

# FCC Test Report

**Applicant Name:** : Yeonhwa M Tech Co.,Ltd

**FCC ID** : VSODX-7100

**Equipment Type** : Digital 5W Portable Radio

**Models Name** : DX-7100, DX-7100R, CP710, VR7100D, RCD7100, X710, MDP-7124, MDP-7116

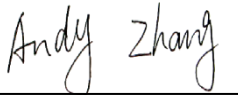
**Report Number** : TZ230604462-E

**Date Of Receipt** : June 12,2023

**Date Of Issue** : June 28,2023

**Test By** :   
(Anna Hu)

**Supervised by** :   
(Hugo Chen)

**Supervised by** :   
(Andy Zhang)

**Tested by** : **Shenzhen Tongzhou Testing Co.,Ltd**  
1th Floor, Building 1, Haomai High-tech Park, Huating Road 387,  
Dalang Street, Longhua, Shenzhen, China

The test report apply only to the specific sample(s) tested under stated test conditions  
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

**REPORT REVISE RECORD**

| <b>Revision</b> | <b>Description</b>          | <b>Issued Data</b> | <b>Remark</b> |
|-----------------|-----------------------------|--------------------|---------------|
| Revision 1.0    | Initial Test Report Release | June 28,2023       | Andy Zhang    |
|                 |                             |                    |               |
|                 |                             |                    |               |



## **1. TEST STANDARDS**

[FCC Part 2](#): FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS

[FCC Part 90](#): PRIVATE LAND MOBILE RADIO SERVICES.

[ANSI/TIA-603-E-2016](#): Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.

[ANSI C63.26-2015](#): IEEE/ANSI Standard for Compliance Testing of Transmitters Used in Licensed Radio Services

## 2. GENERAL INFORMATION

|                          |                                                                                                                                                                     |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Models Name              | DX-7100, DX-7100R, CP710, VR7100D, RCD7100, X710, MDP-7124, MDP-7116                                                                                                |
| Difference description   | See 2.1 of this report                                                                                                                                              |
| Test Model               | DX-7100                                                                                                                                                             |
| Applicant                | Yeonhwa M Tech Co.,Ltd                                                                                                                                              |
| Address                  | 36, Jeonpa-ro, 44beon-gil, Manan-gu, Anyang-si, Gyeonggi-do, korea 14086                                                                                            |
| Manufacturer             | Yeonhwa M Tech Co.,Ltd                                                                                                                                              |
| Address                  | 36, Jeonpa-ro, 44beon-gil, Manan-gu, Anyang-si, Gyeonggi-do, korea 14086                                                                                            |
| Equipment Type           | Digital 5W Portable Radio                                                                                                                                           |
| Trade Mark               |   |
| Hardware version:        | BK71-R1                                                                                                                                                             |
| Software version:        | V2.5.2.0                                                                                                                                                            |
| Extreme Temp. Tolerance  | 0°C-+40°C                                                                                                                                                           |
| EUT Power Rating         | DC 7.4 V by battery                                                                                                                                                 |
| Operating Frequency      | 136 MHz – 174 MHz                                                                                                                                                   |
| Channel Spacing          | 12.5 KHz                                                                                                                                                            |
| Modulation Type          | FM, 4FSK                                                                                                                                                            |
| Emission Designation     | FM VOICE:11K0F3E<br>4FSK VOICE:7K60F1E<br>4FSK DATA:7K60F1D                                                                                                         |
| Antenna Type:            | Detachable Antenna                                                                                                                                                  |
| Antenna gain:            | 0.0 dBi                                                                                                                                                             |
| Data of receipt          | June 12,2023                                                                                                                                                        |
| Date of test             | June 12,2023 to June 28,2023                                                                                                                                        |
| Deviation                | None                                                                                                                                                                |
| Test Sample              | TZ230604463-1#                                                                                                                                                      |
| Condition of Test Sample | Normal                                                                                                                                                              |

The Frequency can be set by software from 136MHz to 174MHz, but all the channel set will follow Below before market:



| Frequency Range(MHz) | FCC rule part |
|----------------------|---------------|
| 136-150.8 MHz        | For Federal   |
| 150.8-152.855 MHz    | FCC Part 90   |
| 152.855-154 MHz      | FCC Part 90   |
| 154-156.2475 MHz     | FCC Part 90   |
| 157.45-161.575 MHz   | FCC Part 90   |
| 161.775-161.9625 MHz | FCC Part 90   |
| 161.625-161.755 MHz  | FCC Part 90   |
| 162.0375-173.2 MHz   | FCC Part 90   |
| 173.2-173.4 MHz      | FCC Part 90   |
| 173.4-174 MHz        | For Federal   |

## 2.1. Difference of Models

| Model(s)                                               | Brand name                                                                        | Function | Difference description                                      | Appearance                                                                          |
|--------------------------------------------------------|-----------------------------------------------------------------------------------|----------|-------------------------------------------------------------|-------------------------------------------------------------------------------------|
| DX-7100, DX-7100R,<br>CP710, VR7100D,<br>RCD7100, X710 |  | LCD Type | All the same except<br>for the model name<br>and brand name |  |
| MDP-7124, MDP-<br>7116                                 |  |          |                                                             |                                                                                     |

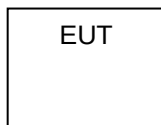
## 2.2. EUT operation mode

| Modulation | Channel separation | Frequency (MHz) | Operation Description |
|------------|--------------------|-----------------|-----------------------|
| FM         | 12.5 KHz           | 151.0250        | Op1                   |
|            | 12.5 KHz           | 162.0250        | Op2                   |
|            | 12.5 KHz           | 173.3875        | Op3                   |
| 4FSK       | 12.5 KHz           | 151.0250        | Op4                   |
|            | 12.5 KHz           | 162.0250        | Op5                   |
|            | 12.5 KHz           | 173.3875        | Op6                   |



### 2.3. Block Diagram of Test Setup

Fig. 2-1 Configuration of Tested System



### 2.4. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: VSODX-7100** filing to comply with FCC Part 2, FCC Part 90 of FCC CFR 47 Rules.



### **3. TEST ENVIRONMENT**

#### **3.1. Address of the test laboratory**

**Shenzhen Tongzhou Testing Co.,Ltd  
1th Floor, Building 1, Haomai High-tech Park, Huating Road 387, Dalang Street, Longhua,  
Shenzhen, China**

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 (2014) and CISPR Publication 22.

#### **3.2. Test Facility**

##### **FCC**

Designation Number: CN1275

Test Firm Registration Number: 167722

Shenzhen Tongzhou Testing Co.,Ltd has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

##### **A2LA**

Certificate Number: 5463.01

Shenzhen Tongzhou Testing Co.,Ltd has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

##### **IC**

ISED#: 22033

CAB identifier: CN0099

Shenzhen Tongzhou Testing Co.,Ltd has been listed by Innovation, Science and Economic Development Canada to perform electromagnetic emission measurement.

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.10 and CISPR 16-1-4:2010

#### **3.3. Environmental conditions**

During the measurement the environmental conditions were within the listed ranges:

|                       |              |
|-----------------------|--------------|
| Temperature:          | 15-35 ° C    |
|                       |              |
| Humidity:             | 30-60 %      |
|                       |              |
| Atmospheric pressure: | 950-1050mbar |





### 3.4. Test Description

| Test Specification clause     | Test case                         | Pass                                | Fail                     | NA                       | NP                       | Remark |
|-------------------------------|-----------------------------------|-------------------------------------|--------------------------|--------------------------|--------------------------|--------|
| §90.205<br>§2.1046(a)         | RF Power Output                   | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Pass   |
| §90.205<br>§2.1046(a)         | RF Power Output(Conducted Method) | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Pass   |
| §2.1047                       | Modulation Characteristic         | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Pass   |
| §90.209<br>§2.1049            | 99% Occupied Bandwidth            | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Pass   |
| §90.210<br>§2.1049            | Emission Mask                     | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Pass   |
| §90.213<br>§2.1055            | Frequency Stability               | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Pass   |
| §2.1051<br>§2.1053<br>§90.210 | TX spurious emissions             | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Pass   |
| §90.214                       | Transient frequency behavior      | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Pass   |

Note:

1. NA = Not Applicable; NP = Not Performed;
2. The measurement uncertainty is not included in the test result.

### 3.5. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16 – 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen Tongzhou Testing Co.,Ltd quality system acc. To DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen Tongzhou Testing Co.,Ltd laboratory is reported:

| Test Item                | Frequency Range | Uncertainty | Note |
|--------------------------|-----------------|-------------|------|
| Radiation Uncertainty :  | 9KHz~30MHz      | ±3.08dB     | (1)  |
|                          | 30MHz~1000MHz   | ±4.42dB     | (1)  |
|                          | 1GHz~40GHz      | ±4.06dB     | (1)  |
| Conduction Uncertainty : | 150kHz~30MHz    | ±2.23dB     | (1)  |

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



### 3.6. Equipments Used during the Test

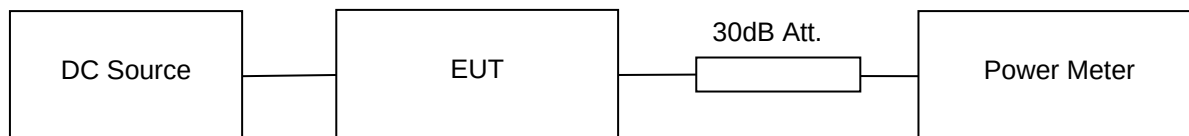
| Item | Test Equipment                  | Manufacturer | Model No.    | Serial No.  | Calibration Date | Calibration Due Date |
|------|---------------------------------|--------------|--------------|-------------|------------------|----------------------|
| 1    | EMI Test Receiver               | R&S          | ESCI-7       | 100849/003  | 2022/12/28       | 2023/12/27           |
| 2    | Signal Generator (SG B)         | Keysight     | N5182A       | MY4620709   | 2022/12/28       | 2023/12/27           |
| 3    | Signal Generator(SG C)          | R&S          | SML03        | 102924/0013 | 2022/12/28       | 2023/12/27           |
| 4    | Climate Chamber                 | KRUOMR       | KRM-1000     | KRM16072901 | 2022/12/28       | 2023/12/27           |
| 5    | RF COMMUNICATION TEST SET(SG A) | HP           | 8921A        | 3430A01131  | 2022/12/28       | 2023/12/27           |
| 6    | Wideband Antenna                | schwarzbeck  | VULB 9163    | 958         | 2022/11/13       | 2025/11/12           |
| 7    | Wideband Antenna                | Sunol        | JB3          | A020115     | 2022/11/13       | 2025/11/12           |
| 8    | Amplifier                       | schwarzbeck  | BBV 9743     | 209         | 2022/12/28       | 2023/12/27           |
| 9    | Amplifier                       | Tonscend     | TSAMP-0518SE | --          | 2022/12/28       | 2023/12/27           |
| 10   | Horn Antenna                    | schwarzbeck  | BBHA 9120D   | 01989       | 2022/11/13       | 2025/11/12           |
| 11   | Horn Antenna                    | schwarzbeck  | 9120D-1141   | 1574        | 2022/11/13       | 2025/11/12           |
| 12   | 50Ω RF Load                     | MKRF         | RFA001       | RFA001      | 2022/12/28       | 2023/12/27           |
| 13   | Attenuator                      | JS           | RFA004       | RFA004      | 2022/12/28       | 2023/12/27           |
| 14   | Controller                      | MF           | MF7802       | N/A         | N/A              | N/A                  |
| 15   | MXA Signal Analyzer             | Keysight     | N9020A       | MY52091623  | 2022/12/28       | 2023/12/27           |
| 16   | Test Software                   | Tonscend     | JS36-RSE     | V1.0.2.0    | N/A              | N/A                  |
| 17   | Digital Radio Test Set          | AEROFLEX     | 3920         | 299001967   | 2022/12/28       | 2023/12/27           |



## **4. TEST CONDITIONS AND RESULTS**

### **4.1. Transmitter Output Power**

#### **TEST CONFIGURATION**



#### **TEST PROCEDURE**

- 1) Connect the equipment as illustrated.
- 2) Set EUT working in continuous mode in low, middle, high frequency, read and record the peak power value.

#### **TEST RESULTS**

| Modulation   | Channel Separation | Test Frequency (MHz) | Reading(dBm)     |                 |
|--------------|--------------------|----------------------|------------------|-----------------|
|              |                    |                      | High Power Level | Low Power Level |
| FM           | 12.5KHz            | 151.025              | 36.91            | 29.87           |
|              |                    | 162.0250             | 36.54            | 29.19           |
|              |                    | 173.3875             | 36.87            | 29.88           |
| 4FSK         | 12.5KHz            | 151.025              | 36.69            | 29.75           |
|              |                    | 162.0250             | 36.28            | 29.11           |
|              |                    | 173.3875             | 36.77            | 29.75           |
| Rated Power  |                    |                      | 5W(37.00dBm)     | 1W(30dBm)       |
| Result Power |                    |                      | Pass             | Pass            |

The rated 5W for High Power and 1W for Low power.

## 4.2. Modulation Characteristics

### TEST CONFIGURATION

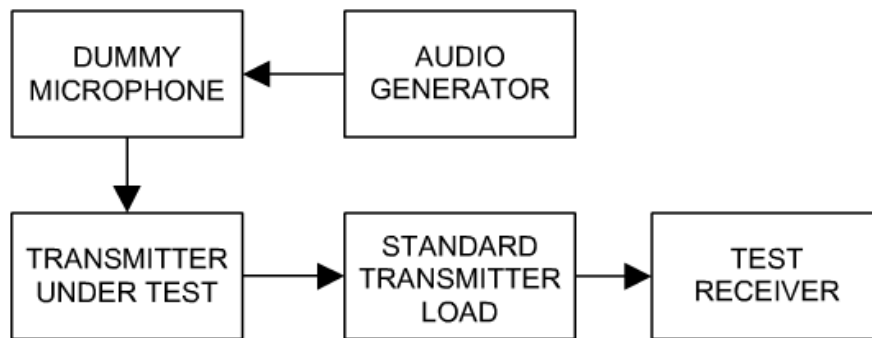


Figure 1: Modulation Limit & Audio Frequency Response

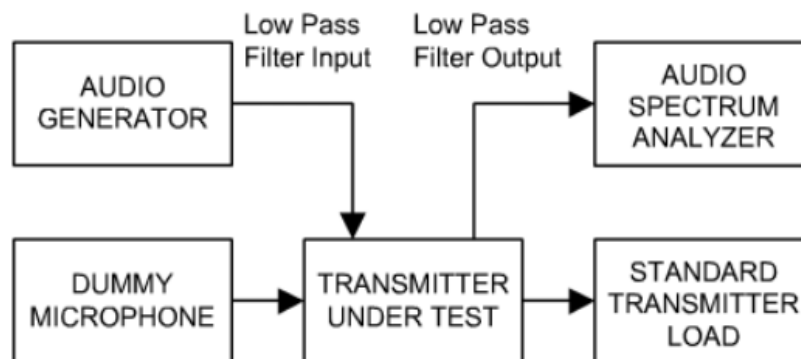


Figure 2: Audio Low Pass Filter Response

### TEST PROCEDURE

#### Modulation limitations

- 1 Connect the equipment as illustrated.
- 2 Adjust the transmitter per the manufacturer's procedure for full rated system deviation.
- 3 Set the test receiver to measure peak positive deviation. Set the audio bandwidth for  $\leq 0.25$  Hz to  $\geq 15,000$  Hz. Turn the de-emphasis function off.
- 4 Apply a 1000 Hz modulating signal to the transmitter from the audio frequency generator, and adjust the level to obtain 60% of full rated system deviation, this level is as a reference (0dB) and vary the input level from -20 to +20dB.
- 5 Measure both the instantaneous and steady-state deviation at and after the time of increasing the audio input level
- 6 Repeat step 4-5 with input frequency changing to 300Hz, 500Hz, 1000Hz, 1500Hz, 2000Hz, 2500Hz and 3000Hz in sequence.

#### Audio Frequency Response

- 1 Configure the EUT as shown in figure 1.
- 2 Adjust the audio input for 20% of rated system deviation at 1kHz using this level as a reference.
- 3 Vary the Audio frequency from 300Hz to 3 KHz. and record the frequency deviation.
- 4 Audio Frequency Response =  $20 \log_{10} (\text{Deviation of test frequency} / \text{Deviation of 1 KHz reference})$ .

#### Audio Low Pass Filter Frequency Response

- 1 Configure the EUT as shown in figure 2.
- 2 Connect the audio frequency generator as close as possible the input of the post limiter low pass filter within the transmitter under test.
- 3 Connect the audio spectrum analyzer to the output of the post limiter low pass filter within the transmitter under test.



- 4 Apply a 1000 Hz tone from the audio frequency generator and adjust the level per manufacturer's specifications.
- 5 Record the dB level of the 1000 Hz spectral line on the audio spectrum analyzer as  $LEV_{REF}$ .
- 6 Set the audio frequency generator to the desired test frequency between 3000 Hz and the upper low pass filter limit.
- 7 Record audio spectrum analyzer levels, at the test frequency in step 6).
- 8 Record the dB level on the audio spectrum analyzer as  $LEV_{RREQ}$ .
- 9 Calculate the audio frequency response at the test frequency as:  
 $low\ pass\ filter\ response = LEV_{FREQ} - LEV_{REF}$
- 11 Repeat steps 6) through 10) for all the desired test frequencies.

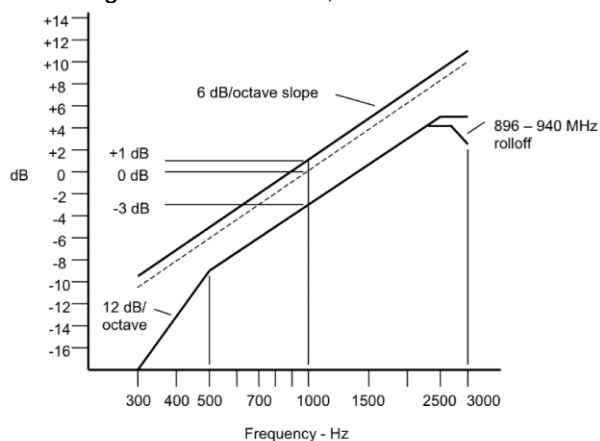
### **LIMIT**

#### **Modulation limitations**

According to TIA/EIA 603 D, For FM transmitters, the sum of the highest modulating frequency in Hertz and the amount of the frequency deviation or swing in Hertz may not exceed 2800 Hz and the maximum deviation may not exceed 2.5 kHz.

#### **Audio Frequency Response**

According to TIA/EIA 603 D,



The audio frequency response from 300 Hz to 3000 Hz shall not vary more than +1 dB or -3 dB from a true 6 dB per octave pre-emphasis characteristic as referenced to the 1000 Hz level. The exception is from 500 Hz to 3000 Hz, where an additional 6 dB per octave rolloff is allowed.

The following exceptions are also permissible:

- a) An additional 6 dB per octave attenuation is allowed from 2500 Hz to 3000 Hz in equipment operating in the 25 MHz to 869 MHz range.
- b) An additional 6 dB per octave rolloff is allowed from 2300 Hz to 2700 Hz, and an additional 12 dB per octave is allowed from 2700 Hz to 3000 Hz, in equipment operating in the 896 MHz to 940 MHz range, and all narrowband (12.5 kHz and 15 kHz channelization) equipment.

