

# TEST REPORT

|                                                                                                                                           |                                                               |                                                                          |
|-------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|--------------------------------------------------------------------------|
| <b>KCTL Inc.</b><br>65, Sinwon-ro, Yeongtong-gu,<br>Suwon-si, Gyeonggi-do, 443-390, Korea<br>TEL: 82 70 5008 1021<br>FAX: 82 505 299 8311 | Report No.: KCTL15-FR0071(1)<br><br>Page( 1 ) / ( 119 ) Pages | <b>KCTL</b><br><a href="http://www.kctl.co.kr">http://www.kctl.co.kr</a> |
|-------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|--------------------------------------------------------------------------|

## 1. Applicant

Name: E-TECH Co., Ltd.  
Address: #403-901, 655, Pyeongcheon-ro, Wonmi-gu, Bucheon-si,  
Gyeonggi-do, Korea

## 2. Sample Description:

FCC ID: R72NEW400  
Type of equipment: FM Handheld Transceiver (UHF)  
Basic Model: NEW400

## 3. Date of Test:

November 2 ~ November 10, 2015  
April 5 ~ April 15, 2016

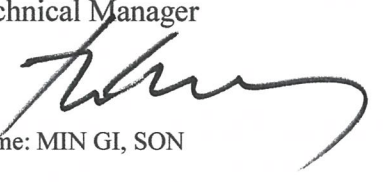
## 4. Test method used:

FCC Part 2 Subpart J,  
FCC Part 90 Subpart I

## 5. Test Results

Test Item: Refer to page 8  
Result: Refer to page 9 ~ page 118  
Measurement Uncertainty: Refer to page 8

This result shown in this report refer only to the sample(s) tested unless otherwise stated.

|             |                                                                                                                            |                                                                                                                                |
|-------------|----------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| Affirmation | Tested by<br><br>Name: MYEONG HWA, JANG | Technical Manager<br><br>Name: MIN GI, SON |
|-------------|----------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|

2016. 04. 18

**KCTL Inc.** Testing Laboratory

### History of Issued Test Report

| Issued date:.     | Report Number    | History                         |
|-------------------|------------------|---------------------------------|
| November 24, 2015 | KCTL15-FR0071    | Issued the original test report |
| April 18, 2016    | KCTL15-FR0071(1) | Added and tested more test mode |

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## 1. Client information

**Applicant:** E-TECH Co., Ltd.  
**Address:** #403-901, 655, Pyeongcheon-ro, Wonmi-gu, Bucheon-si, Gyeonggi-do, Korea  
**Telephone number:** +82-32-328-3184  
**Facsimile number:** +82-32-328-3186  
**Contact person:** Jae-Hyun Kim / pico76@etech2004.co.kr

**Manufacturer:** E-TECH Co., Ltd.  
**Address:** #403-901, 655, Pyeongcheon-ro, Wonmi-gu, Bucheon-si, Gyeonggi-do, Korea

## 2. Laboratory information

### Address

#### **KCTL Inc.**

65 Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, Korea

Telephone Number: 82-70-5008-1016 Facsimile Number: 82-505-299-8311

### Certificate

KOLAS No.: KT231

FCC Site Designation No.: KR0040

FCC Site Registration No.: 687132

VCCI Site Registration No.: R-3327, G-198, C-3706, T-1849

IC Site Registration No.:8035A-2

### SITE MAP



### 3. Description of E.U.T.

#### 3.1 Basic description

|                         |                                                                         |
|-------------------------|-------------------------------------------------------------------------|
| Applicant:              | E-TECH Co., Ltd.                                                        |
| Address of Applicant    | #403-901, 655, Pyeongcheon-ro, Wonmi-gu, Bucheon-si, Gyeonggi-do, Korea |
| Manufacturer            | E-TECH Co., Ltd.                                                        |
| Address of Manufacturer | #403-901, 655, Pyeongcheon-ro, Wonmi-gu, Bucheon-si, Gyeonggi-do, Korea |
| Type of equipment       | FM Handheld Transceiver (UHF)                                           |
| Basic Model             | NEW400                                                                  |
| Serial number           | N/A                                                                     |

#### 3.2 General description

|                             |                                        |
|-----------------------------|----------------------------------------|
| Frequency Range             | 406.10 MHz ~ 512.00 MHz                |
| Type of Modulation          | 12.5BW, 6.25BW                         |
| Emission Designators        | 9K4F3E for 12.5BW<br>4K5F3E for 6.25BW |
| Number of Channels          | 32 ch                                  |
| Type of Antenna             | Helical Antenna                        |
| Transmit Power              | 1 W / 4 W                              |
| Power supply                | DC 7.4 V                               |
| H/W Version                 | 1.0                                    |
| S/W version                 | 1.0                                    |
| Test SW Version             | N/A                                    |
| RF power setting in TEST SW | N/A                                    |

Note : The above EUT information was declared by the manufacturer.

### 3.3 Test frequency

|                  | Frequency  |
|------------------|------------|
| Low frequency    | 406.10 MHz |
| Middle frequency | 459.00 MHz |
| High frequency   | 512.00 MHz |

### 3.4 Test Voltage

| Mode             | Voltage  |
|------------------|----------|
| Norminal voltage | DC 7.4 V |

## 4. Summary of test results

### 4.1 Standards & results

| FCC Rule Reference                                                                | Parameter                                        | Report Section | Test Result |
|-----------------------------------------------------------------------------------|--------------------------------------------------|----------------|-------------|
| 2.1046(a), 90.205                                                                 | Output Power Conducted                           | 5.1            | C           |
| 90.213, 2.1055                                                                    | Frequency Stability                              | 5.2            | C           |
| 2.1047(b)                                                                         | Modulation Limiting                              | 5.3            | C           |
| 2.1047(a)                                                                         | Audio Frequency Response                         | 5.4            | C           |
| 2.1047(a)                                                                         | Audio Low Pass Filter Frequency Response         | 5.5            | C           |
| 2.1049, 90.209, 90.210                                                            | Occupied Bandwidth and Emission Mask             | 5.6            | C           |
| 90.214                                                                            | Transient Frequency Behaviour of the Transmitter | 5.7            | C           |
| 2.1051, 90.210                                                                    | Conducted Spurious Emission                      | 5.8            | C           |
| 2.1053(a), 90.210                                                                 | Radiated Spurious Emission                       | 5.9            | C           |
| Note: C = complies<br>NC = Not complies<br>NT = Not tested<br>NA = Not Applicable |                                                  |                |             |

\* The general test methods used to test this device is TIA-603-D.

