 69.54                                    |
| 30-88              | 100                    | 3            | 40                                       |
| 88-216             | 150                    | 3            | 43.5                                     |
| 216-960            | 200                    | 3            | 46                                       |
| Above 960          | 500                    | 3            | 54                                       |

Remark 1. Emission level in dBuV/m=20 log (uV/m)

- 2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
- 3. Only spurious frequency is permitted to locate within the Restricted Bands specified in provision of ξ 15.205 Table 1
- 4. Emission spurious frequency which appearing within the Restricted Bands specified in provision of ξ15.205 Table 1, then the general radiated emission limits in ξ 15.209 Table 2 apply.

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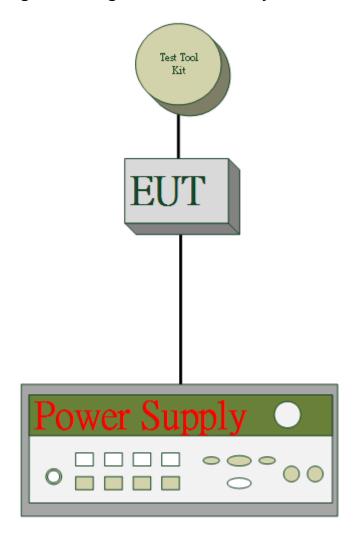
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Page: 10 of 32

### **Configuration of Tested System**

Fig. 2-1 Configuration of Tested System



**Table 2-1 Equipment Used in Tested System** 

| Item | Equipment     | Mfr/Brand | Model/<br>Type No. | Series No. | Data Cable | Power Cord |
|------|---------------|-----------|--------------------|------------|------------|------------|
| 1.   | Test Tool Kit | N/A       | N/A                | N/A        | N/A        | N/A        |

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Page: 11 of 32

# **Summary of Test Results**

| FCC Rules              | Description Of Test              | Remark   |
|------------------------|----------------------------------|----------|
| §15.207(a)             | AC Power Line Conducted Emission | N/A      |
| §15.239                | Radiated Emission                | Complied |
| §2.1049<br>§15.215 (c) | 20dB Bandwidth                   | Complied |
| §15.203                | Antenna Requirement              | Complied |

# 4. Description of test modes

### 4.1 Operated in 88.1 ~ 107.9MHz Band

199 channels are provided for FM 88.1 ~ 107.9MHz, channel step: 0.1MHz.

#### 4.2 The Worst Test Modes and Channel Details

- The EUT has been tested under operating condition.
- 2 Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.
- Investigation has been done on all the possible configurations for searching the worst

#### **RADIATED EMISSION TEST:**

| Emilosion 1201:        |                      |                   |            |  |
|------------------------|----------------------|-------------------|------------|--|
| RADIATED EMISSION TEST |                      |                   |            |  |
| MODE                   | AVAILABLE<br>CHANNEL | TESTED<br>CHANNEL | MODULATION |  |
| FM                     | 1 to 199             | 1,98,199          | FM         |  |

#### Note:

The field strength of radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) for FM Transmitter for channel Low, Mid and High, the worst case E2 position was reported.

#### ANTENNA PORT CONDUCTED MEASUREMENT:

| CONDUCTED TEST                           |          |          |    |  |
|--|----------|----------|----|--|
| 20dB Band Width                          |          |          |    |  |
| MODE AVAILABLE TESTED MODULATION CHANNEL |          |          |    |  |
| FM                                       | 1 to 199 | 1,98,199 | FM |  |

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Page: 12 of 32

### **MEASUREMENT UNCERTAINTY**

| Test Items                          | Uncertainty                 |
|-------------------------------------|-----------------------------|
| AC Power Line Conducted<br>Emission | +/- 2.586 dB                |
| Frequency Stability                 | +/- 51.33 Hz                |
| 20 dB OCCUPIED BANDWIDTH            | +/- 51.33 Hz                |
| Temperature                         | +/- 0.65 °C                 |
| Humidity                            | +/- 4.6 %                   |
| DC / AC Power Source                | DC= +/- 0.13%, AC= +/- 0.2% |

### Radiated Spurious Emission:

| Management  | 30MHz - 180MHz: +/- 3.37dB |
|---|----------------------------|
| Measurement uncertainty (Polarization : <b>Vertical</b> ) | 180MHz -417MHz: +/- 3.19dB |
|   | 0.417GHz-1GHz: +/- 3.19dB  |

| Management                          | 30MHz - 167MHz: +/- 4.22dB |
|-------------------------------------|----------------------------|
| Measurement uncertainty             | 167MHz -500MHz: +/- 3.44dB |
| (Polarization : <b>Horizontal</b> ) | 0.5GHz-1GHz: +/- 3.39dB    |

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

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Page: 13 of 32

### 6. Conducted Emissions Test

### 6.1 Standard Applicable

Frequency within 150 kHz to 30MHz shall not exceed the limit table as below.

| Trequestey within 100 it in the color in the colored the infinite capito de perevis |                  |          |  |  |  |  |  |
|---|------------------|----------|--|--|--|--|--|
| Frequency range   | Limits<br>dB(uV) |          |  |  |  |  |  |
| MHz   | Quasi-peak       | Average  |  |  |  |  |  |
| 0.15 to 0.50  | 66 to 56         | 56 to 46 |  |  |  |  |  |
| 0.50 to 5   | 56               | 46       |  |  |  |  |  |
| 5 to 30   | 60               | 50       |  |  |  |  |  |

#### Note

- 1. The lower limit shall apply at the transition frequencies
- 2. The limit decreases linearly with the logarithm of the frequency in the range  $0.15~\mathrm{MHz}$  to  $0.50~\mathrm{MHz}$ .