#### **Audio Low Pass Filter Frequency Response**

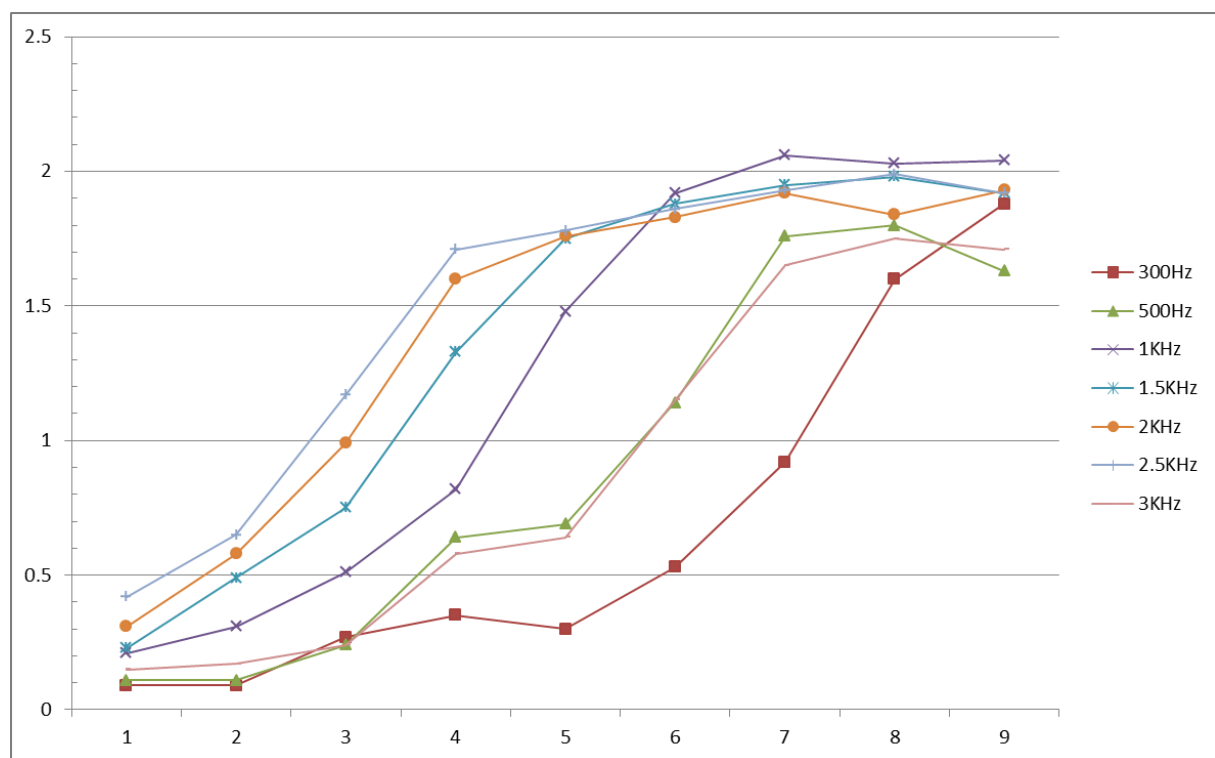
According to TIA/EIA 603 D,

| Audio band | Minimum Attenuation Rel. to 1KHz Attenuation |
|------------|----------------------------------------------|
| 3-20KHz    | $100 \cdot \log_{10} (f/3)$ decibels         |
| 20-30KHz   | 82.5dB                                       |

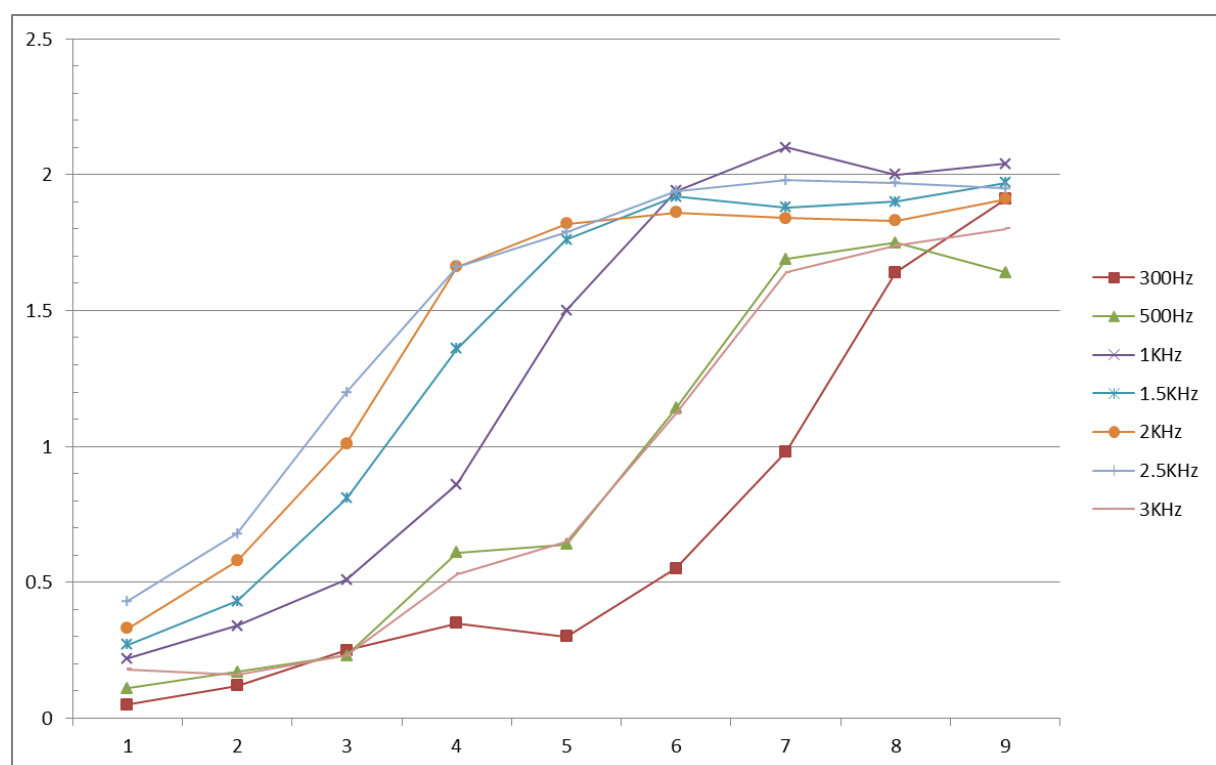
### **TEST RESULTS**

#### 4.2.1.1 Modulation Characteristics

| 151.025MHz @ 12.5 KHz Channel Separation |                                |       |      |        |      |        |      |            |        |
|------------------------------------------|--------------------------------|-------|------|--------|------|--------|------|------------|--------|
| Modulation Input(dBC)                    | Peak Frequency Deviation (KHz) |       |      |        |      |        |      | Limit(KHz) | Result |
|                                          | 300Hz                          | 500Hz | 1KHz | 1.5KHz | 2KHz | 2.5KHz | 3KHz |            |        |
| -20                                      | 0.25                           | 0.37  | 0.28 | 0.33   | 0.35 | 0.42   | 0.26 | 2.5        | Pass   |
| -15                                      | 0.53                           | 0.32  | 0.5  | 0.42   | 0.52 | 0.66   | 0.62 | 2.5        | Pass   |
| -10                                      | 0.68                           | 0.4   | 0.58 | 0.55   | 0.89 | 0.81   | 0.77 | 2.5        | Pass   |
| -5                                       | 1.11                           | 0.45  | 0.87 | 1.05   | 1.44 | 1.31   | 1.21 | 2.5        | Pass   |
| 0                                        | 1.11                           | 0.76  | 1.5  | 1.42   | 1.8  | 1.8    | 1.66 | 2.5        | Pass   |
| 5                                        | 1.44                           | 1.31  | 2.11 | 1.9    | 1.92 | 1.82   | 1.64 | 2.5        | Pass   |
| 10                                       | 1.67                           | 1.69  | 2.1  | 1.95   | 1.92 | 2.02   | 1.59 | 2.5        | Pass   |
| 15                                       | 1.51                           | 1.9   | 2.2  | 2.11   | 2.02 | 2.21   | 1.6  | 2.5        | Pass   |
| 20                                       | 1.64                           | 1.83  | 2.1  | 2.09   | 2.13 | 1.9    | 1.46 | 2.5        | Pass   |



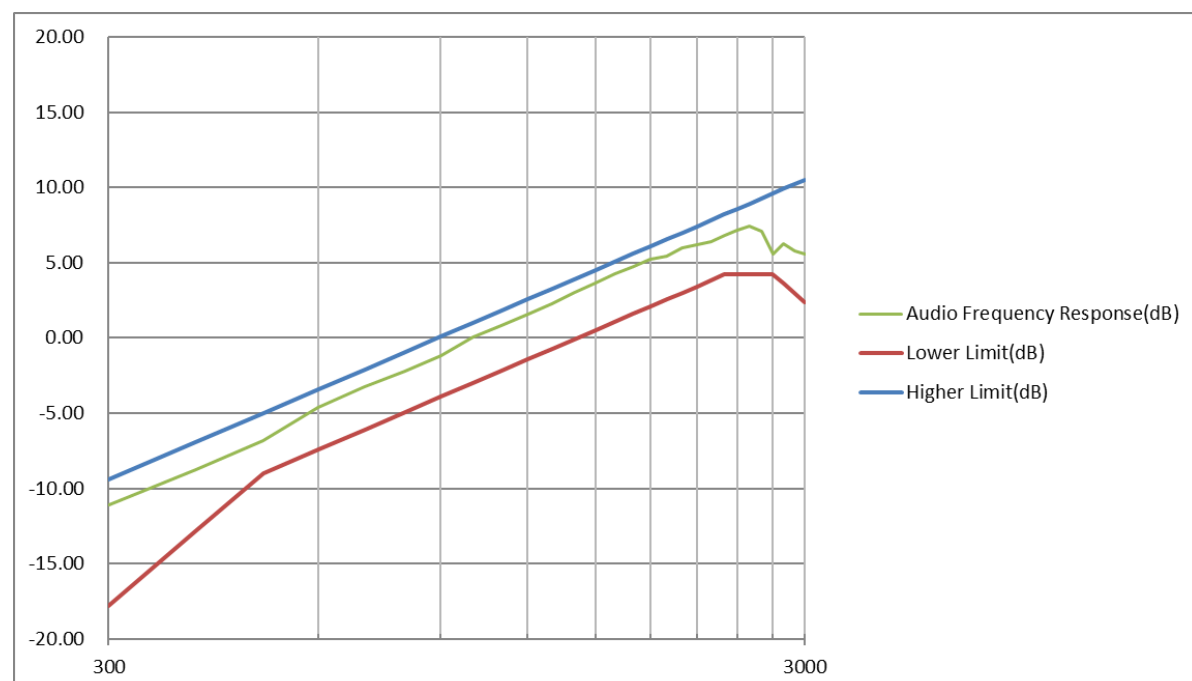
| 173.3875MHz @ 12.5 KHz Channel Separation |                                |       |      |        |      |        |      |            |        |
|-------------------------------------------|--------------------------------|-------|------|--------|------|--------|------|------------|--------|
| Modulation Input(dBC)                     | Peak Frequency Deviation (KHz) |       |      |        |      |        |      | Limit(KHz) | Result |
|                                           | 300Hz                          | 500Hz | 1KHz | 1.5KHz | 2KHz | 2.5KHz | 3KHz |            |        |
| -20                                       | 0.23                           | 0.37  | 0.32 | 0.33   | 0.34 | 0.45   | 0.29 | 2.5        | Pass   |
| -15                                       | 0.55                           | 0.34  | 0.55 | 0.4    | 0.52 | 0.65   | 0.64 | 2.5        | Pass   |
| -10                                       | 0.65                           | 0.39  | 0.58 | 0.58   | 0.89 | 0.8    | 0.77 | 2.5        | Pass   |
| -5                                        | 1.08                           | 0.46  | 0.87 | 1.07   | 1.48 | 1.3    | 1.19 | 2.5        | Pass   |
| 0                                         | 1.09                           | 0.73  | 1.5  | 1.39   | 1.81 | 1.79   | 1.7  | 2.5        | Pass   |
| 5                                         | 1.44                           | 1.28  | 2.13 | 1.92   | 1.93 | 1.85   | 1.61 | 2.5        | Pass   |
| 10                                        | 1.7                            | 1.66  | 2.15 | 1.91   | 1.88 | 2.05   | 1.58 | 2.5        | Pass   |
| 15                                        | 1.51                           | 1.86  | 2.16 | 2.08   | 1.97 | 2.23   | 1.6  | 2.5        | Pass   |
| 20                                        | 1.65                           | 1.8   | 2.1  | 2.11   | 2.16 | 1.89   | 1.5  | 2.5        | Pass   |





#### 4.5.3 Audio Frequency Response

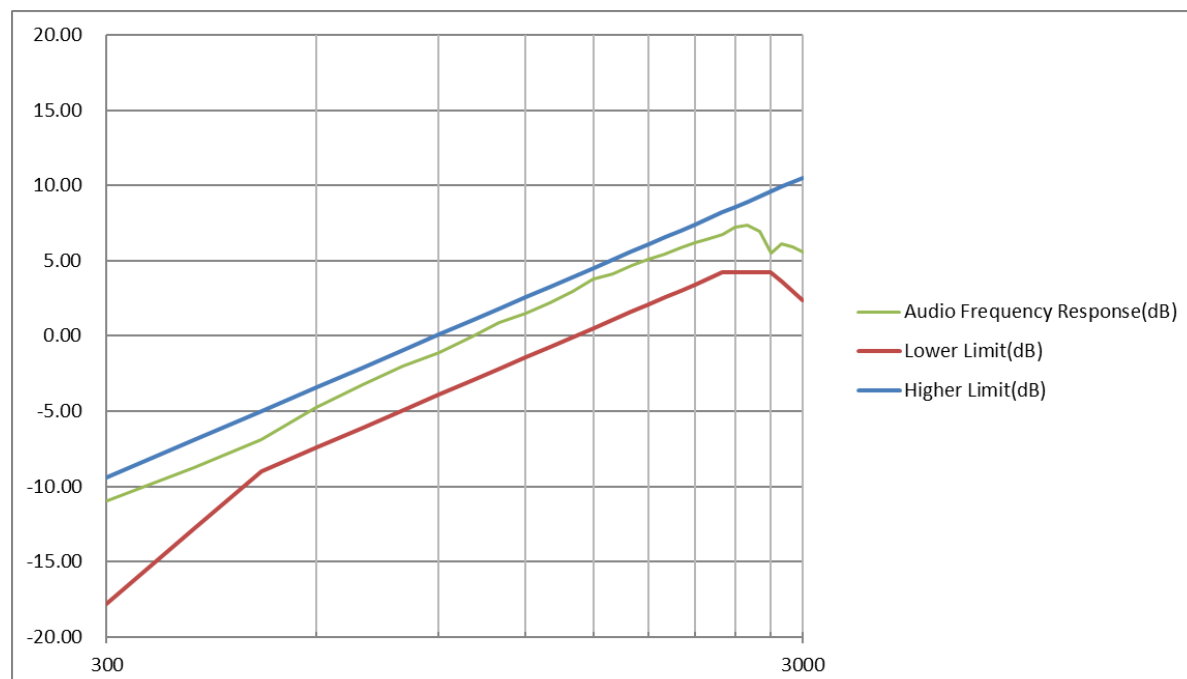
| 151.025MHz@ 12.5 KHz Channel Separation |                 |                              |                  |
|-----------------------------------------|-----------------|------------------------------|------------------|
| Frequency(Hz)                           | Lower Limit(dB) | Audio Frequency Response(dB) | Higher Limit(dB) |
| 300                                     | -17.84          | -11.09                       | -9.42            |
| 400                                     | -12.86          | -8.76                        | -6.93            |
| 500                                     | -9.00           | -6.85                        | -5.00            |
| 600                                     | -7.42           | -4.62                        | -3.42            |
| 700                                     | -6.09           | -3.23                        | -2.09            |
| 800                                     | -4.93           | -2.21                        | -0.93            |
| 900                                     | -3.91           | -1.19                        | 0.09             |
| 1000                                    | -3              | 0.03                         | 1.00             |
| 1100                                    | -2.17           | 0.84                         | 1.83             |
| 1200                                    | -1.42           | 1.57                         | 2.58             |
| 1300                                    | -0.73           | 2.28                         | 3.27             |
| 1400                                    | -0.09           | 3.02                         | 3.91             |
| 1500                                    | 0.51            | 3.64                         | 4.51             |
| 1600                                    | 1.07            | 4.23                         | 5.07             |
| 1700                                    | 1.59            | 4.77                         | 5.59             |
| 1800                                    | 2.09            | 5.25                         | 6.09             |
| 1900                                    | 2.56            | 5.44                         | 6.56             |
| 2000                                    | 3.00            | 5.95                         | 7.00             |
| 2100                                    | 3.42            | 6.16                         | 7.42             |
| 2200                                    | 3.83            | 6.39                         | 7.83             |
| 2300                                    | 4.21            | 6.84                         | 8.21             |
| 2400                                    | 4.21            | 7.16                         | 8.58             |
| 2500                                    | 4.21            | 7.40                         | 8.93             |
| 2600                                    | 4.21            | 7.05                         | 9.27             |
| 2700                                    | 4.21            | 5.56                         | 9.60             |
| 2800                                    | 3.58            | 6.25                         | 9.91             |
| 2900                                    | 2.97            | 5.78                         | 10.22            |
| 3000                                    | 2.39            | 5.56                         | 10.51            |







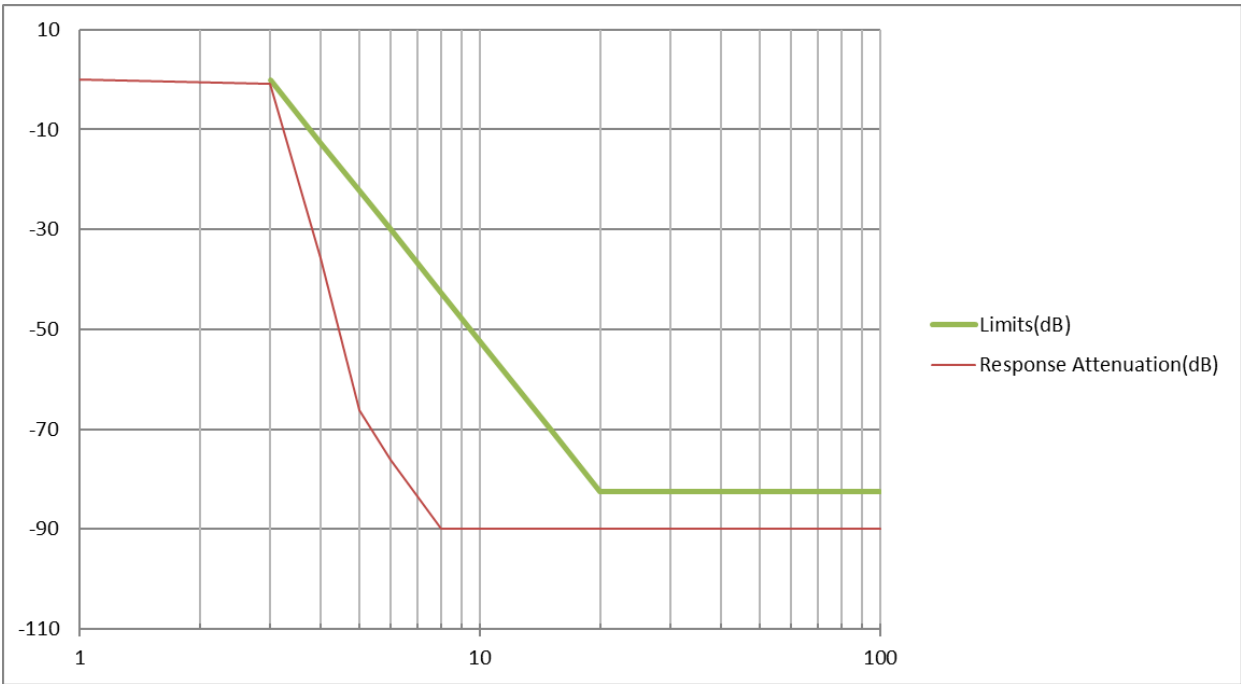
| 173.3875MHz@ 12.5 KHz Channel Separation |                 |                              |                  |
|------------------------------------------|-----------------|------------------------------|------------------|
| Frequency(Hz)                            | Lower Limit(dB) | Audio Frequency Response(dB) | Higher Limit(dB) |
| 300                                      | -17.84          | -11.00                       | -9.42            |
| 400                                      | -12.86          | -8.79                        | -6.93            |
| 500                                      | -9.00           | -6.89                        | -5.00            |
| 600                                      | -7.42           | -4.79                        | -3.42            |
| 700                                      | -6.09           | -3.24                        | -2.09            |
| 800                                      | -4.93           | -2.03                        | -0.93            |
| 900                                      | -3.91           | -1.14                        | 0.09             |
| 1000                                     | -3              | -0.09                        | 1.00             |
| 1100                                     | -2.17           | 0.89                         | 1.83             |
| 1200                                     | -1.42           | 1.47                         | 2.58             |
| 1300                                     | -0.73           | 2.20                         | 3.27             |
| 1400                                     | -0.09           | 2.94                         | 3.91             |
| 1500                                     | 0.51            | 3.78                         | 4.51             |
| 1600                                     | 1.07            | 4.12                         | 5.07             |
| 1700                                     | 1.59            | 4.68                         | 5.59             |
| 1800                                     | 2.09            | 5.07                         | 6.09             |
| 1900                                     | 2.56            | 5.43                         | 6.56             |
| 2000                                     | 3.00            | 5.82                         | 7.00             |
| 2100                                     | 3.42            | 6.16                         | 7.42             |
| 2200                                     | 3.83            | 6.49                         | 7.83             |
| 2300                                     | 4.21            | 6.72                         | 8.21             |
| 2400                                     | 4.21            | 7.21                         | 8.58             |
| 2500                                     | 4.21            | 7.36                         | 8.93             |
| 2600                                     | 4.21            | 6.93                         | 9.27             |
| 2700                                     | 4.21            | 5.51                         | 9.60             |
| 2800                                     | 3.58            | 6.13                         | 9.91             |
| 2900                                     | 2.97            | 5.90                         | 10.22            |
| 3000                                     | 2.39            | 5.55                         | 10.51            |