### 4.2 Uncertainty

| Measurement Item             | Expanded Uncertainty<br>$U = kU_c (k = 2)$ |                      |
|------------------------------|--------------------------------------------|----------------------|
| Conducted RF power           | 1.30 dB                                    |                      |
| Conducted Spurious Emissions | 1.52 dB                                    |                      |
| Radiated Spurious Emissions  | 30 MHz ~ 300 MHz:                          | + 4.94 dB, - 5.06 dB |
|                              |                                            | + 4.93 dB, - 5.05 dB |
|                              | 300 MHz ~ 1 000 MHz:                       | + 4.97 dB, - 5.08 dB |
|                              |                                            | + 4.84 dB, - 4.96 dB |
| Conducted Emissions          | 1 GHz ~ 25 GHz:                            | + 6.03 dB, - 6.05 dB |
|                              | 9 kHz ~ 150 kHz:                           | 3.75 dB              |
|                              | 150 kHz ~ 30 MHz:                          | 3.36 dB              |



## 5. Test results

### 5.1 Output Power Conducted

#### 5.1.1 Regulation

According to §90.205, (r) All other frequency bands. Requested transmitter power will be considered and authorized on a case by case basis.

(s) The output power shall not exceed by more than 20 percent either the output power shown in the Radio Equipment List [available in accordance with §90.203(a)(1)] for transmitters included in this list or when not so listed, the manufacturer's rated output power for the particular transmitter specifically listed on the authorization.

#### 5.1.2 Measurement Procedure

1. The conducted RF output power is the available power at the output terminals of the transmitter when the output terminals are corrected to the standard transmitter load.
2. The test sample is feeding a 50 ohm coaxial attenuator which is connected to a spectrum analyzer.
3. The power output at the transmitter antenna port is determined by adding the value of the attenuator to the spectrum analyzer reading.
4. The test are performed at the frequencies(low, middle, high channels of the EUT operating band) and full rated power levels of the transmitter.

### 5.1.3 Test Result

- Complied

\* 12.5BW

-Target Power\_1W

| Channel | Frequency [MHz] | Result [dBm] | Result [W] | Limit [W] | Margin [W] | Current [A] |
|---------|-----------------|--------------|------------|-----------|------------|-------------|
| Lowest  | 406.10          | 30.03        | 1.01       | 1.20      | 0.19       | 0.81        |
| Middle  | 459.00          | 30.66        | 1.16       | 1.20      | 0.04       | 0.58        |
| Highest | 512.00          | 30.24        | 1.06       | 1.20      | 0.14       | 0.60        |

-Target Power\_4W

| Channel | Frequency [MHz] | Result [dBm] | Result [W] | Limit [W] | Margin [W] | Current [A] |
|---------|-----------------|--------------|------------|-----------|------------|-------------|
| Lowest  | 406.10          | 36.03        | 4.01       | 4.80      | 0.79       | 1.56        |
| Middle  | 459.00          | 36.26        | 4.23       | 4.80      | 0.57       | 1.10        |
| Highest | 512.00          | 36.18        | 4.14       | 4.80      | 0.66       | 1.34        |

\* 6.25BW

-Target Power\_1W

| Channel | Frequency [MHz] | Result [dBm] | Result [W] | Limit [W] | Margin [W] | Current [A] |
|---------|-----------------|--------------|------------|-----------|------------|-------------|
| Lowest  | 406.10          | 30.20        | 1.05       | 1.20      | 0.15       | 0.80        |
| Middle  | 459.00          | 30.54        | 1.13       | 1.20      | 0.07       | 0.57        |
| Highest | 512.00          | 30.13        | 1.03       | 1.20      | 0.17       | 0.59        |

-Target Power\_4W

| Channel | Frequency [MHz] | Result [dBm] | Result [W] | Limit [W] | Margin [W] | Current [A] |
|---------|-----------------|--------------|------------|-----------|------------|-------------|
| Lowest  | 406.10          | 35.97        | 3.95       | 4.80      | 0.85       | 1.52        |
| Middle  | 459.00          | 35.85        | 3.85       | 4.80      | 0.95       | 1.09        |
| Highest | 512.00          | 35.41        | 3.48       | 4.80      | 1.32       | 1.24        |

-NOTE:

1. We took the insertion loss of the cable loss into consideration within the measuring instrument.

## 5.2 Frequency Stability

### 5.2.1 Regulation

According to §90.213, in the 150-174 MHz band, fixed and base stations with a 12.5 kHz channel bandwidth must have a frequency stability of 2.5 ppm. Fixed and base stations with a 6.25 kHz channel bandwidth must have a frequency stability of 1.0 ppm.

In the 150-174 MHz band, mobile stations designed to operate with a 12.5 kHz channel bandwidth or designed to operate on a frequency specifically designated for itinerant use or designed for low-power operation of two watts or less, must have a frequency stability of 5.0 ppm. Mobile stations designed to operate with a 6.25 kHz channel bandwidth must have a frequency stability of 2.0 ppm.