### 6.2 Measurement Equipment Used:

| mode a chieff Equipment Cooki |              |                   |                  |             |             |  |  |  |  |  |
|-------------------------------|--------------|-------------------|------------------|-------------|-------------|--|--|--|--|--|
| Conducted Emission Test Site  |              |                   |                  |             |             |  |  |  |  |  |
| Name of Equipment             | Manufacturer | Model             | Serial           | Calibration | Calibration |  |  |  |  |  |
|                               |              |                   | Number           | Date        | Due         |  |  |  |  |  |
| EMI Test Receiver             | R&S          | ESCI 7            | 100950           | 12/12/2014  | 12/11/2015  |  |  |  |  |  |
| Coaxial Cables                | N/A          | N30N30-1042-150cm | N/A              | 01/06/2015  | 01/07/2016  |  |  |  |  |  |
| LISN                          | Schwarzbeck  | NSLK 8127         | 8127-648         | 06/09/2015  | 06/08/2016  |  |  |  |  |  |
| LISN                          | Rolf-Heine   | NNB-2/16Z         | 99012            | 03/04/2015  | 03/03/2016  |  |  |  |  |  |
| Test Software                 | Farad        | EZ-EMC            | Ver.<br>SGS-03A2 | N.C.R.      | N.C.R.      |  |  |  |  |  |

#### 6.3 EUT Setup

- 1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI 63.10:2013.
- 2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
- 3. The LISN was connected with 120Vac/60Hz power source.

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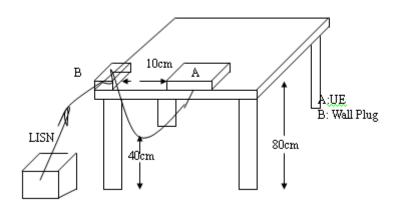
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Page: 14 of 32

### 6.4 Test SET-UP (Block Diagram of Configuration)



#### 6.5 Measurement Procedure

- 1. The EUT was placed on a table which is 0.8m above ground plan.
- 2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 3. Repeat above procedures until all frequency measured were complete.

#### 6.6 Measurement Result:

N/A, the power supply is 12Vdc.

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Page: 15 of 32

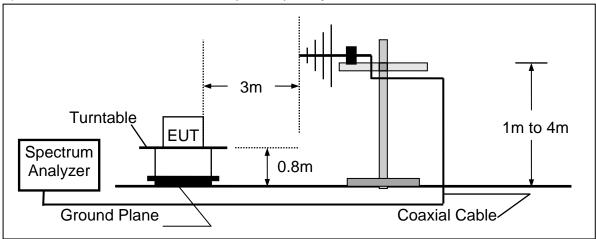
### 7. Radiated Emission Test

#### 7.1 Measurement Procedure

- 1. The EUT was placed on a turn table which is 0.8m above ground plane.
- 2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 4. Repeat above procedures until all frequency measured were complete.

### 7.2 Test SET-UP (Block Diagram of Configuration)

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



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Page: 16 of 32

### 7.3 Measurement Equipment Used:

| 966 Chamber       |                 |                          |              |            |            |  |  |  |
|-------------------|-----------------|--------------------------|--------------|------------|------------|--|--|--|
| EQUIPMENT         | MFR             | MODEL                    | SERIAL       | LAST       | CAL DUE.   |  |  |  |
| TYPE              |                 | NUMBER                   | NUMBER       | CAL.       |            |  |  |  |
| EMI Test Receiver | R&S             | ESU 40                   | 100363       | 04/09/2015 | 04/08/2016 |  |  |  |
| Loop Antenna      | ETS-Lindgren    | 6502                     | 00143303     | 12/09/2014 | 12/08/2015 |  |  |  |
| Broadband Antenna | TESEQ           | CBL 6112D                | 35240        | 12/05/2014 | 12/04/2015 |  |  |  |
| Pre Amplifier     | EMC Instruments | EMC330                   | 980096       | 12/19/2014 | 12/18/2015 |  |  |  |
| Coaxial Cable     | Huber+Suhner    | RG 214/U                 | 966Rx 9K-30M | 12/19/2014 | 12/18/2015 |  |  |  |
| Coaxial Cable     | Huber+Suhner    | RG 214/U<br>SUCOFLEX 104 | 966Rx 30M-3G | 12/19/2014 | 12/18/2015 |  |  |  |
| Site NSA          | SGS             | 966 Chamber C            | SAC-C        | 03/04/2015 | 03/03/2016 |  |  |  |
| Site VSWR         | SGS             | 966 Chamber C            | SAC-C        | 03/04/2015 | 03/03/2016 |  |  |  |
| DC Power Supply   | HOLA            | DP-3003                  | D7070035     | 05/04/2015 | 05/03/2016 |  |  |  |
| Controller        | MF              | MF-7802                  | N/A          | N.C.R.     | N.C.R.     |  |  |  |
| Antenna Master    | MF              | N/A                      | N/A          | N.C.R.     | N.C.R.     |  |  |  |
| Turn Table        | MF              | N/A                      | N/A          | N.C.R.     | N.C.R.     |  |  |  |
| Test Software     | World-Pallas    | Dr. E                    | V 3.0 Lite   | N.C.R.     | N.C.R.     |  |  |  |