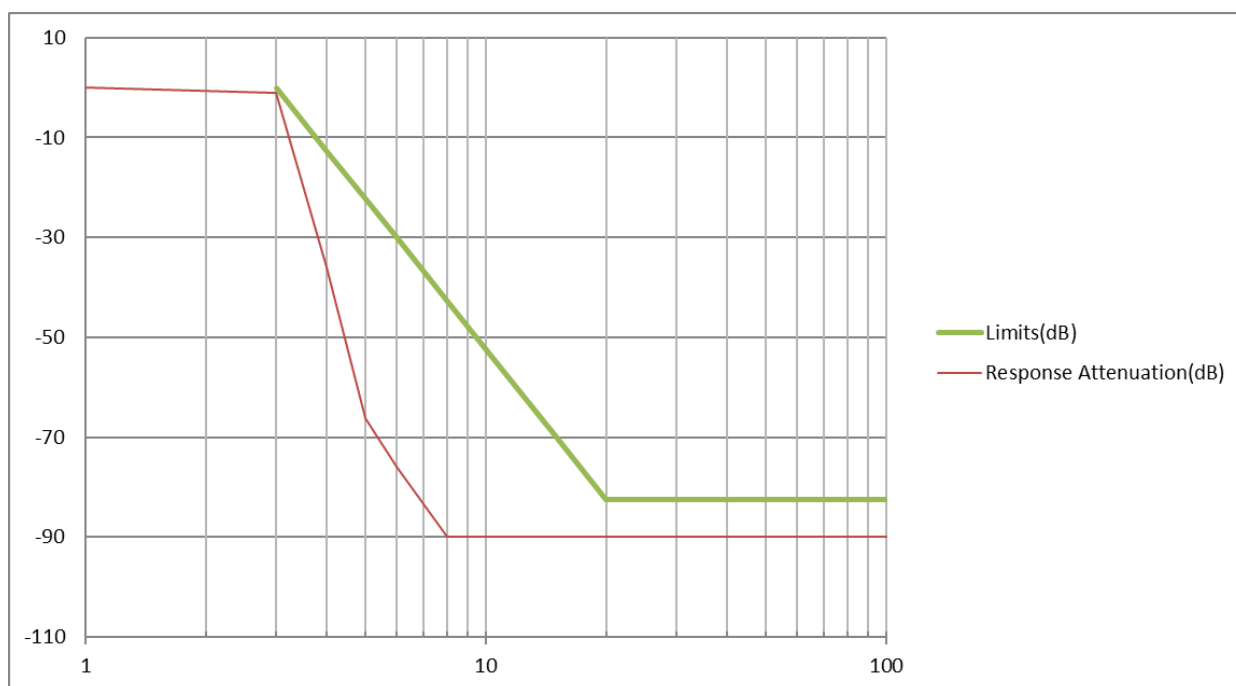
4.5.3 Audio Low Pass Filter Frequency Response

| 151.025MHz@ 12.5 KHz Channel Separation |                      |        |
|-----------------------------------------|----------------------|--------|
| Audio Frequency (KHz)                   | dB relative to 1 KHz | Limits |
| 1                                       | 0                    | 0      |
| 3                                       | -0.9                 | 0      |
| 4                                       | -35.8                | -12.5  |
| 5                                       | -66.3                | -22.2  |
| 6                                       | -76.1                | -30.1  |
| 8                                       | -89.9                | -42.6  |
| 10                                      | -89.9                | -52.3  |
| 15                                      | -89.9                | -69.9  |
| 20                                      | -89.9                | -82.4  |
| 30                                      | -89.9                | -82.5  |
| 40                                      | -89.9                | -82.5  |
| 50                                      | -89.9                | -82.5  |
| 60                                      | -89.9                | -82.5  |
| 70                                      | -89.9                | -82.5  |
| 80                                      | -89.9                | -82.5  |
| 90                                      | -89.9                | -82.5  |
| 100                                     | -89.9                | -82.5  |



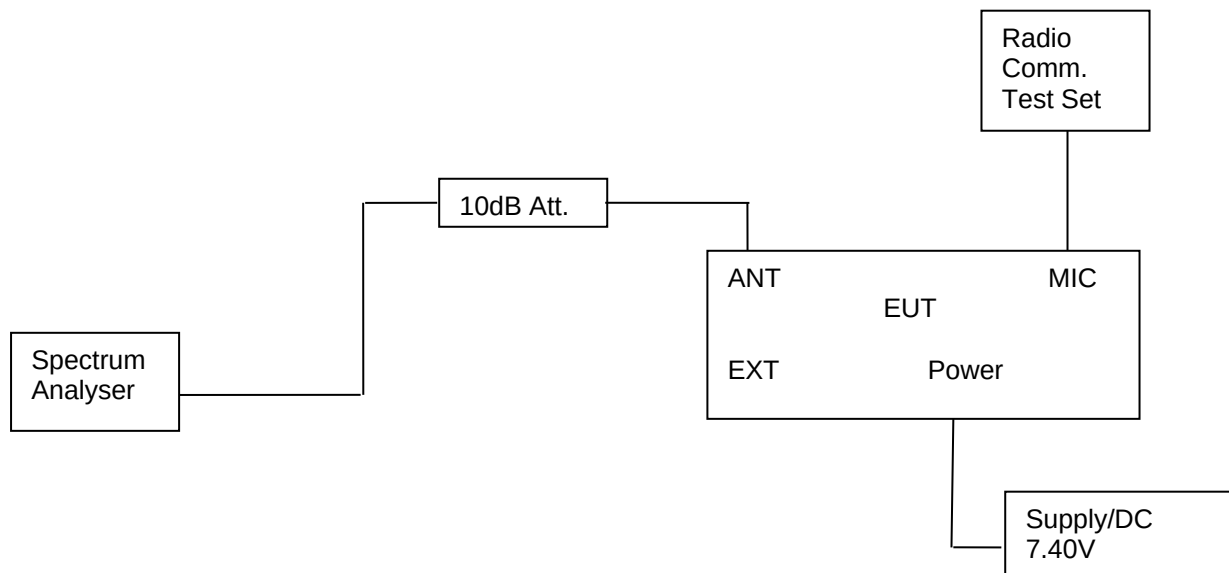


| 173.3875MHz@ 12.5 KHz Channel Separation |                      |        |
|------------------------------------------|----------------------|--------|
| Audio Frequency (KHz)                    | dB relative to 1 KHz | Limits |
| 1                                        | 0                    | 0      |
| 3                                        | -1.1                 | 0      |
| 4                                        | -36.1                | -12.5  |
| 5                                        | -66.2                | -22.2  |
| 6                                        | -75.9                | -30.1  |
| 8                                        | -89.9                | -42.6  |
| 10                                       | -89.9                | -52.3  |
| 15                                       | -89.9                | -69.9  |
| 20                                       | -89.9                | -82.4  |
| 30                                       | -89.9                | -82.5  |
| 40                                       | -89.9                | -82.5  |
| 50                                       | -89.9                | -82.5  |
| 60                                       | -89.9                | -82.5  |
| 70                                       | -89.9                | -82.5  |
| 80                                       | -89.9                | -82.5  |
| 90                                       | -89.9                | -82.5  |
| 100                                      | -89.9                | -82.5  |



### 4.3. Occupied Bandwidth and Emission Mask

#### TEST CONFIGURATION



#### TEST PROCEDURE

- 1 The EUT was modulated by 2.5 KHz Sine wave audio signal;the level of the audio signal employed is 16 dB greater than that necessary to produce 50% of rated system deviation.
- 2 Set EUT work at continuous transmitting.
- 3 Set SPA Centre Frequency = fundamental frequency, RBW=300Hz, VBW= 1 KHz, span =100 KHz.
- 4 Set SPA Max hold. Mark peak, Set 99% Occupied Bandwidth and 26dB Occupied Bandwidth.

#### LIMIT

##### Standard Channel Spacing/Bandwidth

| Frequency band (MHz)                  | Channel spacing (kHz) | Authorized bandwidth (kHz) |
|---------------------------------------|-----------------------|----------------------------|
| Below 25 <sup>2</sup>                 |                       |                            |
| 25-50                                 | 20                    | 20                         |
| 72-76                                 | 20                    | 20                         |
| 150-174                               | <sup>1</sup> 7.5      | <sup>1 3</sup> 20/11.25/6  |
| 216-220 <sup>5</sup>                  | 6.25                  | 20/11.25/6                 |
| 220-222                               | 5                     | 4                          |
| 406-512 <sup>2</sup>                  | <sup>1</sup> 6.25     | <sup>136</sup> 20/11.25/6  |
| 806-809/851-854                       | 12.5                  | 20                         |
| 809-824/854-869                       | 25                    | <sup>6</sup> 20            |
| 896-901/935-940                       | 12.5                  | 13.6                       |
| 902-928 <sup>4</sup>                  |                       |                            |
| 929-930                               | 25                    | 20                         |
| 1427-1432 <sup>5</sup>                | 12.5                  | 12.5                       |
| <sup>3</sup> 2450-2483.5 <sup>2</sup> |                       |                            |
| Above 2500 <sup>2</sup>               |                       |                            |

<sup>1</sup>For stations authorized on or after August 18, 1995.

<sup>2</sup>Bandwidths for radiolocation stations in the 420-450 MHz band and for stations operating in bands subject to this footnote will be reviewed and authorized on a case-by-case basis.



<sup>3</sup>Operations using equipment designed to operate with a 25 kHz channel bandwidth will be authorized a 20 kHz bandwidth. Operations using equipment designed to operate with a 12.5 kHz channel bandwidth will be authorized a 11.25 kHz bandwidth. Operations using equipment designed to operate with a 6.25 kHz channel bandwidth will be authorized a 6 kHz bandwidth. All stations must operate on channels with a bandwidth of 12.5 kHz or less beginning January 1, 2013, unless the operations meet the efficiency standard of §90.203(j)(3).

<sup>4</sup>The maximum authorized bandwidth shall be 12 MHz for non-multilateration LMS operations in the band 909.75-921.75 MHz and 2 MHz in the band 902.00-904.00 MHz. The maximum authorized bandwidth for multilateration LMS operations shall be 5.75 MHz in the 904.00-909.75 MHz band; 2 MHz in the 919.75-921.75 MHz band; 5.75 MHz in the 921.75-927.25 MHz band and its associated 927.25-927.50 MHz narrowband forward link; and 8.00 MHz if the 919.75-921.75 MHz and 921.75-927.25 MHz bands and their associated 927.25-927.50 MHz and 927.50-927.75 MHz narrowband forward links are aggregated.

<sup>5</sup>See §90.259.

<sup>6</sup>Operations using equipment designed to operate with a 25 kHz channel bandwidth may be authorized up to a 22 kHz bandwidth if the equipment meets the Adjacent Channel Power limits of §90.221.

(6)(i) Beginning January 1, 2011, no new applications for the 150-174 MHz and/or 421-512 MHz bands will be acceptable for filing if the applicant utilizes channels with an authorized bandwidth exceeding 11.25 kHz, unless specified elsewhere or the operations meet the efficiency standards of §90.203(j)(3).

(ii) Beginning January 1, 2011, no modification applications for stations in the 150-174 MHz and/or 421-512 MHz bands that increase the station's authorized interference contour, will be acceptable for filing if the applicant utilizes channels with an authorized bandwidth exceeding 11.25 kHz, unless specified elsewhere or the operations meet the efficiency standards of §90.203(j)(3). See §90.187(b)(2)(iii) and (iv) for interference contour designations and calculations. Applications submitted pursuant to this paragraph must comply with frequency coordination requirements of §90.175.

(7) Economic Area (EA)-based licensees in frequencies 817-824/862-869 MHz (813.5-824/858.5-869 MHz in the counties listed in §90.614(c)) may exceed the standard channel spacing and authorized bandwidth listed in paragraph (b)(5) of this section in any National Public Safety Planning Advisory Committee Region when all 800 MHz public safety licensees in the Region have completed band reconfiguration consistent with this part. In any National Public Safety Planning Advisory Committee Region where the 800 MHz band reconfiguration is incomplete, EA-based licensees in frequencies 817-821/862-866 MHz (813.5-821/858.5-866 MHz in the counties listed in §90.614(c)) may exceed the standard channel spacing and authorized bandwidth listed in paragraph (b)(5) of this section. Upon all 800 MHz public safety licensees in a National Public Safety Planning Advisory Committee Region completing band reconfiguration, EA-based 800 MHz SMR licensees in the 821-824/866-869 MHz band may exceed the channel spacing and authorized bandwidth in paragraph (b)(5) of this section. Licensees authorized to exceed the standard channel spacing and authorized bandwidth under this paragraph must provide at least 30 days written notice prior to initiating such service in the bands listed herein to every 800 MHz public safety licensee with a base station in an affected National Public Safety Planning Advisory Committee Region, and every 800 MHz public safety licensee with a base station within 113 kilometers (70 miles) of an affected National Public Safety Planning Advisory Committee Region. Such notice shall include the estimated date upon which the EA-based 800 MHz SMR licensee intends to begin operations that exceed the channel spacing and authorized bandwidth in paragraph (b)(5) of this section.

**Applicable Emission Masks**

| Frequency band (MHz)           | Mask for equipment with audio low pass filter | Mask for equipment without audio low pass filter |
|--------------------------------|-----------------------------------------------|--------------------------------------------------|
| Below 25 <sup>1</sup>          | A or B                                        | A or C                                           |
| 25-50                          | B                                             | C                                                |
| 72-76                          | B                                             | C                                                |
| 150-174 <sup>2</sup>           | B, D, or E                                    | C, D or E                                        |
| 150 paging only                | B                                             | C                                                |
| 220-222                        | F                                             | F                                                |
| 421-512 <sup>2 5</sup>         | B, D, or E                                    | C, D, or E                                       |
| 450 paging only                | B                                             | G                                                |
| 806-809/851-854 <sup>6</sup>   | B                                             | H                                                |
| 809-824/854-869 <sup>3 5</sup> | B                                             | G                                                |
| 896-901/935-940                | I                                             | J                                                |
| 902-928                        | K                                             | K                                                |
| 929-930                        | B                                             | G                                                |
| 4940-4990 MHz                  | L or M                                        | L or M                                           |
| 5850-5925 <sup>4</sup>         |                                               |                                                  |
| All other bands                | B                                             | C                                                |

<sup>1</sup>Equipment using single sideband J3E emission must meet the requirements of Emission Mask A. Equipment using other emissions must meet the requirements of Emission Mask B or C, as applicable.

<sup>2</sup>Equipment designed to operate with a 25 kHz channel bandwidth must meet the requirements of Emission Mask B or C, as applicable. Equipment designed to operate with a 12.5 kHz channel bandwidth must meet the requirements of Emission Mask D, and equipment designed to operate with a 6.25 kHz channel bandwidth must meet the requirements of Emission Mask E.

<sup>3</sup>Equipment used in this licensed to EA or non-EA systems shall comply with the emission mask provisions of §90.691 of this chapter.

<sup>4</sup>DSRCS Roadside Units equipment in the 5850-5925 MHz band is governed under subpart M of this part.

<sup>5</sup>Equipment may alternatively meet the Adjacent Channel Power limits of §90.221

**TEST RESULTS**

| Type    | Frequency(MHz) | Channel Spacing(KHz) | Power Mode(W) | Occupied Channel Bandwidth(KHz) | 26dB Bandwidth(KHz) | Limit(KHz) | Conclusion |
|---------|----------------|----------------------|---------------|---------------------------------|---------------------|------------|------------|
| Analog  | 151.025        | 12.5                 | 5             | 5.172                           | 10.07               | 12.5       | Pass       |
| Analog  | 162.025        | 12.5                 | 5             | 5.17                            | 10.07               | 12.5       | Pass       |
| Analog  | 173.3875       | 12.5                 | 5             | 5.164                           | 10.06               | 12.5       | Pass       |
| Analog  | 151.025        | 12.5                 | 1             | 5.153                           | 10.04               | 12.5       | Pass       |
| Analog  | 162.025        | 12.5                 | 1             | 5.148                           | 10.04               | 12.5       | Pass       |
| Analog  | 173.3875       | 12.5                 | 1             | 5.153                           | 10.06               | 12.5       | Pass       |
| Digital | 151.025        | 12.5                 | 5             | 7.576                           | 9.255               | 12.5       | Pass       |
| Digital | 162.025        | 12.5                 | 5             | 7.564                           | 9.536               | 12.5       | Pass       |
| Digital | 173.3875       | 12.5                 | 5             | 7.606                           | 9.564               | 12.5       | Pass       |
| Digital | 151.025        | 12.5                 | 1             | 7.529                           | 9.692               | 12.5       | Pass       |
| Digital | 162.025        | 12.5                 | 1             | 7.686                           | 9.722               | 12.5       | Pass       |
| Digital | 173.3875       | 12.5                 | 1             | 7.607                           | 9.559               | 12.5       | Pass       |



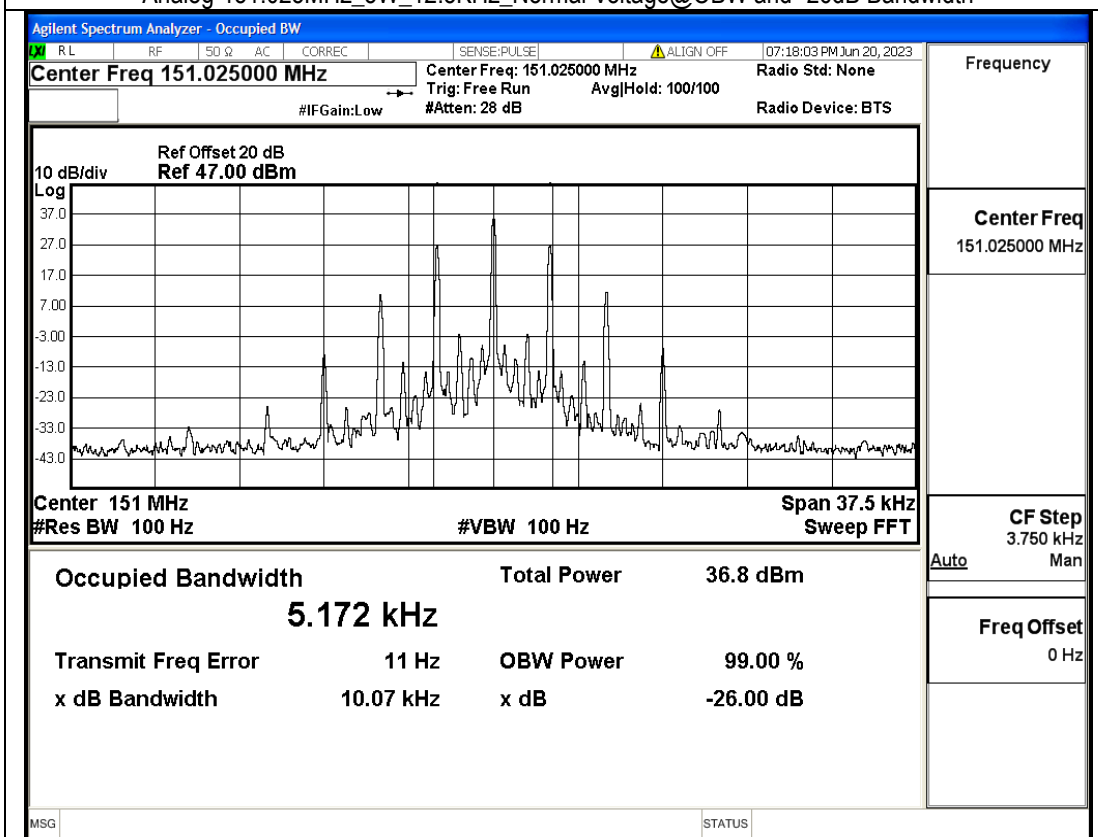
| Type    | Frequency(MHz) | Nominal Power(W) | Channel Spacing(KHz) | Emission Mask Type | Conclusion |
|---------|----------------|------------------|----------------------|--------------------|------------|
| Analog  | 151.025        | 5                | 12.5                 | D                  | Pass       |
| Analog  | 162.025        | 5                | 12.5                 | D                  | Pass       |
| Analog  | 173.3875       | 5                | 12.5                 | D                  | Pass       |
| Analog  | 151.025        | 1                | 12.5                 | D                  | Pass       |
| Analog  | 162.025        | 1                | 12.5                 | D                  | Pass       |
| Analog  | 173.3875       | 1                | 12.5                 | D                  | Pass       |
| Digital | 151.025        | 5                | 12.5                 | D                  | Pass       |
| Digital | 162.025        | 5                | 12.5                 | D                  | Pass       |
| Digital | 173.3875       | 5                | 12.5                 | D                  | Pass       |
| Digital | 151.025        | 1                | 12.5                 | D                  | Pass       |
| Digital | 162.025        | 1                | 12.5                 | D                  | Pass       |
| Digital | 173.3875       | 1                | 12.5                 | D                  | Pass       |

Note:

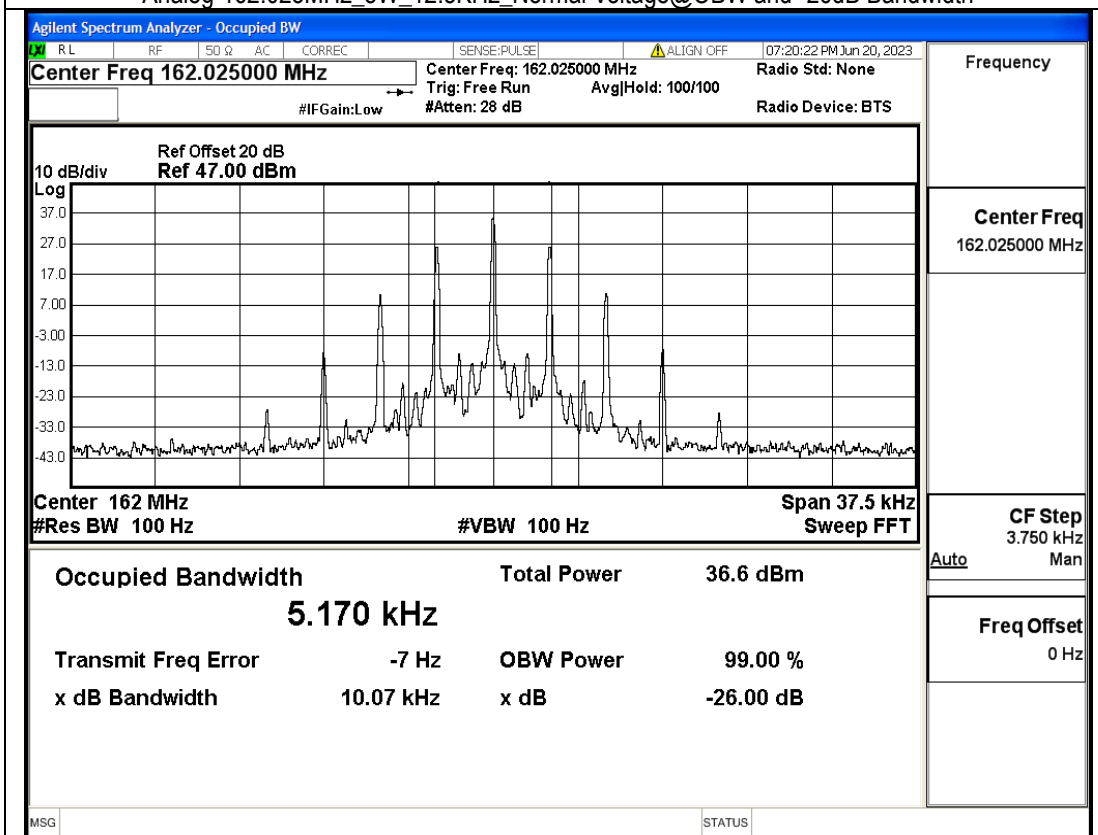
1. All measured including cable loss and atten.
2. Please refer to following test plots;



## Analog-151.025MHz\_5W\_12.5KHz\_Normal Voltage@OBW and -26dB Bandwidth

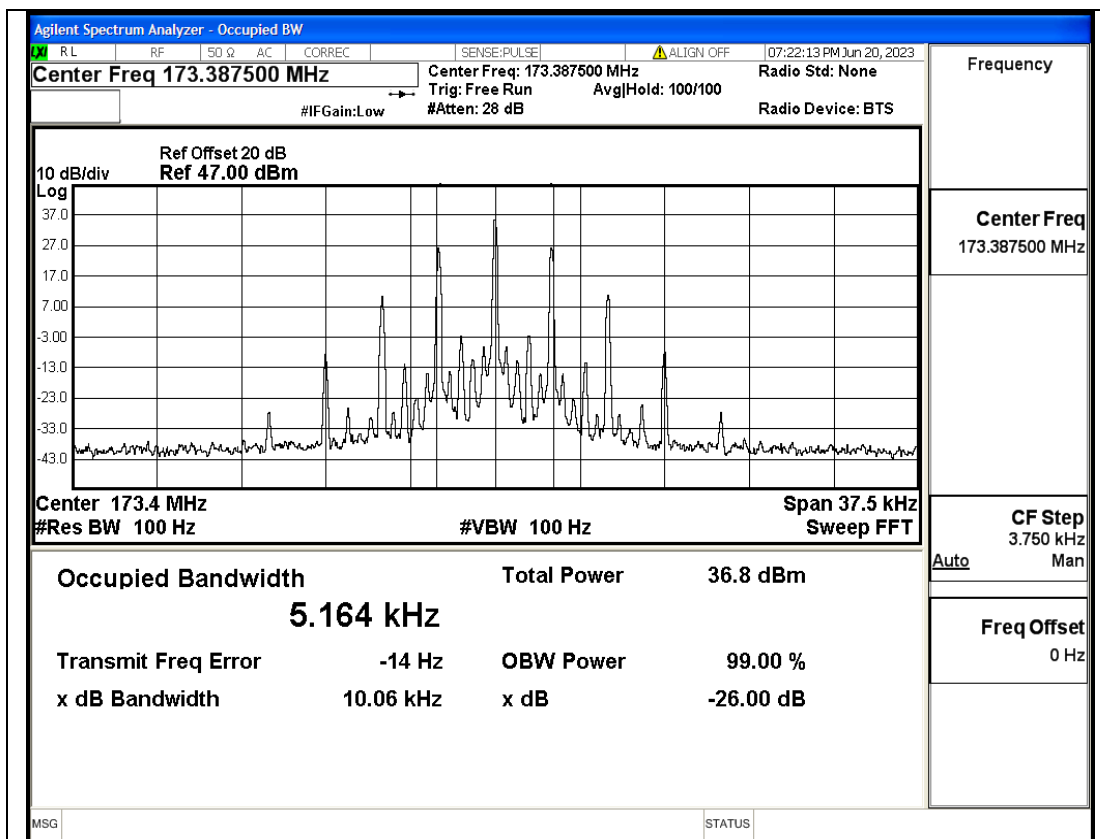


## Analog-162.025MHz\_5W\_12.5KHz\_Normal Voltage@OBW and -26dB Bandwidth

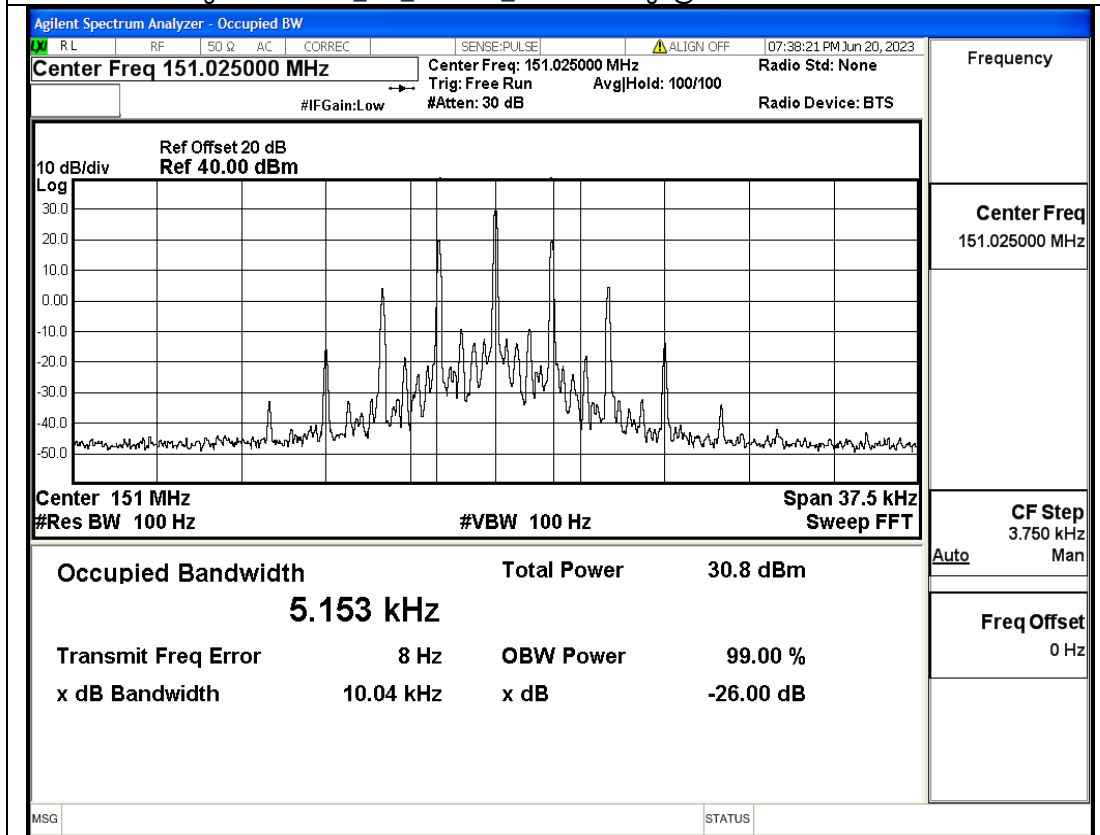


## Analog-173.3875MHz\_5W\_12.5KHz\_Normal Voltage@OBW and -26dB Bandwidth

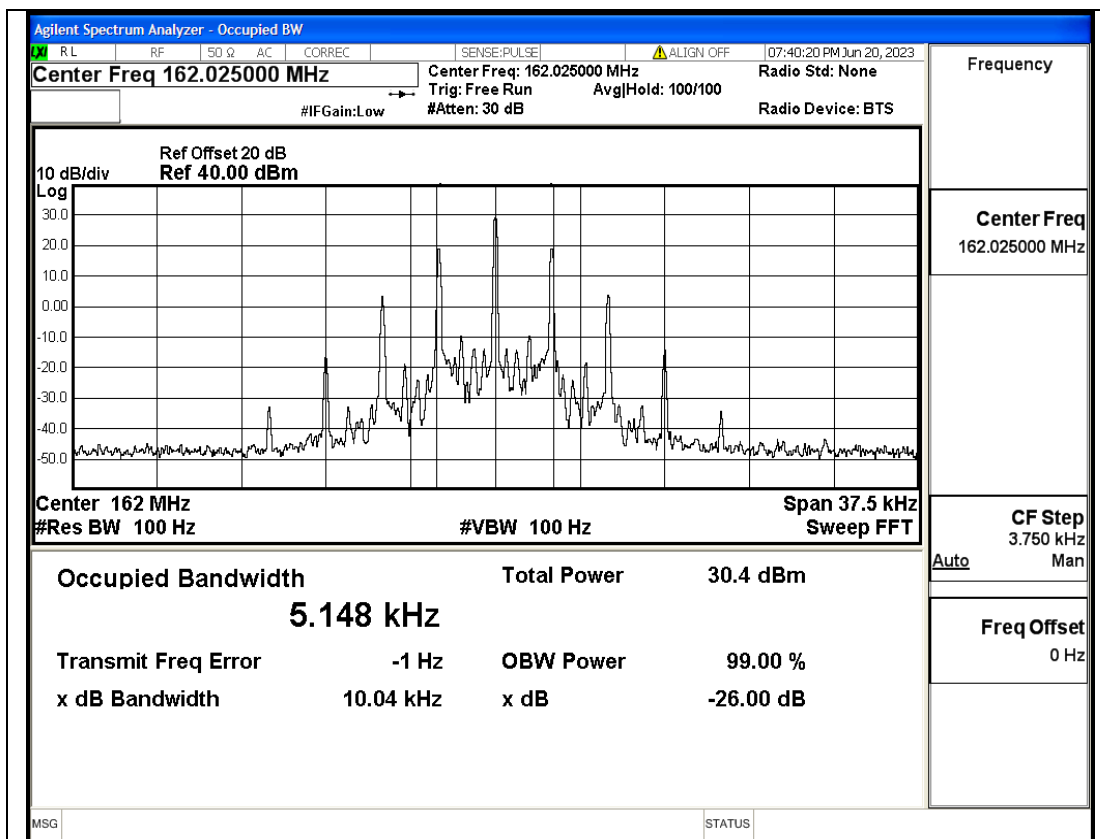




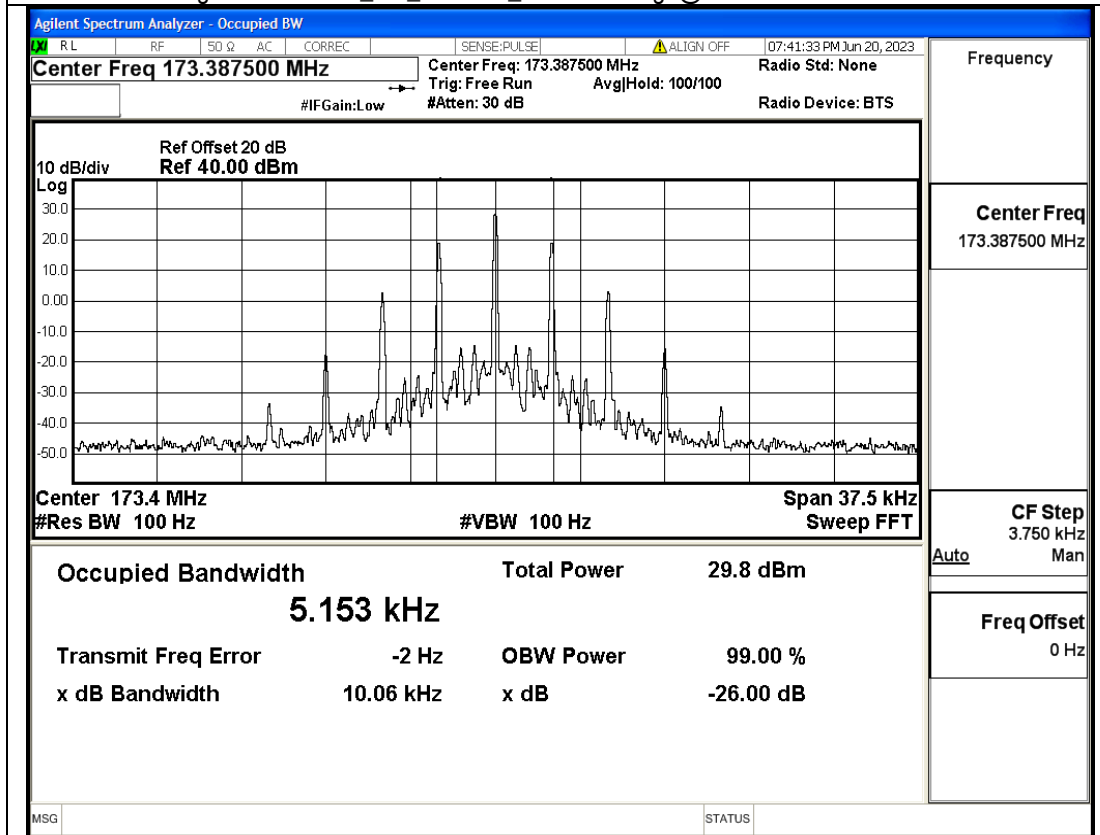
Analog-151.025MHz\_1W\_12.5KHz\_Normal Voltage@OBW and -26dB Bandwidth



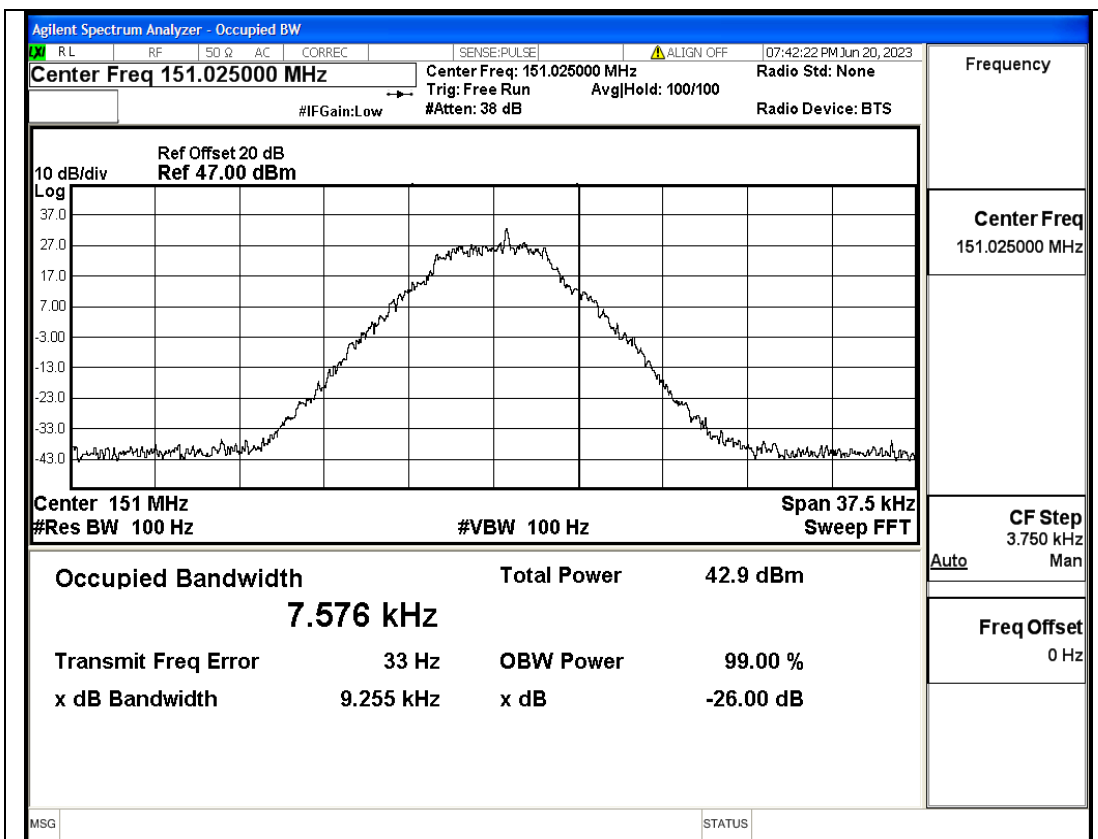
Analog-162.025MHz\_1W\_12.5KHz\_Normal Voltage@OBW and -26dB Bandwidth



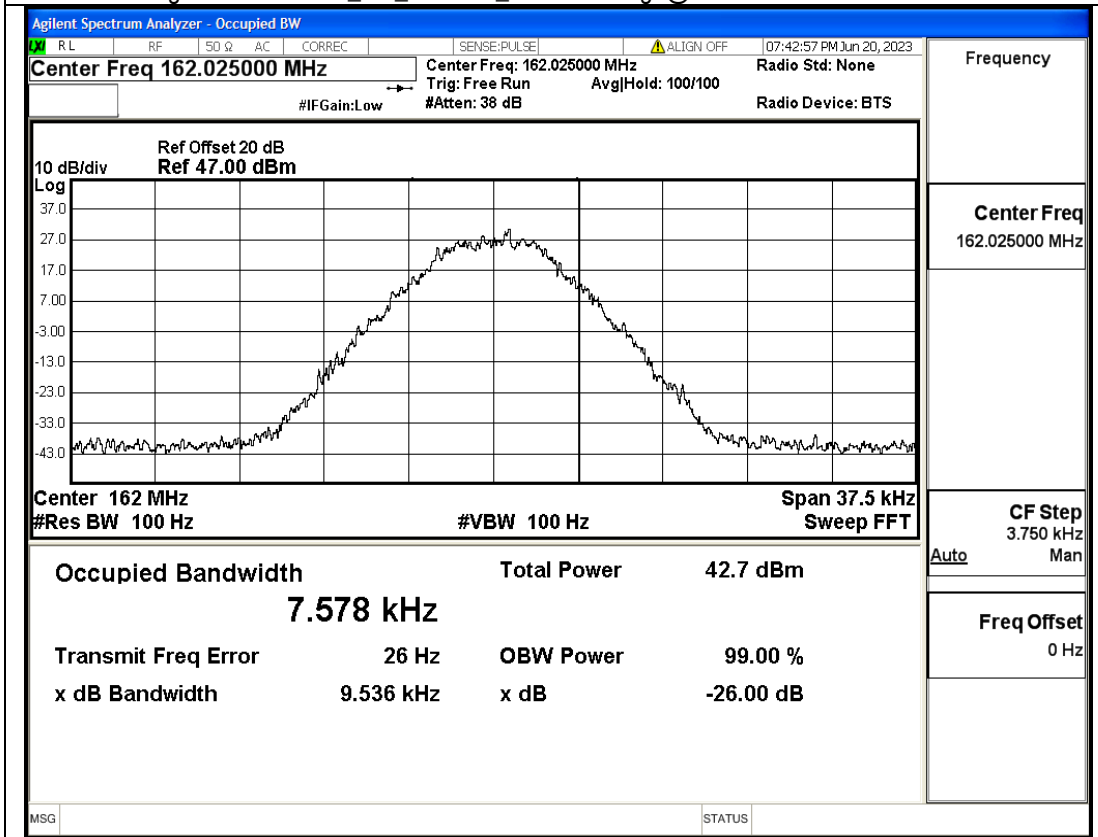
Analog-173.3875MHz\_1W\_12.5KHz\_Normal Voltage@OBW and -26dB Bandwidth