In the 421-512 MHz band, fixed and base stations with a 12.5 kHz channel bandwidth must have a frequency stability of 1.5 ppm. Fixed and base stations with a 6.25 kHz channel bandwidth must have a frequency stability of 0.5 ppm.

In the 421-512 MHz band, mobile stations designed to operate with a 12.5 kHz channel bandwidth must have a frequency stability of 2.5 ppm. Mobile stations designed to operate with a 6.25 kHz channel bandwidth must have a frequency stability of 1.0 ppm.

### 5.2.2 Measurement Procedure

1. The carrier frequency is the stability of the transmitter to maintain an assigned carrier frequency.
2. The frequency stability is measured with variation of ambient temperature from -30°C to +60°C.

### 5.2.3 Test Result

- Complied

\* 12.5BW

-Target Power\_1W\_406.10 MHz

| Voltage [%] | Power [V <sub>DC</sub> ] | Temp. [°C] | Reading Frequency [Hz] | Frequency Error [Hz] | Frequency Error [ppm] |
|-------------|--------------------------|------------|------------------------|----------------------|-----------------------|
| 100         | 7.4                      | -30        | 406 099 832            | -168                 | -0.414                |
|             |                          | -20        | 406 099 813            | -187                 | -0.460                |
|             |                          | -10        | 406 099 877            | -123                 | -0.303                |
|             |                          | 0          | 406 099 889            | -111                 | -0.273                |
|             |                          | 10         | 406 100 103            | 103                  | 0.254                 |
|             |                          | 20         | 406 100 137            | 137                  | 0.337                 |
|             |                          | 30         | 406 100 046            | 46                   | 0.113                 |
|             |                          | 40         | 406 099 999            | -1                   | -0.002                |
|             |                          | 50         | 406 099 919            | -81                  | -0.199                |
|             |                          | 60         | 406 099 906            | -94                  | -0.231                |
|             |                          | Normal     | 406 100 051            | 51                   | 0.126                 |
| 85          | 6.29                     | Normal     | 406 100 044            | 44                   | 0.108                 |
| 115         | 8.51                     | Normal     | 406 100 037            | 37                   | 0.091                 |

-Target Power\_1W\_459.00 MHz

| Voltage [%] | Power [V <sub>DC</sub> ] | Temp. [°C] | Reading Frequency [Hz] | Frequency Error [Hz] | Frequency Error [ppm] |
|-------------|--------------------------|------------|------------------------|----------------------|-----------------------|
| 100         | 7.4                      | -30        | 458 999 816            | -184                 | -0.401                |
|             |                          | -20        | 458 999 786            | -214                 | -0.466                |
|             |                          | -10        | 458 999 859            | -141                 | -0.307                |
|             |                          | 0          | 458 999 886            | -114                 | -0.248                |
|             |                          | 10         | 459 000 110            | 110                  | 0.240                 |
|             |                          | 20         | 459 000 156            | 156                  | 0.340                 |
|             |                          | 30         | 459 000 060            | 60                   | 0.131                 |
|             |                          | 40         | 458 999 952            | -48                  | -0.105                |
|             |                          | 50         | 458 999 912            | -88                  | -0.192                |
|             |                          | 60         | 458 999 898            | -102                 | -0.222                |
|             |                          | Normal     | 459 000 024            | 24                   | 0.052                 |
| 85          | 6.29                     | Normal     | 459 000 020            | 20                   | 0.044                 |
| 115         | 8.51                     | Normal     | 459 000 022            | 22                   | 0.048                 |

-Target Power\_1W\_512.00 MHz

| Voltage [%] | Power [V <sub>DC</sub> ] | Temp. [°C] | Reading Frequency [Hz] | Frequency Error [Hz] | Frequency Error [ppm] |
|-------------|--------------------------|------------|------------------------|----------------------|-----------------------|
| 100         | 7.4                      | -30        | 511 999 814            | -186                 | -0.363                |
|             |                          | -20        | 511 999 756            | -244                 | -0.477                |
|             |                          | -10        | 511 999 837            | -163                 | -0.318                |
|             |                          | 0          | 511 999 885            | -115                 | -0.225                |
|             |                          | 10         | 512 000 109            | 109                  | 0.213                 |
|             |                          | 20         | 512 000 175            | 175                  | 0.342                 |
|             |                          | 30         | 512 000 082            | 82                   | 0.160                 |
|             |                          | 40         | 511 999 985            | -15                  | -0.029                |
|             |                          | 50         | 511 999 906            | -94                  | -0.184                |
|             |                          | 60         | 511 999 888            | -112                 | -0.219                |
|             |                          | Normal     | 512 000 028            | 28                   | 0.055                 |
| 85          | 6.29                     | Normal     | 512 000 031            | 31                   | 0.061                 |
| 115         | 8.51                     | Normal     | 512 000 039            | 39                   | 0.076                 |

-Target Power\_4W\_406.10 MHz

| Voltage [%] | Power [V <sub>DC</sub> ] | Temp. [°C] | Reading Frequency [Hz] | Frequency Error [Hz] | Frequency Error [ppm] |
|-------------|--------------------------|------------|------------------------|----------------------|-----------------------|
| 100         | 7.4                      | -30        | 406 099 917            | -83                  | -0.204                |
|             |                          | -20        | 406 099 814            | -186                 | -0.458                |
|             |                          | -10        | 406 099 850            | -150                 | -0.369                |
|             |                          | 0          | 406 099 941            | -59                  | -0.145                |
|             |                          | 10         | 406 100 026            | 26                   | 0.064                 |
|             |                          | 20         | 406 100 132            | 132                  | 0.325                 |
|             |                          | 30         | 406 100 088            | 88                   | 0.217                 |
|             |                          | 40         | 406 099 998            | -2                   | -0.005                |
|             |                          | 50         | 406 099 933            | -67                  | -0.165                |
|             |                          | 60         | 406 099 916            | -84                  | -0.207                |
|             |                          | Normal     | 406 100 060            | 60                   | 0.148                 |
| 85          | 6.29                     | Normal     | 406 100 062            | 62                   | 0.153                 |
| 115         | 8.51                     | Normal     | 406 100 067            | 67                   | 0.165                 |