### 7.4 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

| Where | FS = Field Strength    | CL = Cable Attenuation Factor (Cable Loss) |
|-------|------------------------|--|
|       | PA - Pooding Amplitude | AG = Amplifier Gain                        |
|       | RA = Reading Amplitude | AG = Ampliner Gain                         |
|       | AF = Antenna Factor    |  |

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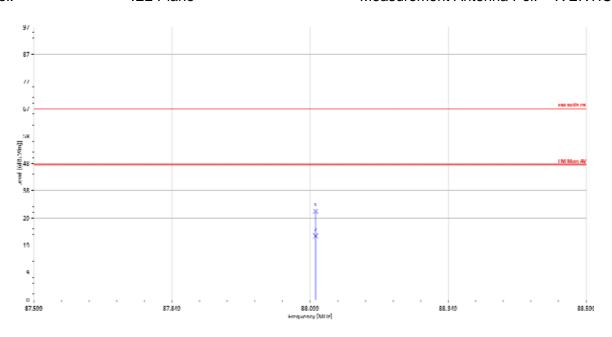
Page: 17 of 32

# 7.5 Radiated Spurious Emission Measurement Result (MAIN)

**Operation Band** :FM **Test Date** :2015-11-09 **Fundamental Frequency** Temp./Humi. :23.0 deg\_C/60 RH :88.1MHz

Operation Mode :MAIN LOW Engineer :Pony

EUT Pol. :E2 Plane Measurement Antenna Pol. :VERTICAL



| Frequency | Detector | Note    | Spectrum Reading | Factor | Actual FS | Limit @3m | Margin |
|-----------|----------|---------|------------------|--------|-----------|-----------|--------|
|           | Mode     |         | Level            |        |           |           |        |
| MHz       | PK/QP/AV | F/H/E/S | dBuV/m           | dB     | dBuV/m    | dBuV/m    | dB     |
|           |          |         |                  |        |           |           |        |
| 88.11     | Peak     | F       | 57.30            | -25.87 | 31.43     | 67.95     | -36.52 |
| 88.11     | Average  | F       | 48.54            | -25.87 | 22.67     | 47.95     | -25.28 |

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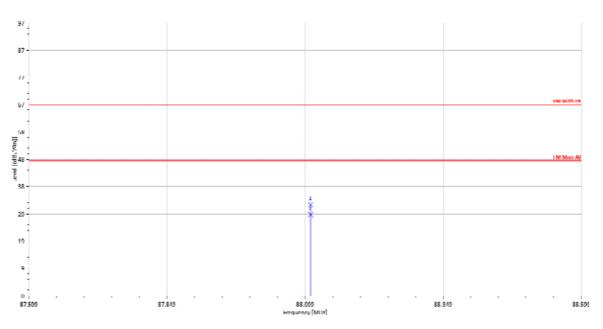


Page: 18 of 32

:FM **Operation Band Test Date** :2015-11-09 Fundamental Frequency Temp./Humi. :88.1MHz :23.0 deg\_C/60 RH

Operation Mode :MAIN LOW Engineer :Pony

EUT Pol. :E2 Plane Measurement Antenna Pol. :HORIZONTAL



| Frequency | Detector | Note    | Spectrum Reading | Factor | Actual FS | Limit @3m | Margin |   |
|-----------|----------|---------|------------------|--------|-----------|-----------|--------|---|
|           | Mode     |         | Level            |        |           |           |        |   |
| MHz       | PK/QP/AV | F/H/E/S | dBuV/m           | dB     | dBuV/m    | dBuV/m    | dB     |   |
| 88.11     | Peak     | F       | 58.21            | -25.87 | 32.34     | 67.95     | -35.61 | _ |
| 88.11     | Average  | F       | 54.68            | -25.87 | 28.81     | 47.95     | -19.14 |   |

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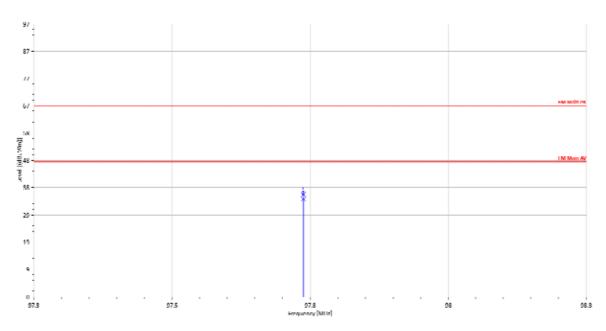