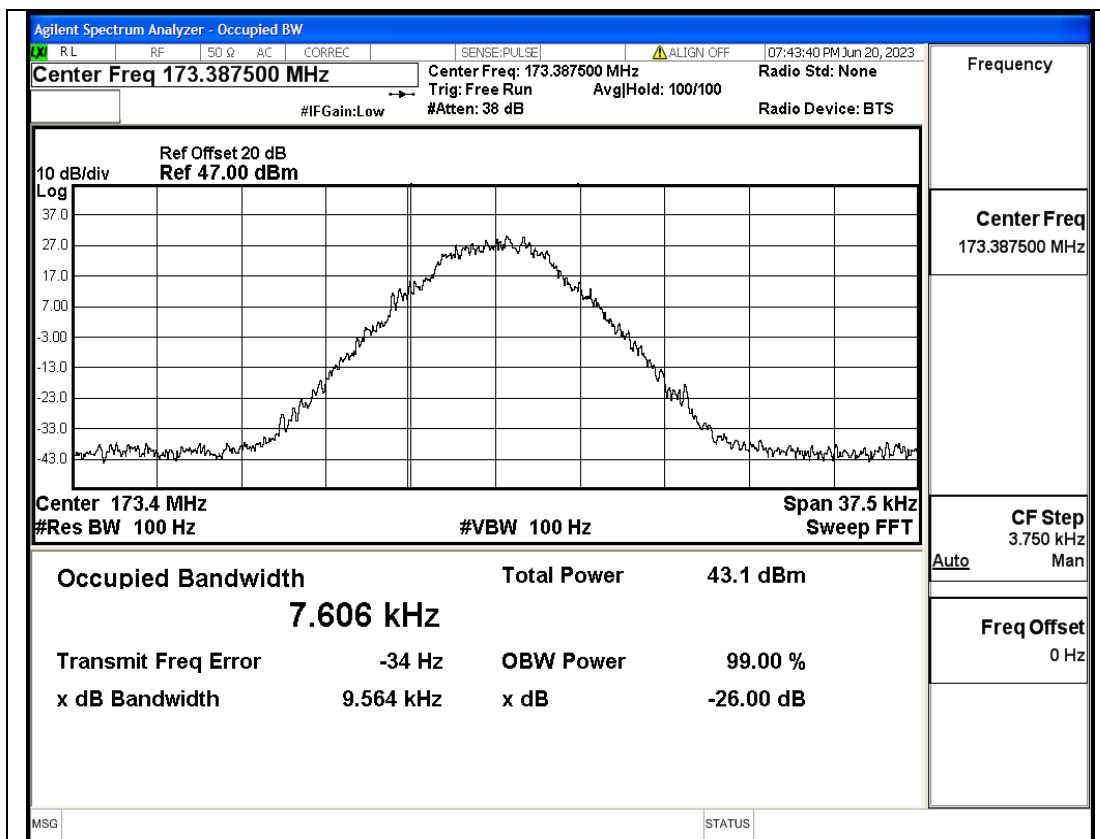
Digital-151.025MHz\_5W\_12.5KHz\_Normal Voltage@OBW and -26dB Bandwidth



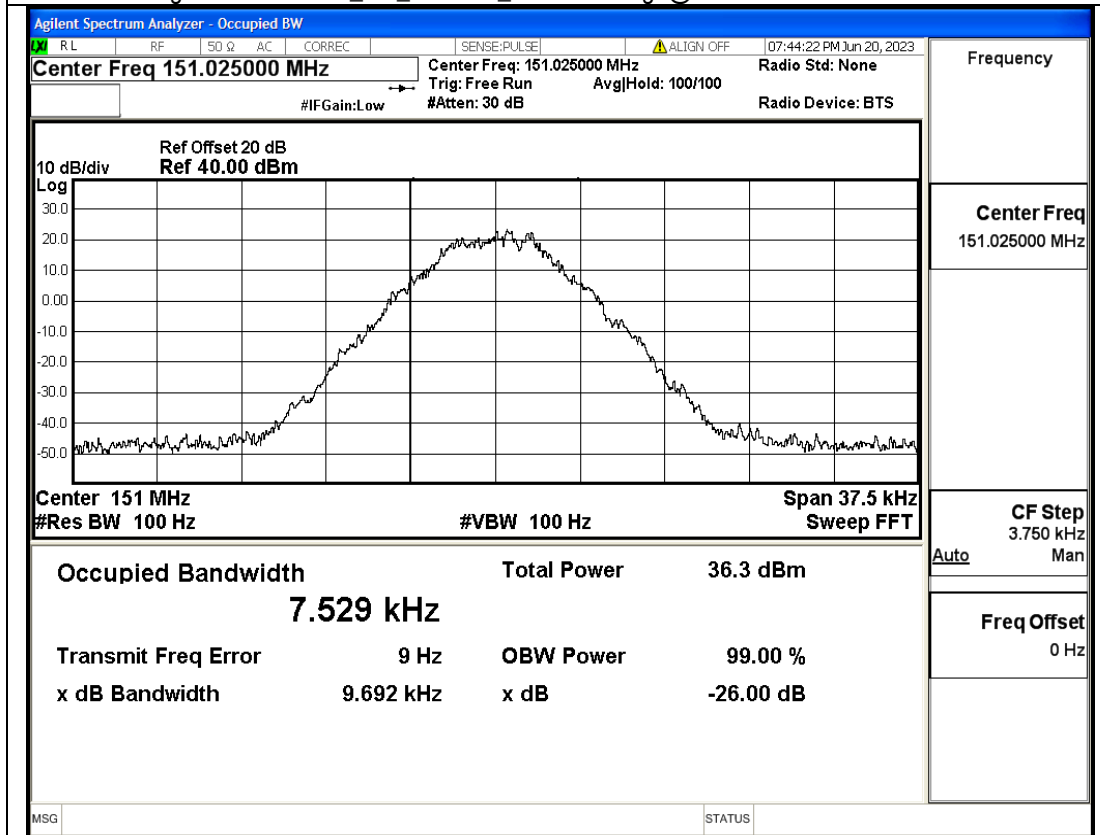
Digital-162.025MHz\_5W\_12.5KHz\_Normal Voltage@OBW and -26dB Bandwidth



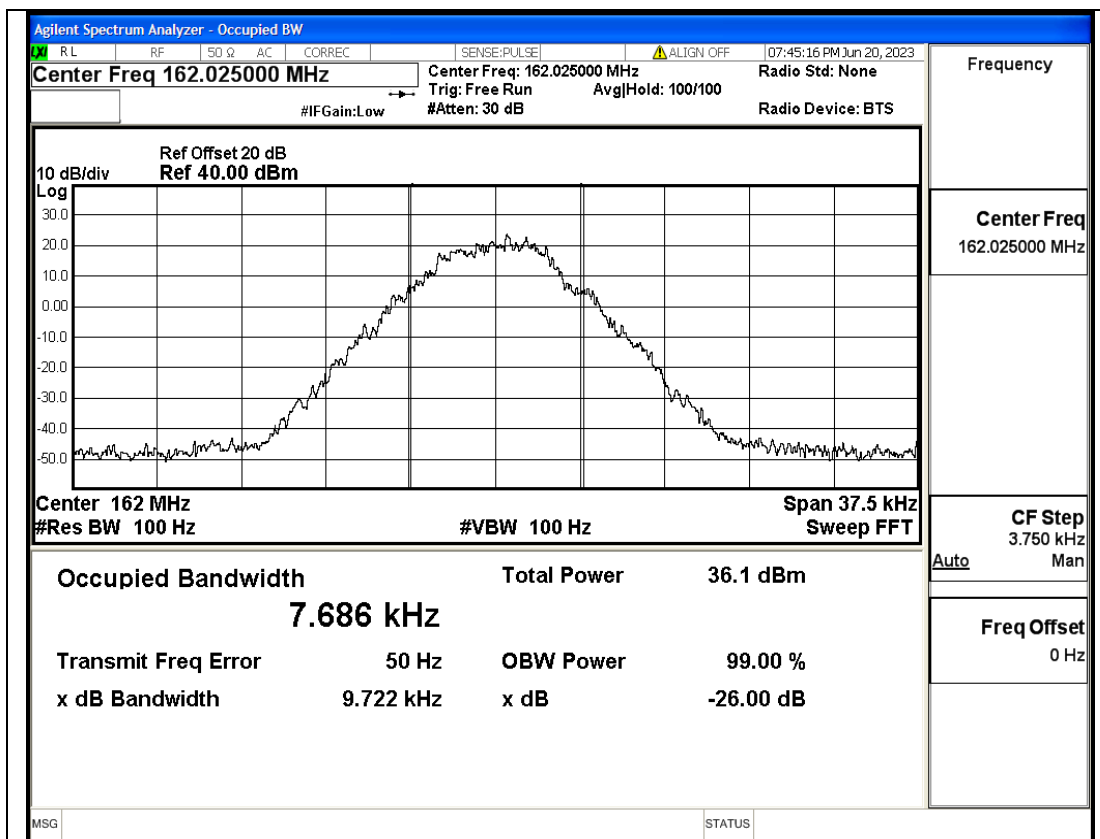
Digital-173.3875MHz\_5W\_12.5KHz\_Normal Voltage@OBW and -26dB Bandwidth



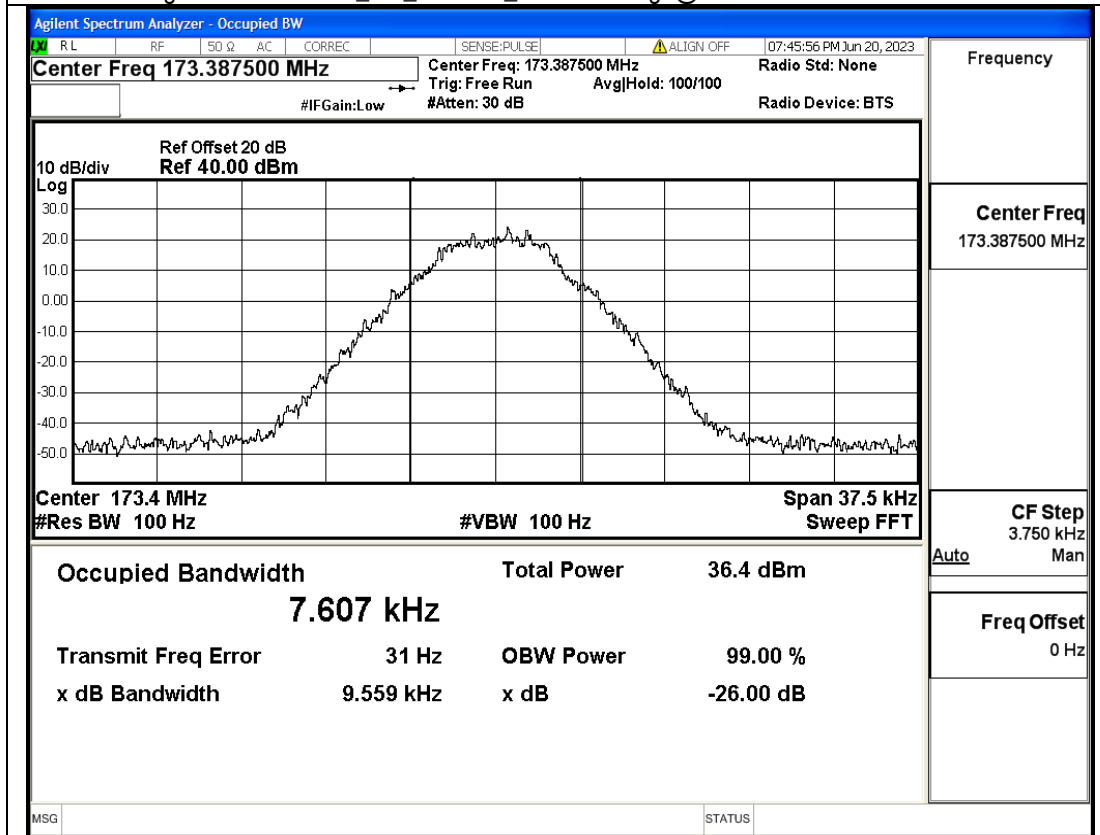
Digital-151.025MHz\_1W\_12.5KHz\_Normal Voltage@OBW and -26dB Bandwidth

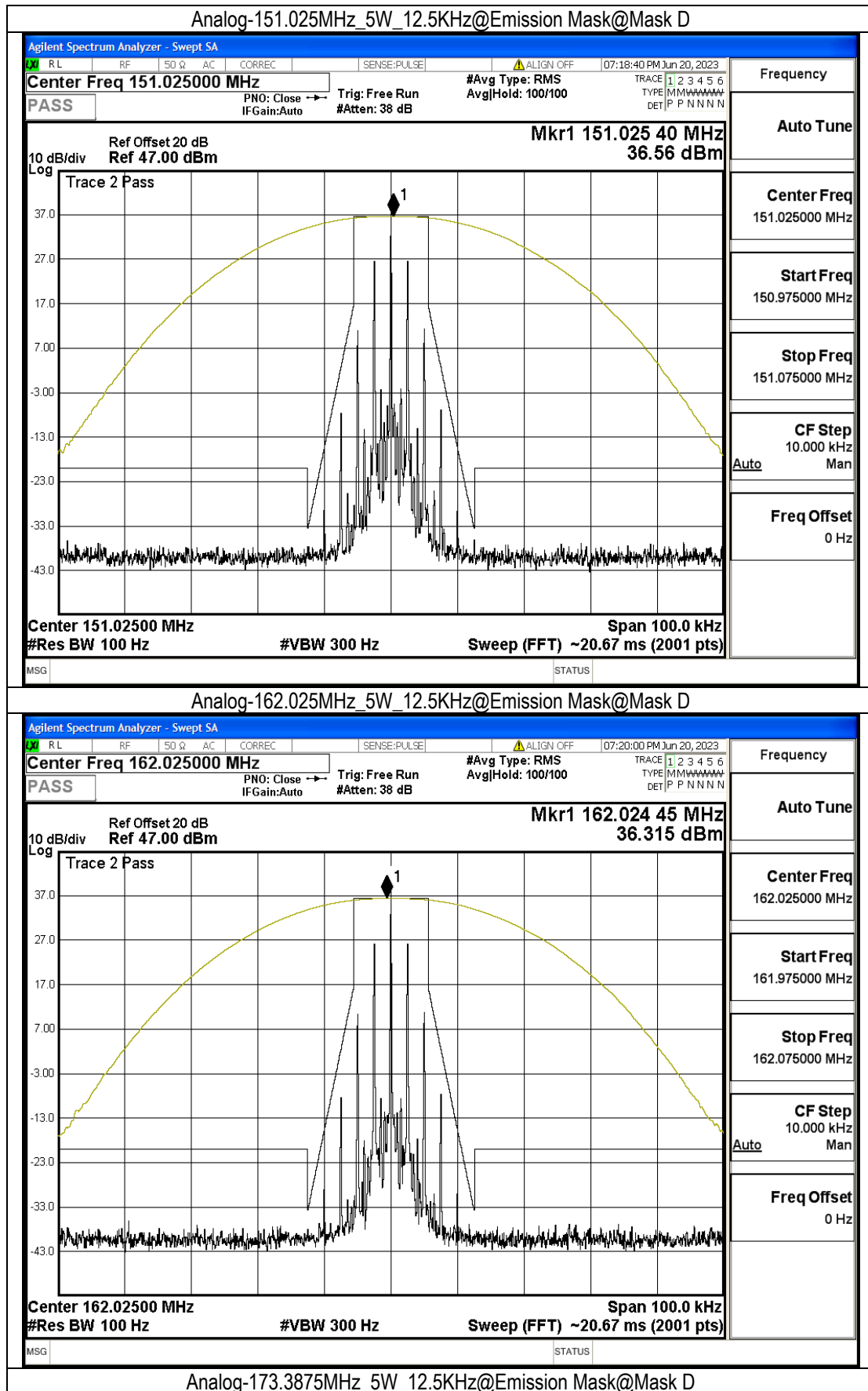


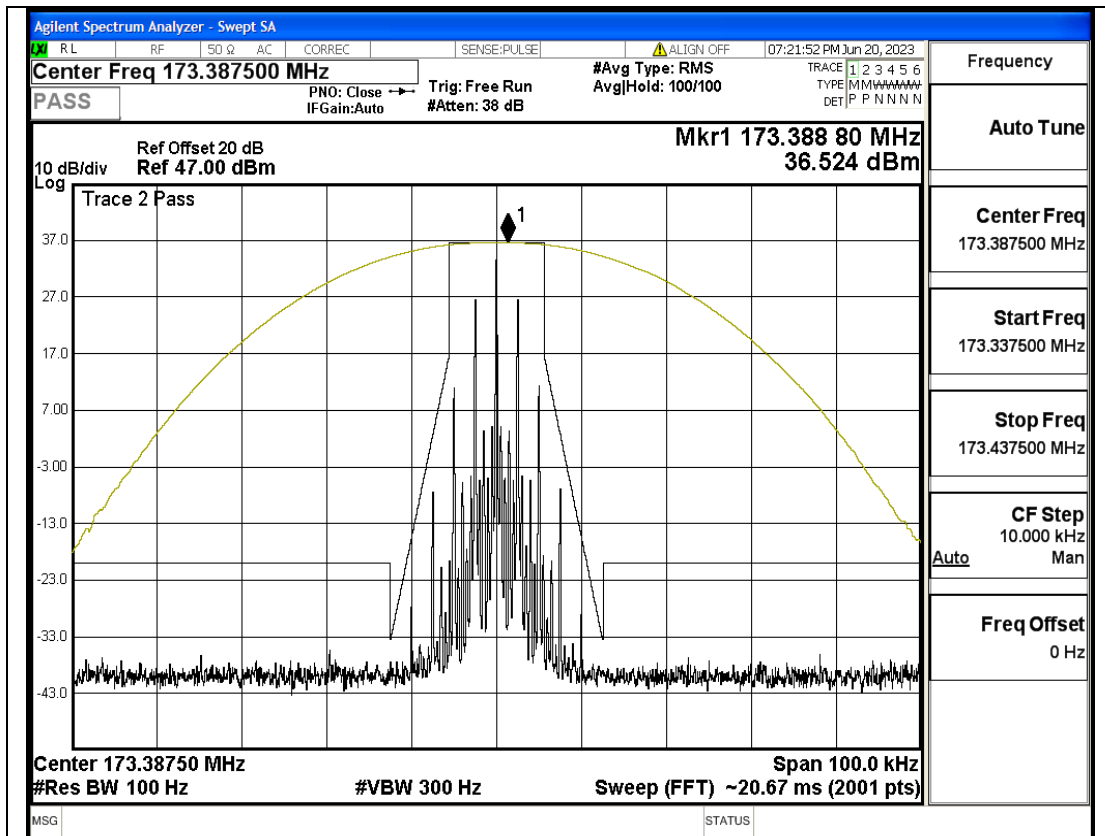
Digital-162.025MHz\_1W\_12.5KHz\_Normal Voltage@OBW and -26dB Bandwidth



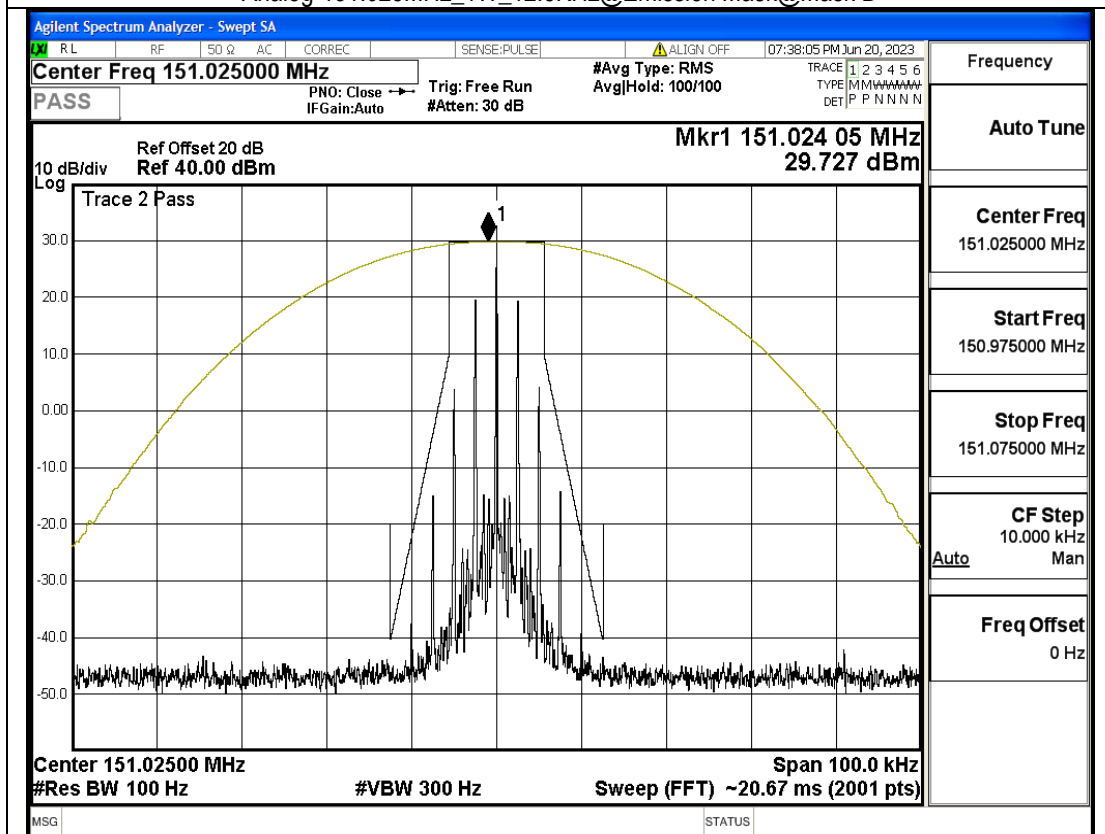
Digital-173.3875MHz\_1W\_12.5KHz\_Normal Voltage@OBW and -26dB Bandwidth