-Target Power\_4W\_459.00 MHz

| Voltage [%] | Power [V <sub>DC</sub> ] | Temp. [°C] | Reading Frequency [Hz] | Frequency Error [Hz] | Frequency Error [ppm] |
|-------------|--------------------------|------------|------------------------|----------------------|-----------------------|
| 100         | 7.4                      | -30        | 458 999 881            | -119                 | -0.259                |
|             |                          | -20        | 458 999 782            | -218                 | -0.475                |
|             |                          | -10        | 458 999 841            | -159                 | -0.346                |
|             |                          | 0          | 458 999 920            | -80                  | -0.174                |
|             |                          | 10         | 459 000 052            | 52                   | 0.113                 |
|             |                          | 20         | 459 000 153            | 153                  | 0.333                 |
|             |                          | 30         | 459 000 092            | 92                   | 0.200                 |
|             |                          | 40         | 458 999 973            | -27                  | -0.059                |
|             |                          | 50         | 458 999 920            | -80                  | -0.174                |
|             |                          | 60         | 458 999 902            | -98                  | -0.214                |
|             |                          | Normal     | 459 000 049            | 49                   | 0.107                 |
| 85          | 6.29                     | Normal     | 459 000 052            | 52                   | 0.113                 |
| 115         | 8.51                     | Normal     | 459 000 060            | 60                   | 0.131                 |

-Target Power\_4W\_512.00 MHz

| Voltage [%] | Power [V <sub>DC</sub> ] | Temp. [°C] | Reading Frequency [Hz] | Frequency Error [Hz] | Frequency Error [ppm] |
|-------------|--------------------------|------------|------------------------|----------------------|-----------------------|
| 100         | 7.4                      | -30        | 511 999 842            | -158                 | -0.309                |
|             |                          | -20        | 511 999 754            | -246                 | -0.480                |
|             |                          | -10        | 511 999 829            | -171                 | -0.334                |
|             |                          | 0          | 511 999 894            | -106                 | -0.207                |
|             |                          | 10         | 512 000 088            | 88                   | 0.172                 |
|             |                          | 20         | 512 000 174            | 174                  | 0.340                 |
|             |                          | 30         | 512 000 092            | 92                   | 0.180                 |
|             |                          | 40         | 511 999 979            | -21                  | -0.041                |
|             |                          | 50         | 511 999 908            | -92                  | -0.180                |
|             |                          | 60         | 511 999 889            | -111                 | -0.217                |
|             |                          | Normal     | 512 000 043            | 43                   | 0.084                 |
| 85          | 6.29                     | Normal     | 512 000 046            | 46                   | 0.090                 |
| 115         | 8.51                     | Normal     | 512 000 051            | 51                   | 0.100                 |

\* 6.25BW

-Target Power\_1W\_406.10 MHz

| Voltage [%] | Power [V <sub>DC</sub> ] | Temp. [°C] | Reading Frequency [Hz] | Frequency Error [Hz] | Frequency Error [ppm] |
|-------------|--------------------------|------------|------------------------|----------------------|-----------------------|
| 100         | 7.4                      | -30        | 406 099 536            | -464                 | -1.143                |
|             |                          | -20        | 406 099 613            | -387                 | -0.953                |
|             |                          | -10        | 406 099 661            | -339                 | -0.835                |
|             |                          | 0          | 406 099 670            | -330                 | -0.813                |
|             |                          | 10         | 406 099 845            | -155                 | -0.382                |
|             |                          | 20         | 406 099 887            | -113                 | -0.278                |
|             |                          | 30         | 406 099 806            | -194                 | -0.478                |
|             |                          | 40         | 406 099 726            | -274                 | -0.675                |
|             |                          | 50         | 406 099 666            | -334                 | -0.822                |
|             |                          | 60         | 406 099 646            | -354                 | -0.872                |
|             |                          | Normal     | 406 099 840            | -160                 | -0.394                |
| 85          | 6.29                     | Normal     | 406 099 831            | -169                 | -0.416                |
| 115         | 8.51                     | Normal     | 406 099 824            | -176                 | -0.433                |

-Target Power\_1W\_459.00 MHz

| Voltage [%] | Power [V <sub>DC</sub> ] | Temp. [°C] | Reading Frequency [Hz] | Frequency Error [Hz] | Frequency Error [ppm] |
|-------------|--------------------------|------------|------------------------|----------------------|-----------------------|
| 100         | 7.4                      | -30        | 458 999 486            | -514                 | -1.120                |
|             |                          | -20        | 458 999 580            | -420                 | -0.915                |
|             |                          | -10        | 458 999 582            | -418                 | -0.911                |
|             |                          | 0          | 458 999 701            | -299                 | -0.651                |
|             |                          | 10         | 458 999 779            | -221                 | -0.481                |
|             |                          | 20         | 458 999 855            | -145                 | -0.316                |
|             |                          | 30         | 458 999 806            | -194                 | -0.423                |
|             |                          | 40         | 458 999 664            | -336                 | -0.732                |
|             |                          | 50         | 458 999 629            | -371                 | -0.808                |
|             |                          | 60         | 458 999 619            | -381                 | -0.830                |
|             |                          | Normal     | 458 999 729            | -271                 | -0.590                |
| 85          | 6.29                     | Normal     | 458 999 728            | -272                 | -0.593                |
| 115         | 8.51                     | Normal     | 458 999 729            | -271                 | -0.590                |