Page: 19 of 32

:FM **Operation Band Test Date** :2015-11-09 Fundamental Frequency Temp./Humi. :97.8MHz :23.0 deg\_C/60 RH

Operation Mode :MAIN MID Engineer :Pony

EUT Pol. :E2 Plane Measurement Antenna Pol. :VERTICAL



| Frequency | Detector | Note    | Spectrum Reading | Factor | Actual FS | Limit @3m | Margin |   |
|-----------|----------|---------|------------------|--------|-----------|-----------|--------|---|
|           | Mode     |         | Level            |        |           |           |        |   |
| MHz       | PK/QP/AV | F/H/E/S | dBuV/m           | dB     | dBuV/m    | dBuV/m    | dB     |   |
| 97.79     | Peak     | F       | 60.61            | -24.21 | 36.40     | 67.95     | -31.55 | _ |
| 97.79     | Average  | F       | 58.91            | -24.21 | 34.70     | 47.95     | -13.25 |   |

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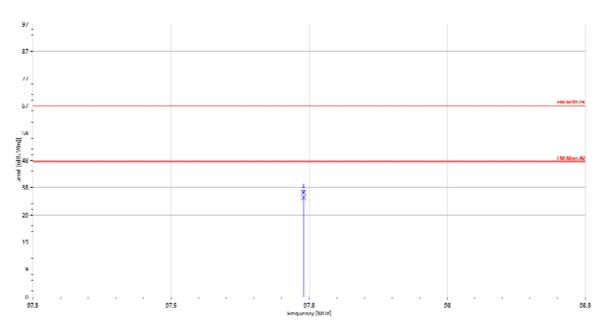


Page: 20 of 32

:FM **Operation Band Test Date** :2015-11-09

Fundamental Frequency Temp./Humi. :97.8MHz :23.0 deg\_C/60 RH Operation Mode :MAIN MID Engineer :Pony

EUT Pol. :E2 Plane Measurement Antenna Pol. :HORIZONTAL



| Frequency | Detector | Note    | Spectrum Reading | Factor | Actual FS | Limit @3m | Margin |   |
|-----------|----------|---------|------------------|--------|-----------|-----------|--------|---|
|           | Mode     |         | Level            |        |           |           |        |   |
| MHz       | PK/QP/AV | F/H/E/S | dBuV/m           | dB     | dBuV/m    | dBuV/m    | dB     |   |
| 97.79     | Peak     | F       | 61.30            | -24.21 | 37.09     | 67.95     | -30.86 | _ |
| 97.79     | Average  | F       | 59.42            | -24.21 | 35.21     | 47.95     | -12.74 |   |

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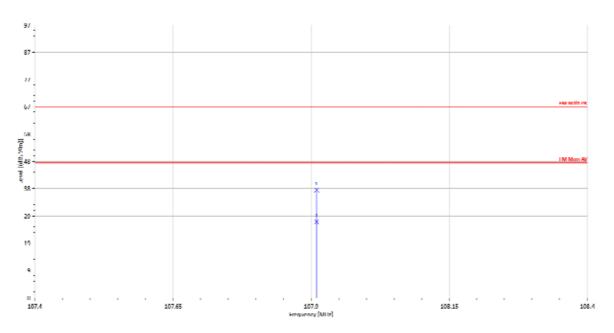


Page: 21 of 32

:FM **Operation Band Test Date** :2015-11-09

Fundamental Frequency :107.9MHz Temp./Humi. :23.0 deg\_C/60 RH :MAIN HIGH

Operation Mode Engineer :Pony EUT Pol. :E2 Plane Measurement Antenna Pol. :VERTICAL



| Frequency | Detector | Note    | Spectrum Reading | Factor | Actual FS | Limit @3m | Margin |   |
|-----------|----------|---------|------------------|--------|-----------|-----------|--------|---|
|           | Mode     |         | Level            |        |           |           |        |   |
| MHz       | PK/QP/AV | F/H/E/S | dBuV/m           | dB     | dBuV/m    | dBuV/m    | dB     |   |
| 107.91    | Peak     | F       | 60.95            | -22.63 | 38.32     | 67.95     | -29.63 | _ |
| 107.91    | Average  | F       | 49.61            | -22.63 | 26.98     | 47.95     | -20.97 |   |

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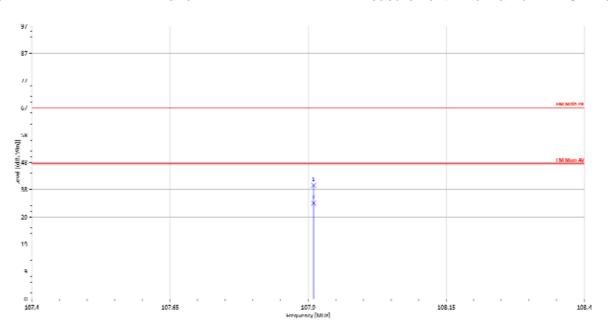