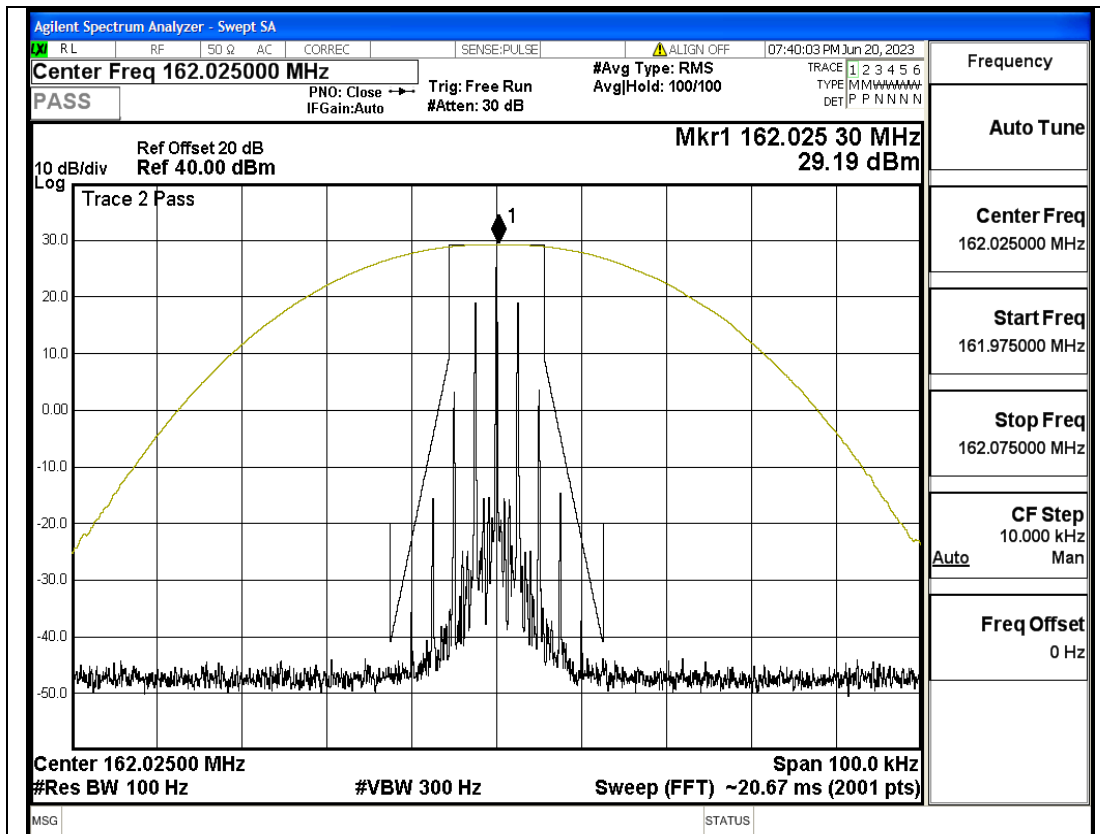




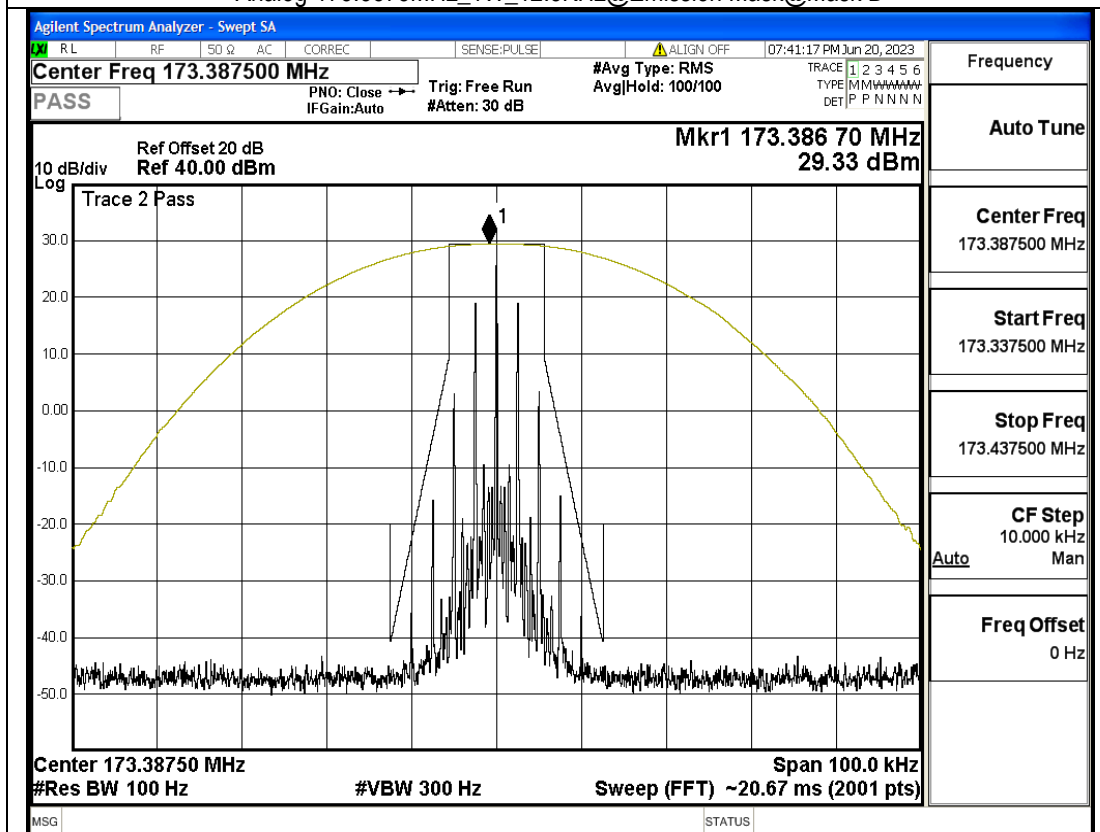
Analog-151.025MHz\_1W\_12.5KHz@Emission Mask@Mask D



Analog-162.025MHz\_1W\_12.5KHz@Emission Mask@Mask D

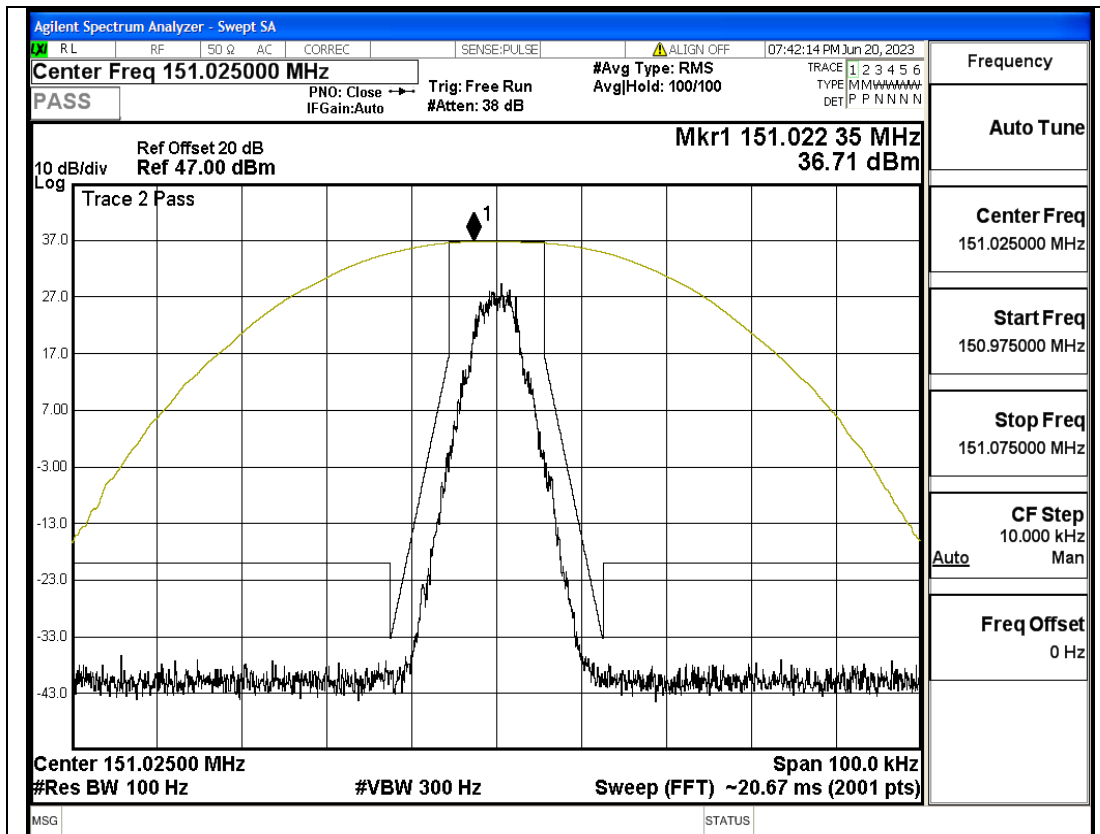


Analog-173.3875MHz\_1W\_12.5KHz@Emission Mask@Mask D

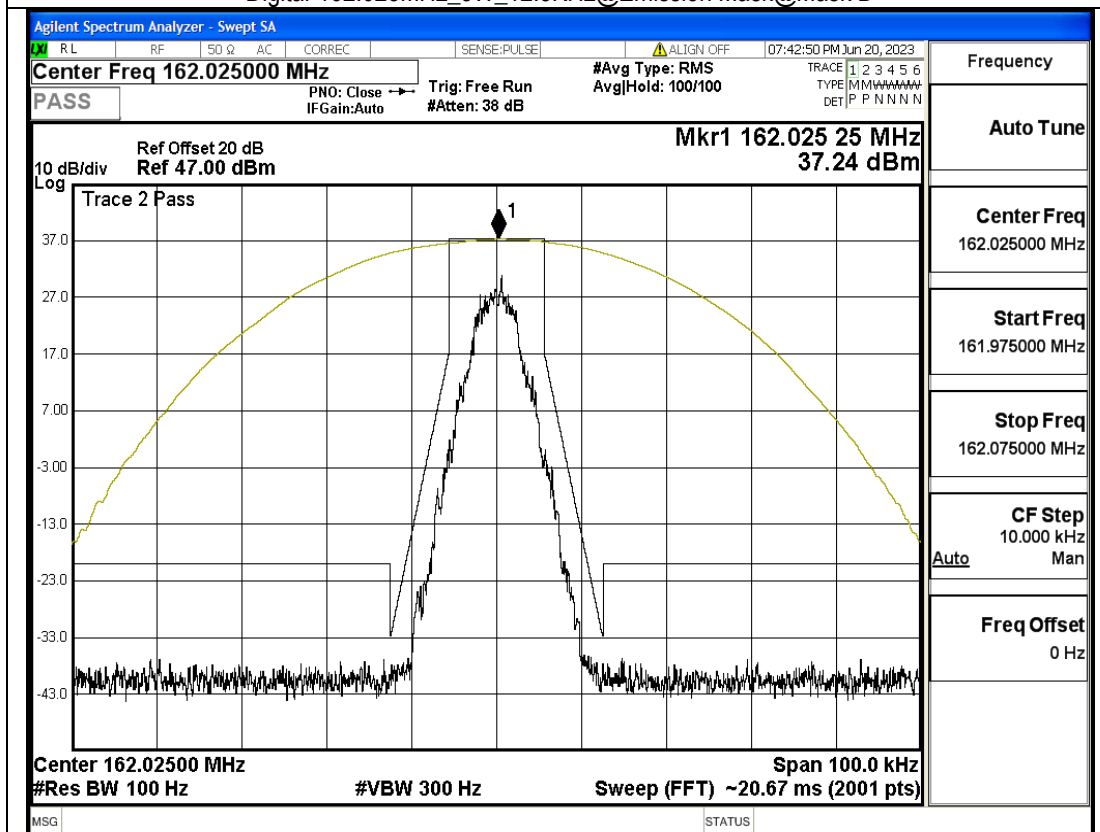


Digital-151.025MHz\_5W\_12.5KHz@Emission Mask@Mask D

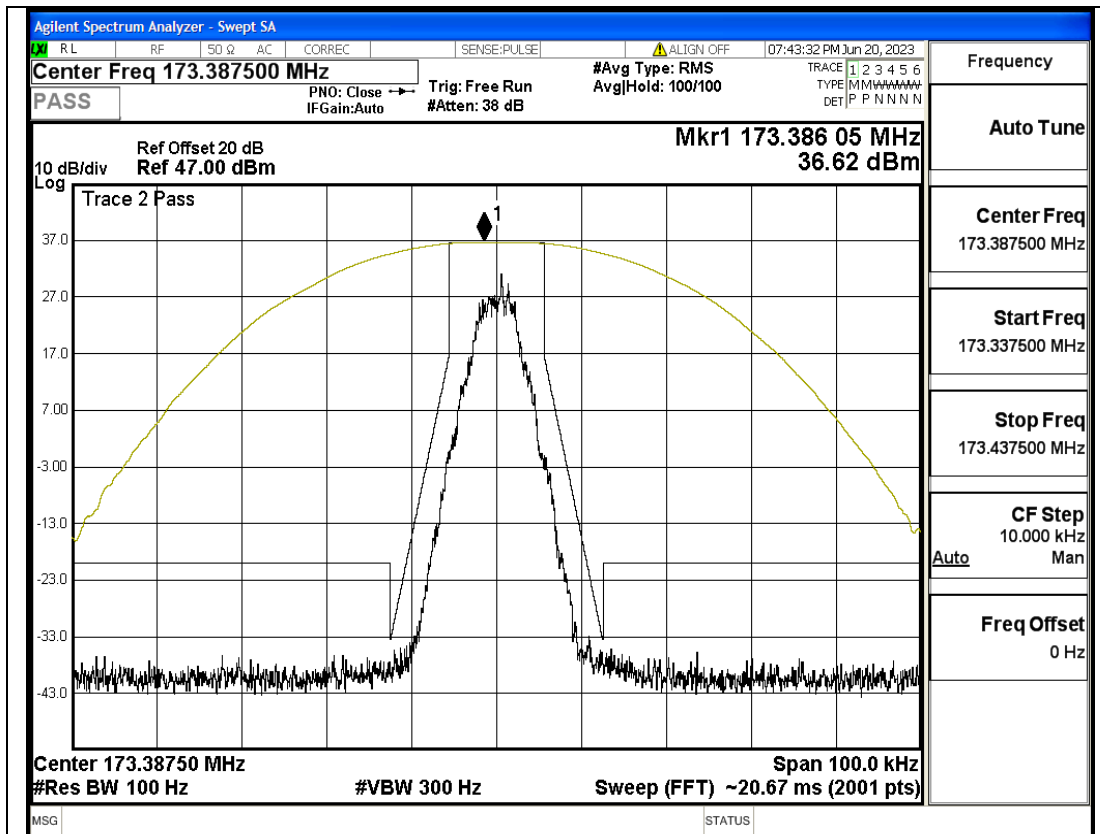




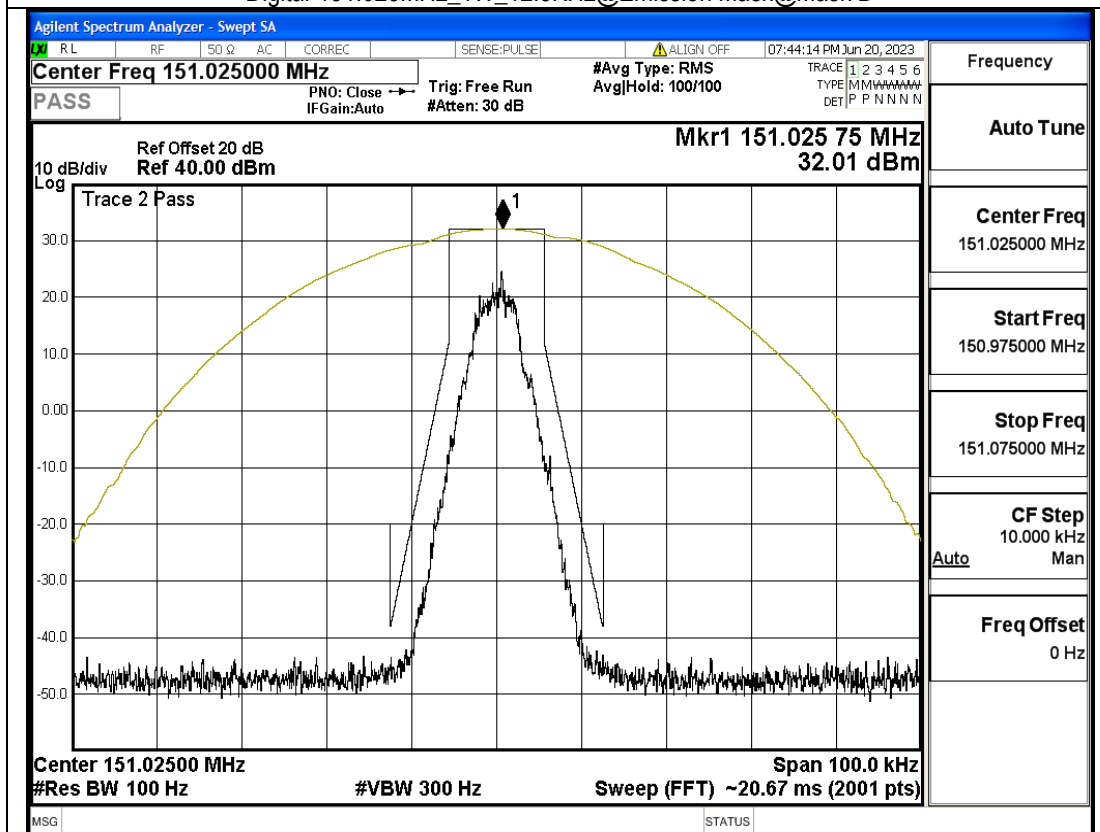
Digital-162.025MHz\_5W\_12.5KHz@Emission Mask@Mask D



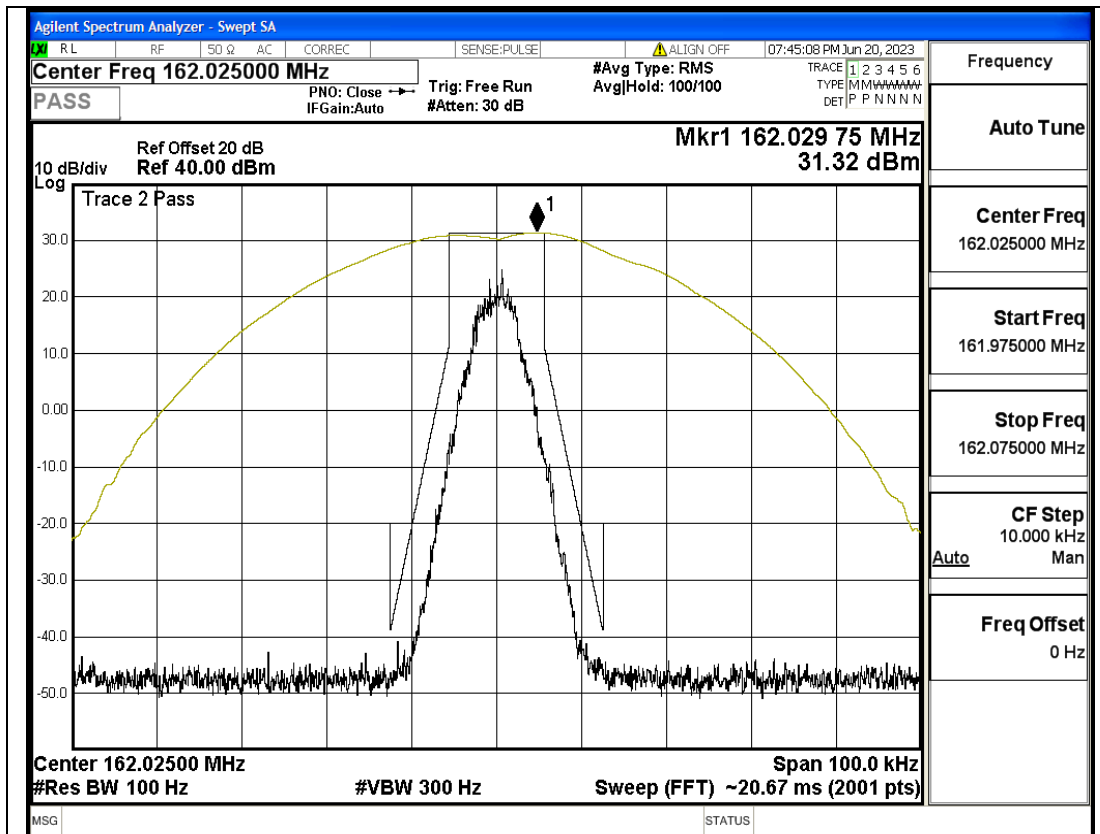
Digital-173.3875MHz\_5W\_12.5KHz@Emission Mask@Mask D