-Target Power\_1W\_512.00 MHz

| Voltage [%] | Power [V <sub>DC</sub> ] | Temp. [°C] | Reading Frequency [Hz] | Frequency Error [Hz] | Frequency Error [ppm] |
|-------------|--------------------------|------------|------------------------|----------------------|-----------------------|
| 100         | 7.4                      | -30        | 511 999 464            | -536                 | -1.047                |
|             |                          | -20        | 511 999 548            | -452                 | -0.883                |
|             |                          | -10        | 511 999 507            | -493                 | -0.963                |
|             |                          | 0          | 511 999 712            | -288                 | -0.563                |
|             |                          | 10         | 511 999 693            | -307                 | -0.600                |
|             |                          | 20         | 511 999 819            | -181                 | -0.354                |
|             |                          | 30         | 511 999 812            | -188                 | -0.367                |
|             |                          | 40         | 511 999 609            | -391                 | -0.764                |
|             |                          | 50         | 511 999 597            | -403                 | -0.787                |
|             |                          | 60         | 511 999 594            | -406                 | -0.793                |
|             |                          | Normal     | 511 999 684            | -316                 | -0.617                |
| 85          | 6.29                     | Normal     | 511 999 680            | -320                 | -0.625                |
| 115         | 8.51                     | Normal     | 511 999 680            | -320                 | -0.625                |

-Target Power\_4W\_406.10 MHz

| Voltage [%] | Power [V <sub>DC</sub> ] | Temp. [°C] | Reading Frequency [Hz] | Frequency Error [Hz] | Frequency Error [ppm] |
|-------------|--------------------------|------------|------------------------|----------------------|-----------------------|
| 100         | 7.4                      | -30        | 406 099 534            | -466                 | -1.148                |
|             |                          | -20        | 406 099 579            | -421                 | -1.037                |
|             |                          | -10        | 406 099 686            | -314                 | -0.773                |
|             |                          | 0          | 406 099 637            | -363                 | -0.894                |
|             |                          | 10         | 406 099 858            | -142                 | -0.350                |
|             |                          | 20         | 406 099 886            | -114                 | -0.281                |
|             |                          | 30         | 406 099 797            | -203                 | -0.500                |
|             |                          | 40         | 406 099 747            | -253                 | -0.623                |
|             |                          | 50         | 406 099 665            | -335                 | -0.825                |
|             |                          | 60         | 406 099 638            | -362                 | -0.891                |
|             |                          | Normal     | 406 099 832            | -168                 | -0.414                |
| 85          | 6.29                     | Normal     | 406 099 796            | -204                 | -0.502                |
| 115         | 8.51                     | Normal     | 406 099 785            | -215                 | -0.529                |



-Target Power\_4W\_459.00 MHz

| Voltage [%] | Power [V <sub>DC</sub> ] | Temp. [°C] | Reading Frequency [Hz] | Frequency Error [Hz] | Frequency Error [ppm] |
|-------------|--------------------------|------------|------------------------|----------------------|-----------------------|
| 100         | 7.4                      | -30        | 458 999 453            | -547                 | -1.192                |
|             |                          | -20        | 458 999 573            | -427                 | -0.930                |
|             |                          | -10        | 458 999 596            | -404                 | -0.880                |
|             |                          | 0          | 458 999 668            | -332                 | -0.723                |
|             |                          | 10         | 458 999 807            | -193                 | -0.420                |
|             |                          | 20         | 458 999 863            | -137                 | -0.298                |
|             |                          | 30         | 458 999 794            | -206                 | -0.449                |
|             |                          | 40         | 458 999 674            | -326                 | -0.710                |
|             |                          | 50         | 458 999 625            | -375                 | -0.817                |
|             |                          | 60         | 458 999 608            | -392                 | -0.854                |
|             |                          | Normal     | 458 999 726            | -274                 | -0.597                |
| 85          | 6.29                     | Normal     | 458 999 723            | -277                 | -0.603                |
| 115         | 8.51                     | Normal     | 458 999 723            | -277                 | -0.603                |

-Target Power\_4W\_512.00 MHz

| Voltage [%] | Power [V <sub>DC</sub> ] | Temp. [°C] | Reading Frequency [Hz] | Frequency Error [Hz] | Frequency Error [ppm] |
|-------------|--------------------------|------------|------------------------|----------------------|-----------------------|
| 100         | 7.4                      | -30        | 511 999 478            | -522                 | -1.020                |
|             |                          | -20        | 511 999 536            | -464                 | -0.906                |
|             |                          | -10        | 511 999 518            | -482                 | -0.941                |
|             |                          | 0          | 511 999 690            | -310                 | -0.605                |
|             |                          | 10         | 511 999 720            | -280                 | -0.547                |
|             |                          | 20         | 511 999 826            | -174                 | -0.340                |
|             |                          | 30         | 511 999 804            | -196                 | -0.383                |
|             |                          | 40         | 511 999 618            | -382                 | -0.746                |
|             |                          | 50         | 511 999 595            | -405                 | -0.791                |
|             |                          | 60         | 511 999 583            | -417                 | -0.814                |
|             |                          | Normal     | 511 999 674            | -326                 | -0.637                |
| 85          | 6.29                     | Normal     | 511 999 669            | -331                 | -0.646                |
| 115         | 8.51                     | Normal     | 511 999 668            | -332                 | -0.648                |

## 5.3 Modulation Limiting

### 5.3.1 Regulation

According to TIA-603-D, the instantaneous peak and steady state deviations shall not exceed rated system deviation at any audio frequency or change in level, as specified in the method of measurement.

### 5.3.2 Measurement Procedure

1. Modulation limiting is the transmitter circuit's ability to limit the transmitter from producing deviations in excess of rated system deviation.
2. The modulation response is measured at certain modulation frequencies, related to 1000 Hz reference signal.
3. The basic setting is 60% of full rated deviation which will be increased the audio generator level from -20 dB to 20 dB in nine steps.
4. Tests are performed for positive and negative modulation.