Page: 22 of 32

:FM **Operation Band Test Date** :2015-11-09

Fundamental Frequency :107.9MHz Temp./Humi. :23.0 deg\_C/60 RH Operation Mode :MAIN HIGH Engineer :Pony

EUT Pol. :E2 Plane Measurement Antenna Pol. :HORIZONTAL



| Frequency | Detector | Note    | Spectrum Reading | Factor | Actual FS | Limit @3m | Margin |   |
|-----------|----------|---------|------------------|--------|-----------|-----------|--------|---|
|           | Mode     |         | Level            |        |           |           |        |   |
| MHz       | PK/QP/AV | F/H/E/S | dBuV/m           | dB     | dBuV/m    | dBuV/m    | dB     |   |
| 107.91    | Peak     | F       | 62.91            | -22.63 | 40.28     | 67.95     | -27.67 | _ |
| 107.91    | Average  | F       | 56.57            | -22.63 | 33.94     | 47.95     | -14.01 |   |

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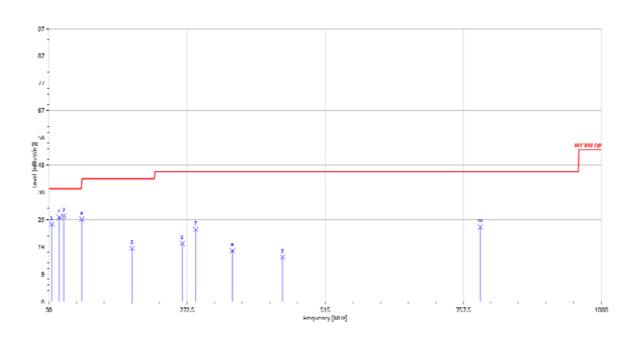
Page: 23 of 32

### 7.6 Radiated Spurious Emission Measurement Result (TX) For Frequency from 30MHz to 1000MHz

Operation Band :2015-11-09 :FM **Test Date** 

**Fundamental Frequency** :88.1MHz Temp./Humi. :23.0 deg\_C/60 RH

**Operation Mode** :TX LOW Engineer :Pony EUT Pol. :E2 Plane Measurement Antenna Pol. :VERTICAL



| Frequency | Detector<br>Mode | Note    | Spectrum Reading<br>Level | Factor | Actual FS | Limit @3m | Margin |
|-----------|------------------|---------|---------------------------|--------|-----------|-----------|--------|
| MHz       | PK/QP/AV         | F/H/E/S | dBuV/m                    | dB     | dBuV/m    | dBuV/m    | dB     |
| 35.63     | Peak             | S       | 43.59                     | -16.22 | 27.36     | 40.00     | -12.64 |
| 48.43     | Peak             | S       | 54.42                     | -24.55 | 29.87     | 40.00     | -10.13 |
| 56.19     | Peak             | S       | 57.75                     | -27.33 | 30.42     | 40.00     | -9.58  |
| 88.20     | Peak             | S       | 54.96                     | -25.86 | 29.10     | 43.50     | -14.40 |
| 176.20    | Peak             | Н       | 42.90                     | -24.11 | 18.79     | 43.50     | -24.71 |
| 264.30    | Peak             | Н       | 40.05                     | -19.50 | 20.55     | 46.00     | -25.45 |
| 288.02    | Peak             | S       | 45.05                     | -19.45 | 25.60     | 46.00     | -20.40 |
| 352.40    | Peak             | Н       | 35.24                     | -17.31 | 17.93     | 46.00     | -28.07 |
| 440.50    | Peak             | Н       | 31.12                     | -15.33 | 15.78     | 46.00     | -30.22 |
| 787.57    | Peak             | S       | 36.33                     | -9.93  | 26.39     | 46.00     | -19.61 |

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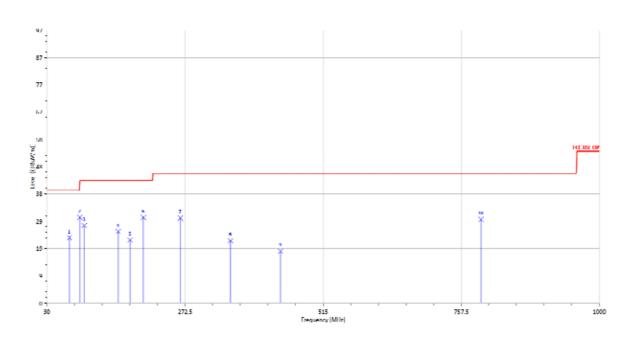


Page: 24 of 32

**Operation Band** :FM **Test Date** :2015-11-09

Fundamental Frequency :88.1MHz Temp./Humi. :23.0 deg\_C/60 RH

Operation Mode :TX LOW Engineer :Pony :VERTICAL EUT Pol. :E2 Plane Measurement Antenna Pol.