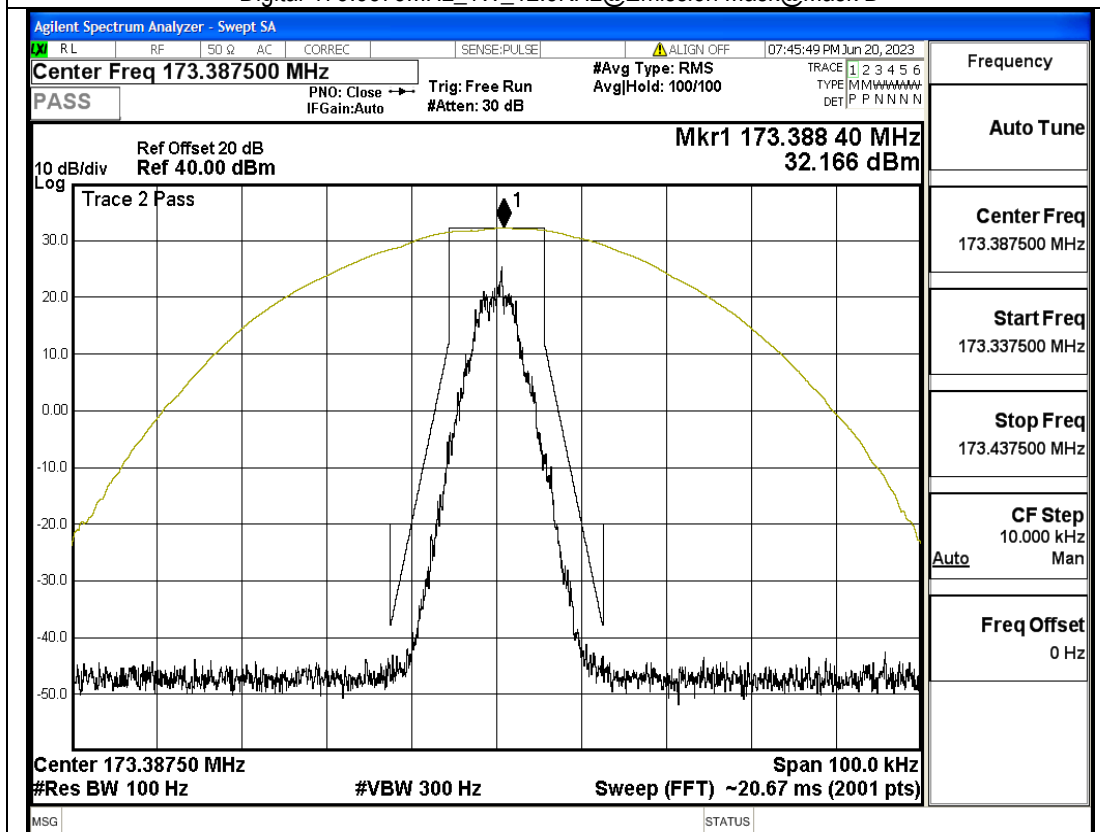
Digital-151.025MHz\_1W\_12.5KHz@Emission Mask@Mask D



Digital-162.025MHz\_1W\_12.5KHz@Emission Mask@Mask D

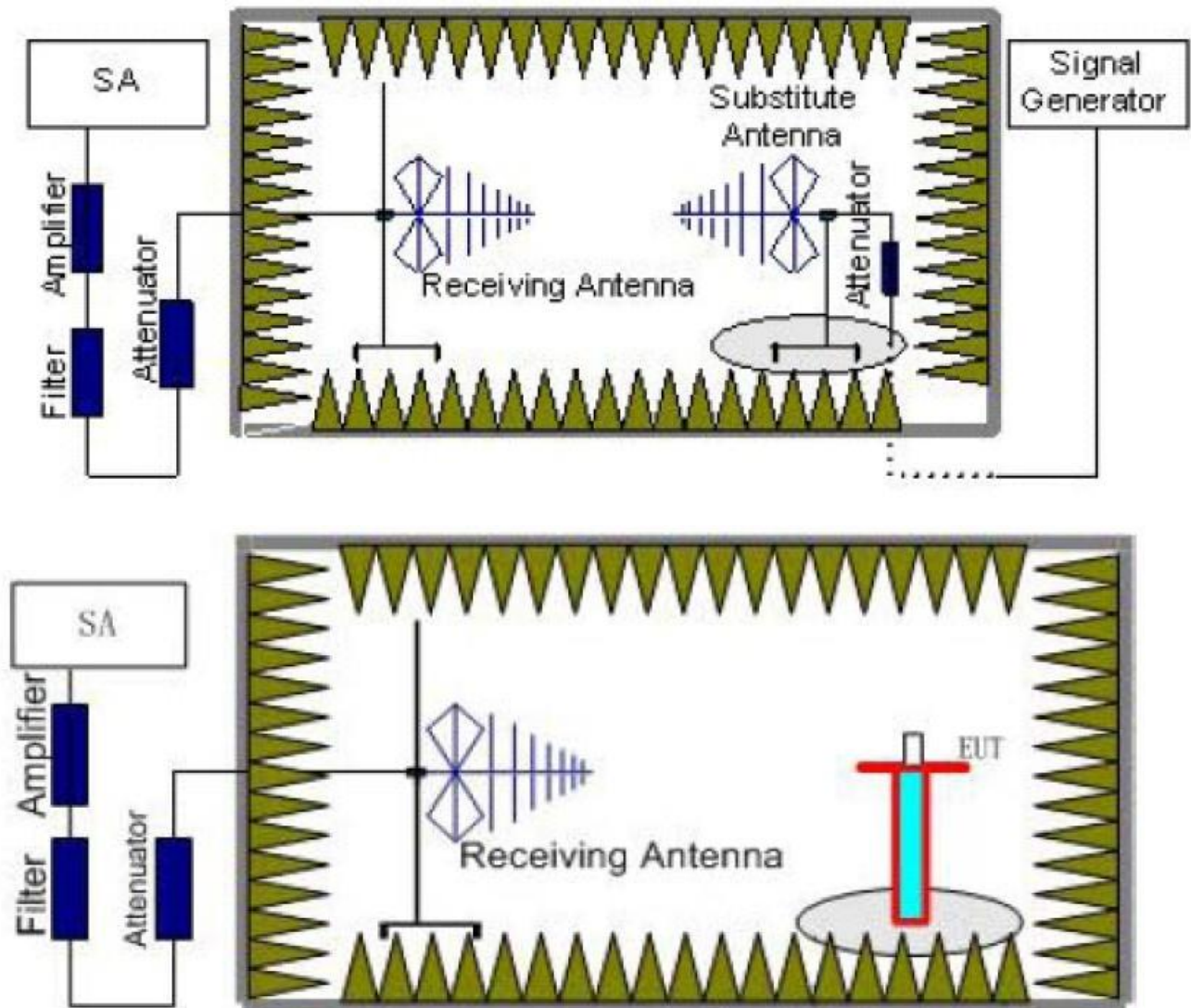


Digital-173.3875MHz\_1W\_12.5KHz@Emission Mask@Mask D



#### 4.4. Field Strength Spurious Emissions

##### TEST CONFIGURATION



##### TEST PROCEDURE

1. EUT was placed on a 1.50 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.50 m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in six channels were measured with peak detector.
2. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyser or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyser or receiver.
3. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=1MHz,VBW=3MHz for above 1GHz and RBW=100KHz,VBW=300KHz for 30MHz to 1GHz, And the maximum value of the receiver should be recorded as ( $P_r$ ).
4. The EUT shall be replaced by a substitution antenna. In the chamber, a substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power ( $P_{Mea}$ ) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver



reach the previously recorded ( $P_r$ ). The power of signal source ( $P_{Mea}$ ) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

5. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss ( $P_{cl}$ ), the Substitution Antenna Gain ( $G_a$ ) and the Amplifier Gain ( $P_{Ag}$ ) should be recorded after test.

The measurement results are obtained as described below:

$$\text{Power(EIRP)} = P_{Mea} - P_{Ag} - P_{cl} + G_a$$

It can omit power amplifier if signal generator level meets requirement;

This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.

6. ERP can be calculated from EIRP by subtracting the gain of the dipole,  $ERP = EIRP - 2.15\text{dBi}$ .

| Subrange<br>(GHz) | RBW    | VBW    | Sweep time<br>(s) |
|-------------------|--------|--------|-------------------|
| 0.00009~0.15      | 1KHz   | 3KHz   | 30                |
| 0.00015~0.03      | 10KHz  | 30KHz  | 10                |
| 0.03~1            | 100KHz | 300KHz | 10                |
| 1~5               | 1 MHz  | 3 MHz  | 5                 |

### **TEST LIMIT**

According to §90.210 d) (3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 12.5 kHz: At least  $50 + 10 \log(P)$  dB or 70 dB, whichever is the lesser attenuation.

### **TEST RESULTS**

**Note : only the high power mode result in test report.**

Note:

1. In general, the worst case attenuation requirement shown above was applied.
2. The measurement frequency range from 9KHz to 5 GHz.
3. EIRP for measure frequency above 1 GHz and ERP for below 1 GHz.
4. \*\*\* means that the emission level is too low to be measured or at least 20 dB down than the limit.

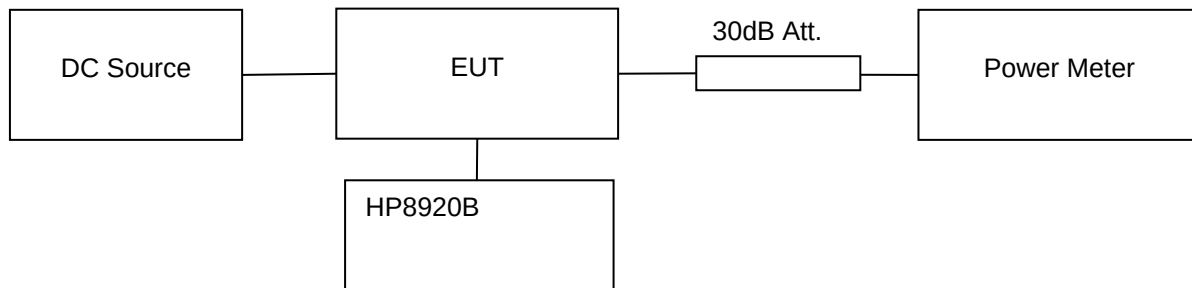


| Test Frequency: 151.025MHz |                        |           |              | Channel Separation:12.5KHz |              |             |              |
|----------------------------|------------------------|-----------|--------------|----------------------------|--------------|-------------|--------------|
| Frequency (MHz)            | P <sub>Mea</sub> (dBm) | Path Loss | Antenna Gain | Correction (dB)            | Values (dBm) | Limit (dBm) | Polarization |
| 302.05                     | -45.40                 | 0.35      | 5.75         | 2.15                       | -42.15       | -20.00      | H            |
| 453.08                     | -42.86                 | 0.43      | 6.7          | 2.15                       | -36.59       | -20.00      | H            |
| 604.10                     | -53.70                 | 0.5       | 7.1          | 2.15                       | -47.10       | -20.00      | H            |
| ...                        | ...                    | ...       | ...          | ...                        | ...          | ...         | H            |
| 302.05                     | -37.86                 | 0.35      | 5.75         | 2.15                       | -34.61       | -20.00      | V            |
| 453.08                     | -41.46                 | 0.43      | 6.7          | 2.15                       | -35.19       | -20.00      | V            |
| 604.10                     | -54.10                 | 0.5       | 7.09         | 2.15                       | -47.51       | -20.00      | V            |
| ...                        | ...                    | ...       | ...          | ...                        | ...          | ...         | V            |

| Test Frequency: 173.3875MHz |                        |           |              | Channel Separation:12.5KHz |              |             |              |
|-----------------------------|------------------------|-----------|--------------|----------------------------|--------------|-------------|--------------|
| Frequency (MHz)             | P <sub>Mea</sub> (dBm) | Path Loss | Antenna Gain | Correction (dB)            | Values (dBm) | Limit (dBm) | Polarization |
| 346.78                      | -48.71                 | 0.37      | 6.03         | 2.15                       | -45.20       | -20.00      | H            |
| 520.16                      | -44.87                 | 0.46      | 7.02         | 2.15                       | -38.31       | -20.00      | H            |
| 693.55                      | -52.97                 | 0.55      | 7.19         | 2.15                       | -46.33       | -20.00      | H            |
| ...                         | ...                    | ...       | ...          | ...                        | ...          | ...         | H            |
| 346.78                      | -38.96                 | 0.37      | 6.03         | 2.15                       | -35.45       | -20.00      | V            |
| 520.16                      | -41.43                 | 0.46      | 7.02         | 2.15                       | -34.87       | -20.00      | V            |
| 693.55                      | -51.29                 | 0.5       | 7.09         | 2.15                       | -44.70       | -20.00      | V            |
| ...                         | ...                    | ...       | ...          | ...                        | ...          | ...         | V            |

#### 4.5. Conducted spurious emission result(at antenna terminal)

##### TEST CONFIGURATION



##### TEST PROCEDURE

- 1) The EUT was modulated by 2.5 KHz Sine wave audio signal;the level of the audio signal employed is 16 dB greater than that necessary to produce 50% of rated system deviation.
- 2) Set EUT working in continuous mode in low,middle,high frequency,read and record the peak power value.

##### TEST LIMIT

According to §90.210 d) (3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 12.5 kHz: At least  $50 + 10 \log (P)$  dB or 70 dB, whichever is the lesser attenuation.