### 5.3.3 Test Result

- Complied

\* 12.5BW

-Target Power\_1W\_406.10 MHz

| Audio input level relative [dB] | Positive peak deviation [kHz] |            |            | Negative peak deviation [kHz] |            |            | Limit [kHz] |
|---------------------------------|-------------------------------|------------|------------|-------------------------------|------------|------------|-------------|
|                                 | 300 [Hz]                      | 1 000 [Hz] | 3 000 [Hz] | 300 [Hz]                      | 1 000 [Hz] | 3 000 [Hz] |             |
| -20                             | 0.097                         | 0.228      | 0.328      | 0.115                         | 0.240      | 0.338      | 2.5         |
| -15                             | 0.123                         | 0.343      | 0.527      | 0.127                         | 0.354      | 0.533      |             |
| -10                             | 0.147                         | 0.531      | 0.852      | 0.153                         | 0.552      | 0.860      |             |
| -5                              | 0.197                         | 0.884      | 1.471      | 0.209                         | 0.893      | 1.468      |             |
| 0                               | 0.301                         | 1.525      | 1.673      | 0.304                         | 1.516      | 1.668      |             |
| 5                               | 0.471                         | 2.058      | 1.667      | 0.481                         | 2.060      | 1.669      |             |
| 10                              | 0.786                         | 1.970      | 1.661      | 0.785                         | 1.990      | 1.657      |             |
| 15                              | 1.335                         | 1.942      | 1.666      | 1.350                         | 1.975      | 1.656      |             |
| 20                              | 2.207                         | 1.935      | 1.663      | 2.228                         | 1.946      | 1.665      |             |

-Target Power\_1W\_459.00 MHz

| Audio input level relative [dB] | Positive peak deviation [kHz] |            |            | Negative peak deviation [kHz] |            |            | Limit [kHz] |
|---------------------------------|-------------------------------|------------|------------|-------------------------------|------------|------------|-------------|
|                                 | 300 [Hz]                      | 1 000 [Hz] | 3 000 [Hz] | 300 [Hz]                      | 1 000 [Hz] | 3 000 [Hz] |             |
| -20                             | 0.084                         | 0.206      | 0.311      | 0.087                         | 0.208      | 0.315      | 2.5         |
| -15                             | 0.101                         | 0.323      | 0.504      | 0.097                         | 0.312      | 0.504      |             |
| -10                             | 0.128                         | 0.524      | 0.877      | 0.133                         | 0.536      | 0.864      |             |
| -5                              | 0.190                         | 0.887      | 1.499      | 0.183                         | 0.885      | 1.488      |             |
| 0                               | 0.277                         | 1.535      | 1.652      | 0.279                         | 1.529      | 1.644      |             |
| 5                               | 0.451                         | 2.019      | 1.648      | 0.460                         | 2.021      | 1.642      |             |
| 10                              | 0.763                         | 1.935      | 1.645      | 0.761                         | 1.945      | 1.636      |             |
| 15                              | 1.318                         | 1.905      | 1.643      | 1.312                         | 1.914      | 1.632      |             |
| 20                              | 2.130                         | 1.913      | 1.638      | 2.140                         | 1.911      | 1.624      |             |

-Target Power\_1W\_512.00 MHz

| Audio input level relative [dB] | Positive peak deviation [kHz] |            |            | Negative peak deviation [kHz] |            |            | Limit [kHz] |
|---------------------------------|-------------------------------|------------|------------|-------------------------------|------------|------------|-------------|
|                                 | 300 [Hz]                      | 1 000 [Hz] | 3 000 [Hz] | 300 [Hz]                      | 1 000 [Hz] | 3 000 [Hz] |             |
| -20                             | 0.075                         | 0.209      | 0.308      | 0.088                         | 0.224      | 0.303      | 2.5         |
| -15                             | 0.088                         | 0.310      | 0.497      | 0.091                         | 0.308      | 0.500      |             |
| -10                             | 0.124                         | 0.528      | 0.863      | 0.121                         | 0.518      | 0.862      |             |
| -5                              | 0.169                         | 0.878      | 1.494      | 0.168                         | 0.884      | 1.482      |             |
| 0                               | 0.259                         | 1.546      | 1.662      | 0.259                         | 1.532      | 1.653      |             |
| 5                               | 0.438                         | 2.021      | 1.672      | 0.427                         | 2.049      | 1.646      |             |
| 10                              | 0.722                         | 1.946      | 1.657      | 0.728                         | 1.948      | 1.650      |             |
| 15                              | 1.253                         | 1.919      | 1.641      | 1.247                         | 1.927      | 1.627      |             |
| 20                              | 2.049                         | 1.913      | 1.648      | 2.062                         | 1.914      | 1.633      |             |

-Target Power\_4W\_406.10 MHz

| Audio input level relative [dB] | Positive peak deviation [kHz] |            |            | Negative peak deviation [kHz] |            |            | Limit [kHz] |
|---------------------------------|-------------------------------|------------|------------|-------------------------------|------------|------------|-------------|
|                                 | 300 [Hz]                      | 1 000 [Hz] | 3 000 [Hz] | 300 [Hz]                      | 1 000 [Hz] | 3 000 [Hz] |             |
| -20                             | 0.104                         | 0.228      | 0.329      | 0.111                         | 0.233      | 0.347      | 2.5         |
| -15                             | 0.112                         | 0.336      | 0.695      | 0.130                         | 0.347      | 0.528      |             |
| -10                             | 0.146                         | 0.534      | 0.859      | 0.153                         | 0.554      | 0.864      |             |
| -5                              | 0.205                         | 0.889      | 1.472      | 0.216                         | 0.897      | 1.474      |             |
| 0                               | 0.294                         | 1.524      | 1.669      | 0.307                         | 1.528      | 1.669      |             |
| 5                               | 0.474                         | 2.046      | 1.663      | 0.478                         | 2.057      | 1.664      |             |
| 10                              | 0.786                         | 1.966      | 1.663      | 0.801                         | 1.987      | 1.657      |             |
| 15                              | 1.361                         | 1.937      | 1.659      | 1.348                         | 1.953      | 1.658      |             |
| 20                              | 2.196                         | 1.952      | 1.662      | 2.216                         | 1.948      | 1.655      |             |