| Frequency | Detector | Note    | Spectrum Reading | Factor | Actual FS | Limit @3m | Margin |
|-----------|----------|---------|------------------|--------|-----------|-----------|--------|
|           | Mode     |         | Level            |        |           |           |        |
| MHz       | PK/QP/AV | F/H/E/S | dBuV/m           | dB     | dBuV/m    | dBuV/m    | dB     |
| 69.77     | Peak     | S       | 51.01            | -27.80 | 23.21     | 40.00     | -16.79 |
| 88.20     | Peak     | S       | 56.29            | -25.86 | 30.43     | 43.50     | -13.07 |
| 95.96     | Peak     | S       | 52.06            | -24.54 | 27.52     | 43.50     | -15.98 |
| 155.13    | Peak     | S       | 48.23            | -22.82 | 25.41     | 43.50     | -18.09 |
| 176.20    | Peak     | Н       | 46.53            | -24.11 | 22.42     | 43.50     | -21.08 |
| 199.75    | Peak     | S       | 53.67            | -23.28 | 30.39     | 43.50     | -13.11 |
| 264.30    | Peak     | Н       | 49.69            | -19.50 | 30.19     | 46.00     | -15.81 |
| 352.40    | Peak     | Н       | 39.46            | -17.31 | 22.15     | 46.00     | -23.85 |
| 440.50    | Peak     | Н       | 33.70            | -15.33 | 18.37     | 46.00     | -27.63 |
| 792.42    | Peak     | S       | 39.44            | -9.75  | 29.69     | 46.00     | -16.31 |

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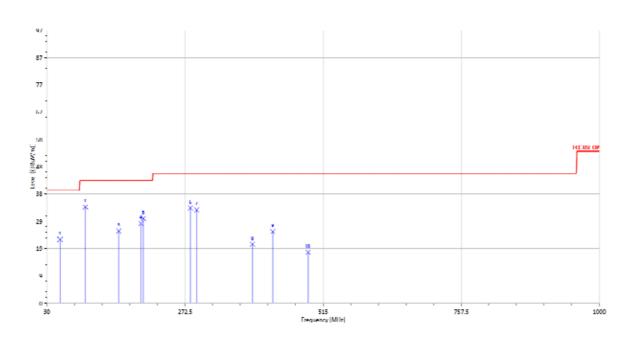


Page: 25 of 32

**Operation Band** :FM **Test Date** :2015-11-09

Fundamental Frequency Temp./Humi. :97.8MHz :23.0 deg\_C/60 RH

Operation Mode :TX MID Engineer :Pony :VERTICAL EUT Pol. :E2 Plane Measurement Antenna Pol.



| Frequency | Detector | Note    | Spectrum Reading | Factor | Actual FS | Limit @3m | Margin |
|-----------|----------|---------|------------------|--------|-----------|-----------|--------|
|           | Mode     |         | Level            |        |           |           |        |
| MHz       | PK/QP/AV | F/H/E/S | dBuV/m           | dB     | dBuV/m    | dBuV/m    | dB     |
| 53.28     | Peak     | S       | 49.12            | -26.52 | 22.61     | 40.00     | -17.39 |
| 97.90     | Peak     | S       | 58.30            | -24.19 | 34.11     | 43.50     | -9.39  |
| 156.10    | Peak     | S       | 48.52            | -22.90 | 25.62     | 43.50     | -17.88 |
| 195.60    | Peak     | Н       | 51.93            | -23.66 | 28.27     | 43.50     | -15.23 |
| 199.75    | Peak     | S       | 53.33            | -23.28 | 30.05     | 43.50     | -13.45 |
| 282.20    | Peak     | S       | 53.37            | -19.61 | 33.76     | 46.00     | -12.24 |
| 293.40    | Peak     | Н       | 52.43            | -19.37 | 33.07     | 46.00     | -12.93 |
| 391.20    | Peak     | Н       | 37.05            | -16.20 | 20.85     | 46.00     | -25.15 |
| 426.73    | Peak     | S       | 40.90            | -15.51 | 25.39     | 46.00     | -20.61 |
| 489.00    | Peak     | Н       | 32.14            | -14.16 | 17.99     | 46.00     | -28.01 |

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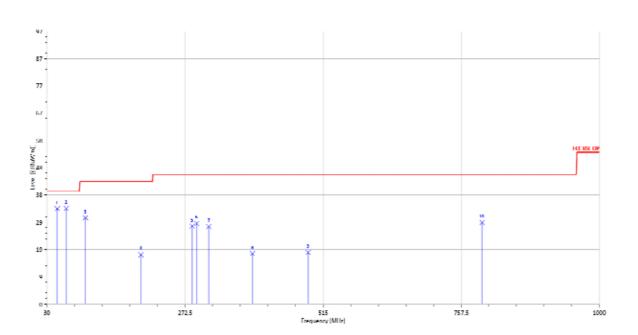
Page: 26 of 32