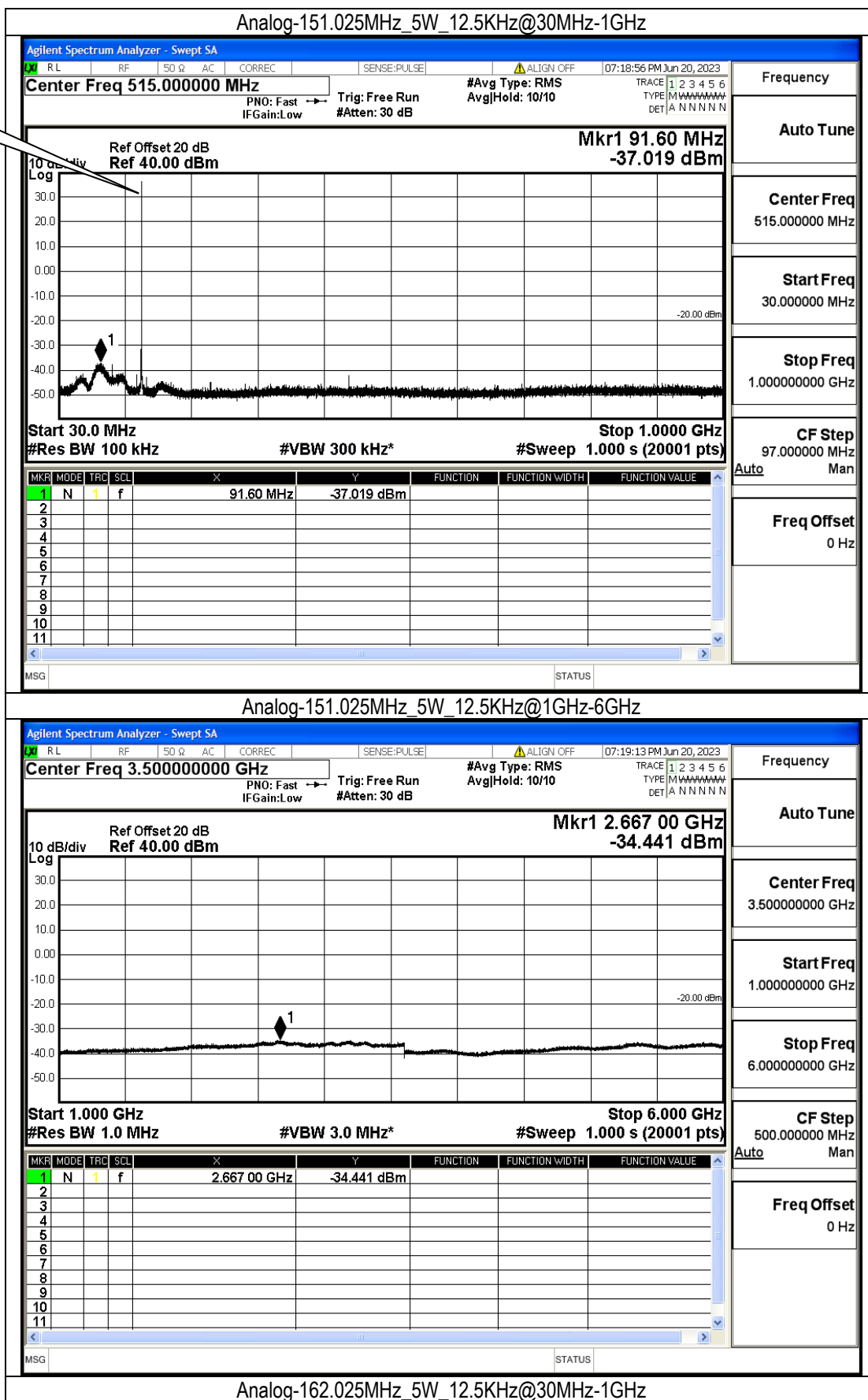
##### TEST RESULTS

**Pass**

**Note:** list the worst case in this item.



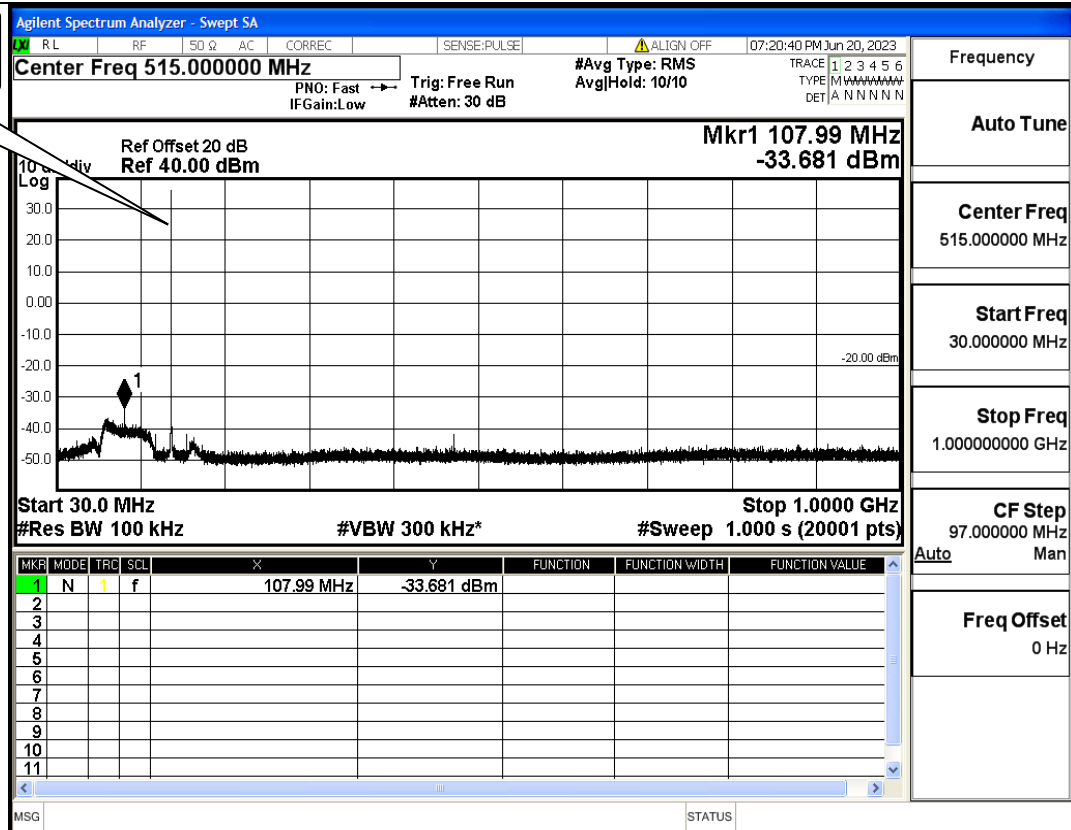
Fundamental



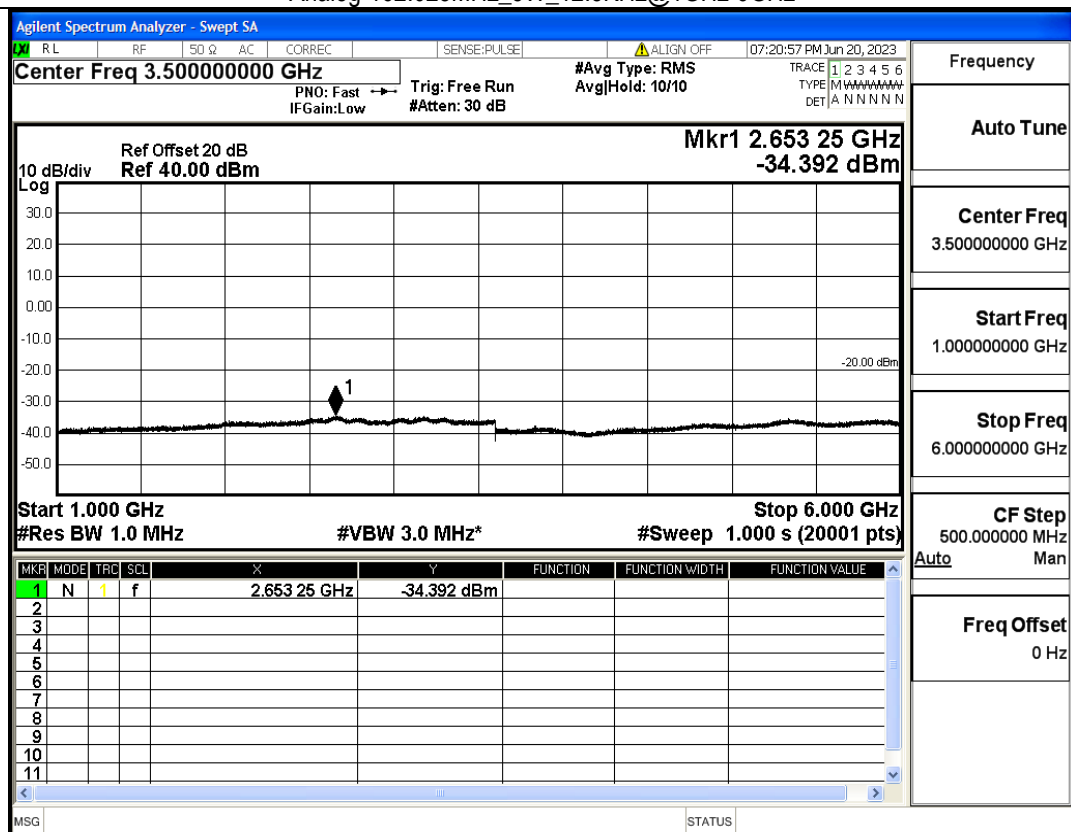




Fundamental



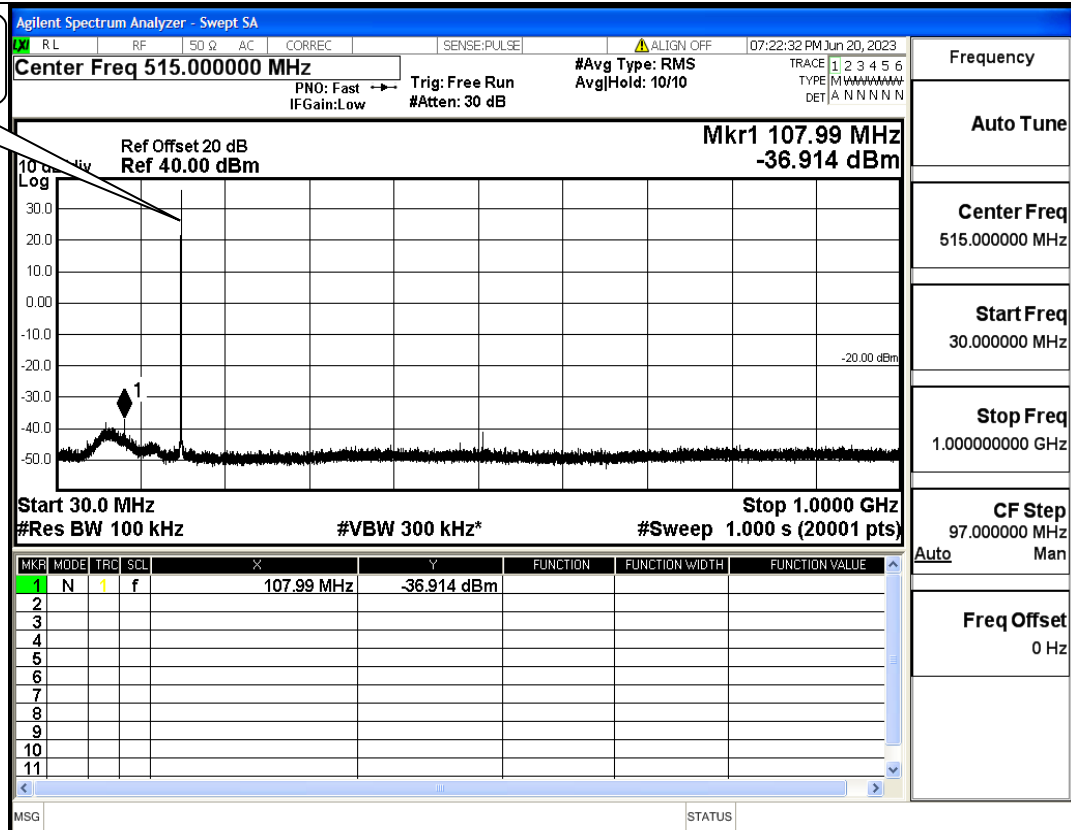
Analog-162.025MHz\_5W\_12.5KHz@1GHz-6GHz



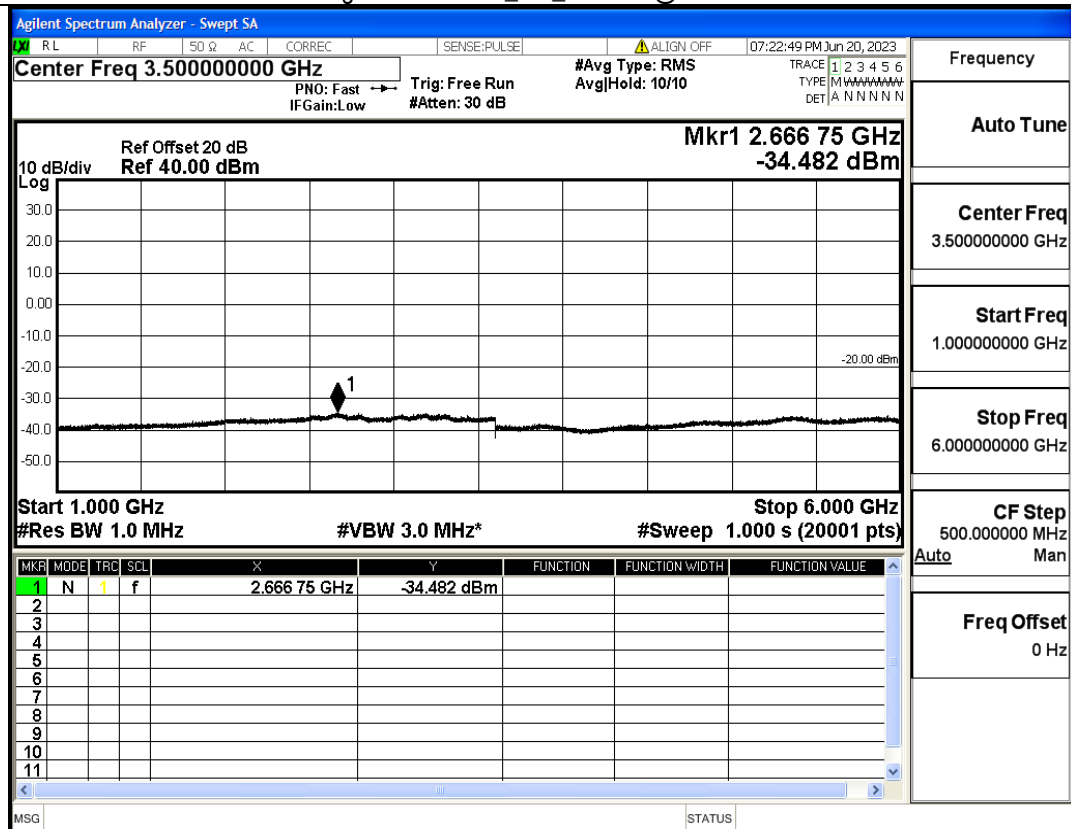
Analog-173.3875MHz\_5W\_12.5KHz@30MHz-1GHz



Fundamental

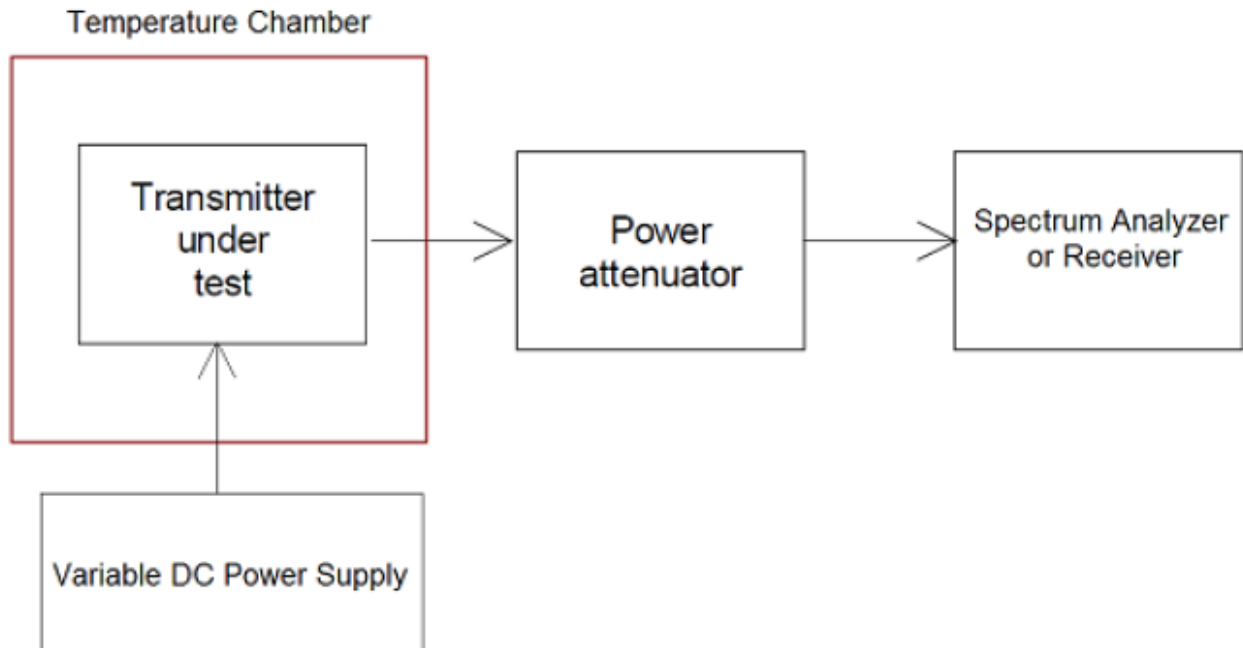


Analog-173.3875MHz\_5W\_12.5KHz@1GHz-6GHz



## 4.6. Frequency Stability

### TEST CONFIGURATION



### TEST PROCEDURE

The EUT was set in the climate chamber and connected to an external DC power supply. The RF output was directly connected to frequency meter. The coupling loss of the additional cables was recorded and taken in account for all the measurements. After temperature stabilization (approx. 20 min for each stage), the frequency for the lower, the middle and the highest frequency range was recorded. For Frequency stability Vs. Voltage the EUT was connected to a DC power supply and the voltage was adjusted in the required ranges. The result was recorded.

### TEST APPLICABLE

- 1 According to FCC Part 2 Section 2.1055 (a)(1), the frequency stability shall be measured with variation of ambient temperature from -30°C to +60°C centigrade.
- 2 According to FCC Part 2 Section 2.1055 (a) (2), for battery powered equipment, the frequency stability shall be measured with reducing primary supply voltage to the battery operating end point, which is specified by the manufacture.
- 3 Vary primary supply voltage from 85 to 115 percent of the nominal value; if manufacturer declares extreme voltage within 85 to 115 percent of the nominal value, measured at extreme voltage declared by manufacturer.

### LIMIT

According to §90.213, In the 150-174 MHz band, mobile stations designed to operate of two watts or more, must have a frequency stability of 5.0 ppm.

**TEST RESULTS**

| Test conditions   |          | Frequency error (ppm) |             |              |
|-------------------|----------|-----------------------|-------------|--------------|
| Voltage Condition | Temp(°C) | 151.025 MHz           | 162.0250MHz | 173.3875 MHz |
| NV                | -20      | 0.30                  | 1.01        | 0.78         |
|                   | -10      | 0.09                  | 0.70        | 1.32         |
|                   | 0        | 0.39                  | 0.54        | 0.17         |
|                   | 10       | 0.60                  | 0.46        | 0.59         |
|                   | 20       | 0.71                  | 0.21        | 0.45         |
|                   | 30       | 0.06                  | 0.37        | 0.65         |
|                   | 40       | 1.21                  | 0.95        | 0.15         |
|                   | 50       | 0.89                  | 1.24        | 0.29         |
| LV                | 20       | 0.69                  | 0.96        | 1.21         |
| HV                | 20       | 0.83                  | 0.58        | 1.07         |
| Limit(ppm)        |          | 5.0                   | 5.0         | 5.0          |
| Result            |          | PASS                  | PASS        | PASS         |

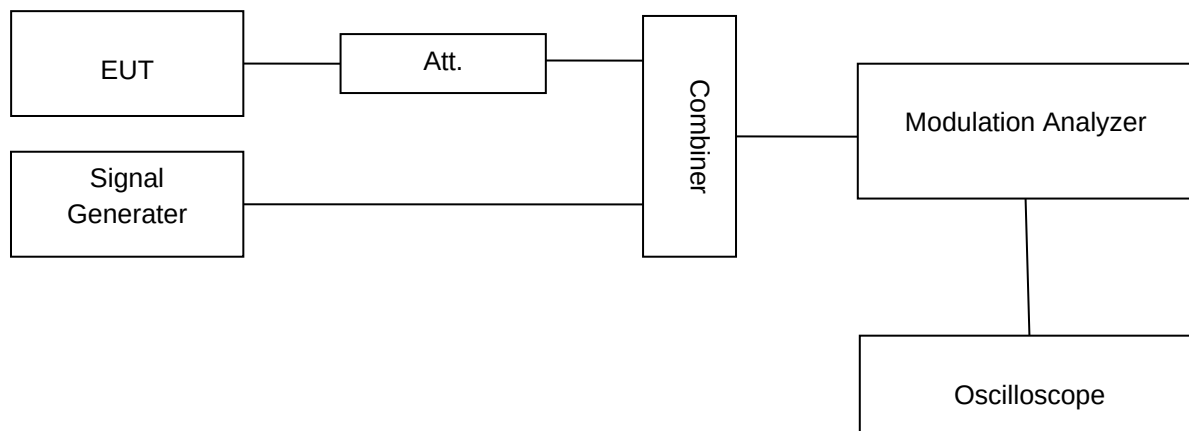
NV: Normal Voltage 7.4V

LV: Low Voltage 6.7V

HV: High Voltage 8.5V

## 4.7. Transient Frequency Behavior

### TEST CONFIGURATION

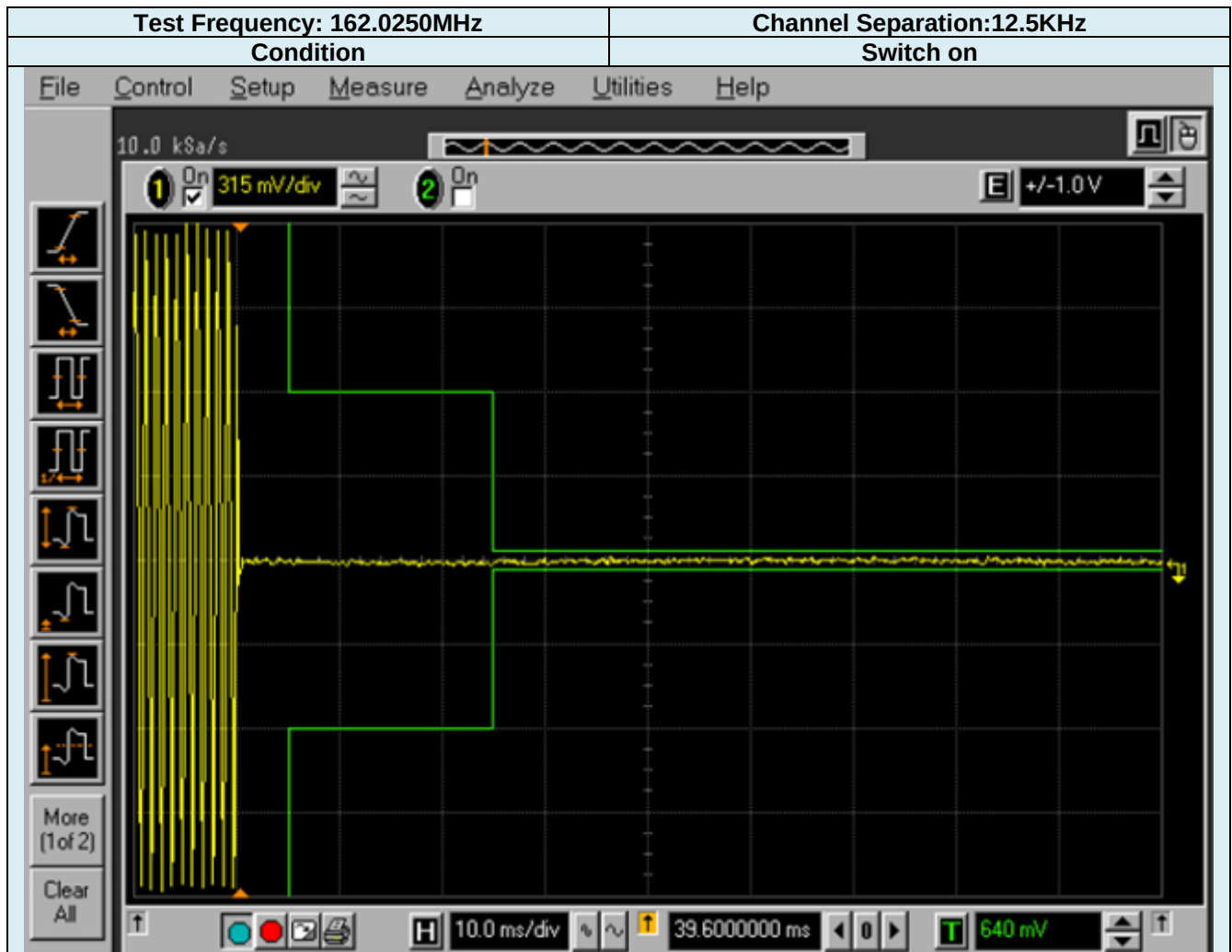


### TEST PROCEDURE

1. Connect the EUT and test equipment as shown on the following block diagram.
2. Set the Spectrum Analyzer to measure FM deviation, and tune the RF frequency to the transmitter assigned frequency.
3. Set the signal generator to the assigned transmitter frequency and modulate it with a 1 kHz tone at  $\pm 12.5$  kHz deviation and set its output level to -100dBm.
4. Turn on the transmitter.
5. Supply sufficient attenuation via the RF attenuator to provide an input level to the Spectrum Analyzer that is 40 dB below the maximum allowed input power when the transmitter is operating at its rated power level. Note this power level on the Spectrum Analyzer as P0.
6. Turn off the transmitter.
7. Adjust the RF level of the signal generator to provide RF power equal to P0. This signal generator RF level shall be maintained throughout the rest of the measurement.
8. Remove the attenuation 1, so the input power to the Spectrum Analyzer is increased by 30 dB when the transmitter is turned on.
9. Adjust the vertical amplitude control of the spectrum analyzer to display the 1000 Hz at  $\pm 4$  divisions vertically centered on the display. Set trigger mode of the Spectrum Analyzer to "Video", and tune the "trigger level" on suitable level. Then set the "trigger offset" to -10ms for turn on and -15ms for turn off.
11. Turn on the transmitter and the transient wave will be captured on the screen of Spectrum Analyzer. Observe the stored display. The instant when the 1 kHz test signal is completely suppressed is considered to be  $t_{on}$ . The trace should be maintained within the allowed divisions during the period  $t_1$  and  $t_2$ .
12. Then turn off the transmitter, and another transient wave will be captured on the screen of Spectrum Analyzer. The trace should be maintained within the allowed divisions during the period  $t_3$ .

**LIMIT**

| Time intervals | Maximum frequency difference | Requirement    |
|----------------|------------------------------|----------------|
|                |                              | 150 to 174 MHz |
| t1             | $\pm 12.5\text{KHz}$         | 5.0 ms         |
| t2             | $\pm 6.25\text{KHz}$         | 20.0 ms        |
| t3             | $\pm 12.5\text{KHz}$         | 5.0 ms         |

**TEST RESULTS**



.....End of Report.....