-Target Power\_4W\_459.00 MHz

| Audio input level relative [dB] | Positive peak deviation [kHz] |            |            | Negative peak deviation [kHz] |            |            | Limit [kHz] |
|---------------------------------|-------------------------------|------------|------------|-------------------------------|------------|------------|-------------|
|                                 | 300 [Hz]                      | 1 000 [Hz] | 3 000 [Hz] | 300 [Hz]                      | 1 000 [Hz] | 3 000 [Hz] |             |
| -20                             | 0.084                         | 0.266      | 0.321      | 0.086                         | 0.206      | 0.316      | 2.5         |
| -15                             | 0.110                         | 0.316      | 0.508      | 0.097                         | 0.312      | 0.508      |             |
| -10                             | 0.134                         | 0.533      | 0.858      | 0.133                         | 0.521      | 0.857      |             |
| -5                              | 0.073                         | 0.908      | 1.477      | 0.074                         | 0.877      | 1.472      |             |
| 0                               | 0.280                         | 1.517      | 1.628      | 0.283                         | 1.516      | 1.627      |             |
| 5                               | 0.450                         | 2.000      | 1.632      | 0.458                         | 1.993      | 1.627      |             |
| 10                              | 0.758                         | 1.924      | 1.629      | 0.755                         | 1.926      | 1.621      |             |
| 15                              | 1.299                         | 1.906      | 1.644      | 1.300                         | 1.919      | 1.638      |             |
| 20                              | 2.129                         | 1.901      | 1.632      | 2.138                         | 1.904      | 1.629      |             |

-Target Power\_4W\_512.00 MHz

| Audio input level relative [dB] | Positive peak deviation [kHz] |            |            | Negative peak deviation [kHz] |            |            | Limit [kHz] |
|---------------------------------|-------------------------------|------------|------------|-------------------------------|------------|------------|-------------|
|                                 | 300 [Hz]                      | 1 000 [Hz] | 3 000 [Hz] | 300 [Hz]                      | 1 000 [Hz] | 3 000 [Hz] |             |
| -20                             | 0.069                         | 0.204      | 0.303      | 0.078                         | 0.193      | 0.307      | 2.5         |
| -15                             | 0.093                         | 0.311      | 0.488      | 0.085                         | 0.310      | 0.492      |             |
| -10                             | 0.123                         | 0.516      | 0.857      | 0.119                         | 0.517      | 0.849      |             |
| -5                              | 0.165                         | 0.881      | 1.476      | 0.174                         | 0.876      | 1.467      |             |
| 0                               | 0.259                         | 1.535      | 1.638      | 0.264                         | 1.530      | 1.625      |             |
| 5                               | 0.434                         | 2.003      | 1.640      | 0.423                         | 2.010      | 1.620      |             |
| 10                              | 0.719                         | 1.933      | 1.633      | 0.728                         | 1.943      | 1.623      |             |
| 15                              | 1.248                         | 1.906      | 1.638      | 1.238                         | 1.910      | 1.624      |             |
| 20                              | 2.035                         | 1.908      | 1.631      | 2.045                         | 1.898      | 1.623      |             |

\* 6.25BW

-Target Power\_1W\_406.10 MHz

| Audio input level relative [dB] | Positive peak deviation [kHz] |            |            | Negative peak deviation [kHz] |            |            | Limit [kHz] |
|---------------------------------|-------------------------------|------------|------------|-------------------------------|------------|------------|-------------|
|                                 | 300 [Hz]                      | 1 000 [Hz] | 3 000 [Hz] | 300 [Hz]                      | 1 000 [Hz] | 3 000 [Hz] |             |
| -20                             | 0.084                         | 0.134      | 0.186      | 0.096                         | 0.144      | 0.200      | 1.25        |
| -15                             | 0.093                         | 0.194      | 0.284      | 0.107                         | 0.201      | 0.287      |             |
| -10                             | 0.111                         | 0.291      | 0.445      | 0.118                         | 0.292      | 0.453      |             |
| -5                              | 0.125                         | 0.458      | 0.745      | 0.137                         | 0.461      | 0.755      |             |
| 0                               | 0.184                         | 0.761      | 0.772      | 0.191                         | 0.774      | 0.768      |             |
| 5                               | 0.258                         | 0.938      | 0.768      | 0.269                         | 0.957      | 0.771      |             |
| 10                              | 0.395                         | 0.896      | 0.760      | 0.401                         | 0.916      | 0.764      |             |
| 15                              | 0.647                         | 0.890      | 0.764      | 0.664                         | 0.902      | 0.774      |             |
| 20                              | 1.009                         | 0.905      | 0.768      | 1.018                         | 0.896      | 0.767      |             |