**Operation Band** :FM **Test Date** :2015-11-09

Fundamental Frequency :97.8MHz Temp./Humi. :23.0 deg\_C/60 RH

Operation Mode :TX MID Engineer :Pony

EUT Pol. :E2 Plane Measurement Antenna Pol. :HORIZONTAL



| Frequency | Detector<br>Mode | Note    | Spectrum Reading Level | Factor | Actual FS | Limit @3m | Margin |
|-----------|------------------|---------|------------------------|--------|-----------|-----------|--------|
| MHz       | PK/QP/AV         | F/H/E/S | dBuV/m                 | dB     | dBuV/m    | dBuV/m    | dB     |
| 48.43     | Peak             | S       | 58.41                  | -24.55 | 33.86     | 40.00     | -6.14  |
| 63.95     | Peak             | S       | 62.17                  | -28.21 | 33.96     | 40.00     | -6.04  |
| 97.90     | Peak             | S       | 54.82                  | -24.19 | 30.64     | 43.50     | -12.86 |
| 195.60    | Peak             | Н       | 41.14                  | -23.66 | 17.48     | 43.50     | -26.02 |
| 285.34    | Peak             | S       | 47.22                  | -19.53 | 27.69     | 46.00     | -18.31 |
| 293.40    | Peak             | S       | 48.02                  | -19.37 | 28.65     | 46.00     | -17.35 |
| 314.21    | Peak             | S       | 46.12                  | -18.62 | 27.49     | 46.00     | -18.51 |
| 391.20    | Peak             | Н       | 34.06                  | -16.20 | 17.86     | 46.00     | -28.14 |
| 489.00    | Peak             | Н       | 32.46                  | -14.16 | 18.30     | 46.00     | -27.70 |
| 794.36    | Peak             | S       | 38.71                  | -9.71  | 29.00     | 46.00     | -17.00 |

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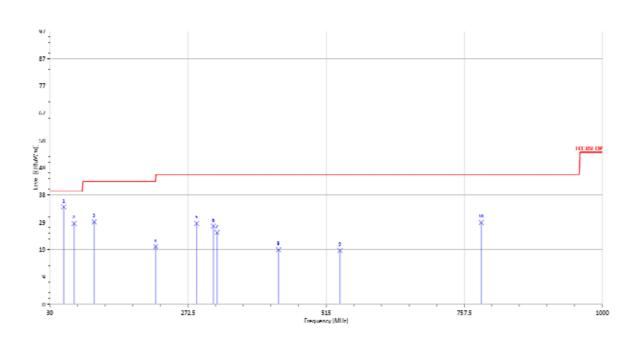


Page: 27 of 32

**Operation Band** :FM **Test Date** :2015-11-09

Fundamental Frequency :107.9MHz Temp./Humi. :23.0 deg\_C/60 RH

Operation Mode :TX HIGH Engineer :Pony :VERTICAL EUT Pol. :E2 Plane Measurement Antenna Pol.



| Frequency | Detector | Note    | Spectrum Reading | Factor | Actual FS | Limit @3m | Margin |
|-----------|----------|---------|------------------|--------|-----------|-----------|--------|
|           | Mode     |         | Level            |        |           |           |        |
| MHz       | PK/QP/AV | F/H/E/S | dBuV/m           | dB     | dBuV/m    | dBuV/m    | dB     |
|           |          |         |                  |        |           |           |        |
| 54.25     | Peak     | S       | 61.33            | -26.79 | 34.53     | 40.00     | -5.47  |
| 72.68     | Peak     | S       | 56.21            | -27.54 | 28.66     | 40.00     | -11.34 |
| 107.60    | Peak     | S       | 51.91            | -22.68 | 29.22     | 43.50     | -14.28 |
| 215.80    | Peak     | Н       | 43.38            | -22.96 | 20.42     | 43.50     | -23.08 |
| 288.02    | Peak     | S       | 48.13            | -19.45 | 28.69     | 46.00     | -17.31 |
| 317.12    | Peak     | S       | 46.24            | -18.54 | 27.70     | 46.00     | -18.30 |
| 323.70    | Peak     | Н       | 43.97            | -18.54 | 25.44     | 46.00     | -20.56 |
| 431.60    | Peak     | Н       | 34.62            | -15.34 | 19.28     | 46.00     | -26.72 |
| 539.50    | Peak     | Н       | 32.32            | -13.30 | 19.02     | 46.00     | -26.98 |
| 787.57    | Peak     | S       | 38.95            | -9.93  | 29.02     | 46.00     | -16.98 |

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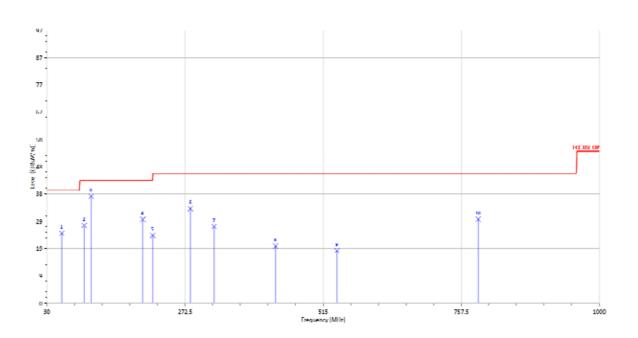
Page: 28 of 32

**Operation Band** :FM **Test Date** :2015-11-09

Fundamental Frequency :107.9MHz Temp./Humi. :23.0 deg\_C/60 RH

Operation Mode :TX HIGH Engineer :Pony

EUT Pol. :E2 Plane Measurement Antenna Pol. :HORIZONTAL



| Frequency | Detector | Note    | Spectrum Reading | Factor | Actual FS | Limit @3m | Margin |
|-----------|----------|---------|------------------|--------|-----------|-----------|--------|
|           | Mode     |         | Level            |        |           |           |        |
| MHz       | PK/QP/AV | F/H/E/S | dBuV/m           | dB     | dBuV/m    | dBuV/m    | dB     |
| 56.19     | Peak     | S       | 52.09            | -27.33 | 24.76     | 40.00     | -15.24 |
| 95.96     | Peak     | S       | 52.10            | -24.54 | 27.56     | 43.50     | -15.94 |
| 107.60    | Peak     | S       | 60.62            | -22.68 | 37.94     | 43.50     | -5.56  |
| 198.78    | Peak     | S       | 53.07            | -23.37 | 29.71     | 43.50     | -13.79 |
| 215.80    | Peak     | Н       | 46.99            | -22.96 | 24.03     | 43.50     | -19.47 |
| 282.20    | Peak     | S       | 53.13            | -19.61 | 33.51     | 46.00     | -12.49 |
| 323.70    | Peak     | Н       | 45.72            | -18.54 | 27.18     | 46.00     | -18.82 |
| 431.60    | Peak     | Н       | 35.55            | -15.34 | 20.21     | 46.00     | -25.79 |
| 539.50    | Peak     | Н       | 31.91            | -13.30 | 18.60     | 46.00     | -27.40 |
| 787.57    | Peak     | S       | 39.71            | -9.93  | 29.77     | 46.00     | -16.23 |

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Page: 29 of 32

### 8. 20dB Occupied Bandwidth

### 8.1 Measurement Procedure

- 1. The EUT was placed on a turn table which is 0.8m above ground plane.
- 2. Set EUT as normal operation by FM digital modulation.
- Set SPA Center Frequency = fundamental frequency, RBW= 10kHz, VBW= 30kHz, Span =300kHz.
- 4. Set SPA Max hold. Mark RMS detector, -20dB of Spectrum Analyzer.
- 5. EUT Operating Conditions: The EUT is connected with a USB dongle and playing songs under testing frequency (adjusted to maximum volume) while playing FM radio by a phone on the other side.
- 6. Note: Because in the event that a 16dB increase cannot be achieved, the level of the tone shall be set to the EUT maximum rated input to the modulator.

### 8.2 Test SET-UP (Block Diagram of Configuration)



8.3 Measurement Equipment Used:

| Conducted Emission Test Site |          |        |            |            |            |  |  |
|------------------------------|----------|--------|------------|------------|------------|--|--|
| EQUIPMENT                    | MFR      | MODEL  | SERIAL     | LAST       | CAL DUE.   |  |  |
| TYPE                         |          | NUMBER | NUMBER     | CAL.       |            |  |  |
| Spectrum Analyzer            | KEYSIGHT | N9010A | MY54510568 | 04/14/2015 | 04/13/2016 |  |  |

#### 8.4 Measurement Results

| Fraguency | OBW   |
|-----------|-------|
| Frequency | (kHz) |
| 88.1MHz   | 77.1  |
| 97.8MHz   | 68.7  |
| 107.9MHz  | 73.8  |

Please refer to next page for test plots.

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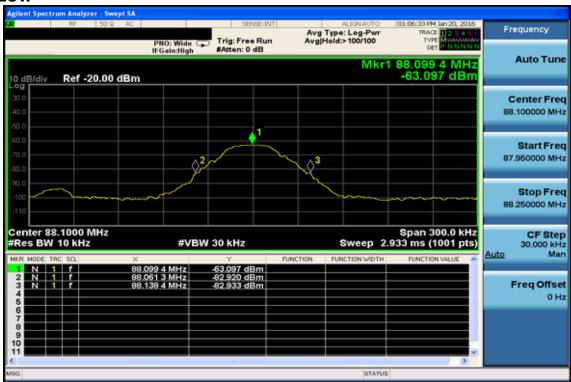
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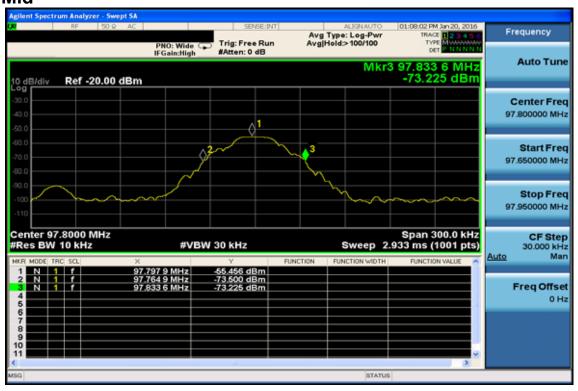


Page: 30 of 32

## **CH Low**



### **CH Mid**



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Page: 31 of 32

# **CH High**



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Page: 32 of 32

### 9. Antenna Requirement

### 9.1 Standard Applicable

According to §15.203, Antenna requirement.

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

#### 9.2 Antenna Connected Construction

A wire antenna design is used.

The antenna is designed as permanently attached and no consideration of replacement. Please see EUT photo for details.

~ End of Report ~

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