-Target Power\_1W\_459.00 MHz

| Audio input level relative [dB] | Positive peak deviation [kHz] |            |            | Negative peak deviation [kHz] |            |            | Limit [kHz] |
|---------------------------------|-------------------------------|------------|------------|-------------------------------|------------|------------|-------------|
|                                 | 300 [Hz]                      | 1 000 [Hz] | 3 000 [Hz] | 300 [Hz]                      | 1 000 [Hz] | 3 000 [Hz] |             |
| -20                             | 0.072                         | 0.129      | 0.183      | 0.073                         | 0.127      | 0.178      | 1.25        |
| -15                             | 0.079                         | 0.172      | 0.270      | 0.078                         | 0.178      | 0.267      |             |
| -10                             | 0.092                         | 0.280      | 0.440      | 0.090                         | 0.274      | 0.436      |             |
| -5                              | 0.114                         | 0.451      | 0.734      | 0.114                         | 0.451      | 0.739      |             |
| 0                               | 0.156                         | 0.756      | 0.743      | 0.157                         | 0.758      | 0.738      |             |
| 5                               | 0.235                         | 0.904      | 0.742      | 0.233                         | 0.906      | 0.740      |             |
| 10                              | 0.376                         | 0.869      | 0.744      | 0.372                         | 0.875      | 0.735      |             |
| 15                              | 0.633                         | 0.864      | 0.740      | 0.631                         | 0.869      | 0.736      |             |
| 20                              | 0.958                         | 0.863      | 0.743      | 0.975                         | 0.866      | 0.738      |             |

-Target Power\_1W\_512.00 MHz

| Audio input level relative [dB] | Positive peak deviation [kHz] |            |            | Negative peak deviation [kHz] |            |            | Limit [kHz] |
|---------------------------------|-------------------------------|------------|------------|-------------------------------|------------|------------|-------------|
|                                 | 300 [Hz]                      | 1 000 [Hz] | 3 000 [Hz] | 300 [Hz]                      | 1 000 [Hz] | 3 000 [Hz] |             |
| -20                             | 0.070                         | 0.118      | 0.175      | 0.062                         | 0.119      | 0.171      | 1.25        |
| -15                             | 0.068                         | 0.177      | 0.269      | 0.070                         | 0.172      | 0.272      |             |
| -10                             | 0.080                         | 0.272      | 0.445      | 0.079                         | 0.268      | 0.440      |             |
| -5                              | 0.101                         | 0.450      | 0.745      | 0.101                         | 0.448      | 0.740      |             |
| 0                               | 0.140                         | 0.767      | 0.747      | 0.148                         | 0.762      | 0.743      |             |
| 5                               | 0.219                         | 0.923      | 0.755      | 0.225                         | 0.917      | 0.743      |             |
| 10                              | 0.360                         | 0.883      | 0.750      | 0.352                         | 0.889      | 0.751      |             |
| 15                              | 0.603                         | 0.874      | 0.751      | 0.605                         | 0.872      | 0.745      |             |
| 20                              | 0.935                         | 0.866      | 0.748      | 0.939                         | 0.873      | 0.743      |             |

-Target Power\_4W\_406.10 MHz

| Audio input level relative [dB] | Positive peak deviation [klz] |            |            | Negative peak deviation [klz] |            |            | Limit [klz] |
|---------------------------------|-------------------------------|------------|------------|-------------------------------|------------|------------|-------------|
|                                 | 300 [Hz]                      | 1 000 [Hz] | 3 000 [Hz] | 300 [Hz]                      | 1 000 [Hz] | 3 000 [Hz] |             |
| -20                             | 0.084                         | 0.146      | 0.195      | 0.093                         | 0.142      | 0.192      | 1.25        |
| -15                             | 0.085                         | 0.196      | 0.287      | 0.096                         | 0.191      | 0.291      |             |
| -10                             | 0.110                         | 0.293      | 0.447      | 0.106                         | 0.305      | 0.446      |             |
| -5                              | 0.138                         | 0.465      | 0.740      | 0.134                         | 0.458      | 0.746      |             |
| 0                               | 0.184                         | 0.758      | 0.763      | 0.187                         | 0.768      | 0.767      |             |
| 5                               | 0.256                         | 0.939      | 0.761      | 0.266                         | 0.944      | 0.770      |             |
| 10                              | 0.405                         | 0.905      | 0.772      | 0.398                         | 0.902      | 0.761      |             |
| 15                              | 0.646                         | 0.887      | 0.766      | 0.657                         | 0.896      | 0.764      |             |
| 20                              | 1.010                         | 0.883      | 0.764      | 1.010                         | 0.882      | 0.754      |             |

-Target Power\_4W\_459.00 MHz

| Audio input level relative [dB] | Positive peak deviation [klz] |            |            | Negative peak deviation [klz] |            |            | Limit [klz] |
|---------------------------------|-------------------------------|------------|------------|-------------------------------|------------|------------|-------------|
|                                 | 300 [Hz]                      | 1 000 [Hz] | 3 000 [Hz] | 300 [Hz]                      | 1 000 [Hz] | 3 000 [Hz] |             |
| -20                             | 0.072                         | 0.126      | 0.174      | 0.067                         | 0.127      | 0.177      | 1.25        |
| -15                             | 0.079                         | 0.180      | 0.275      | 0.078                         | 0.180      | 0.269      |             |
| -10                             | 0.090                         | 0.283      | 0.435      | 0.120                         | 0.280      | 0.441      |             |
| -5                              | 0.117                         | 0.450      | 0.740      | 0.107                         | 0.451      | 0.735      |             |
| 0                               | 0.168                         | 0.755      | 0.742      | 0.157                         | 0.763      | 0.741      |             |
| 5                               | 0.241                         | 0.924      | 0.741      | 0.239                         | 0.910      | 0.737      |             |
| 10                              | 0.382                         | 0.873      | 0.747      | 0.386                         | 0.880      | 0.741      |             |
| 15                              | 0.641                         | 0.872      | 0.745      | 0.638                         | 0.872      | 0.745      |             |
| 20                              | 0.964                         | 0.873      | 0.741      | 0.968                         | 0.875      | 0.740      |             |

-Target Power\_4W\_512.00 MHz

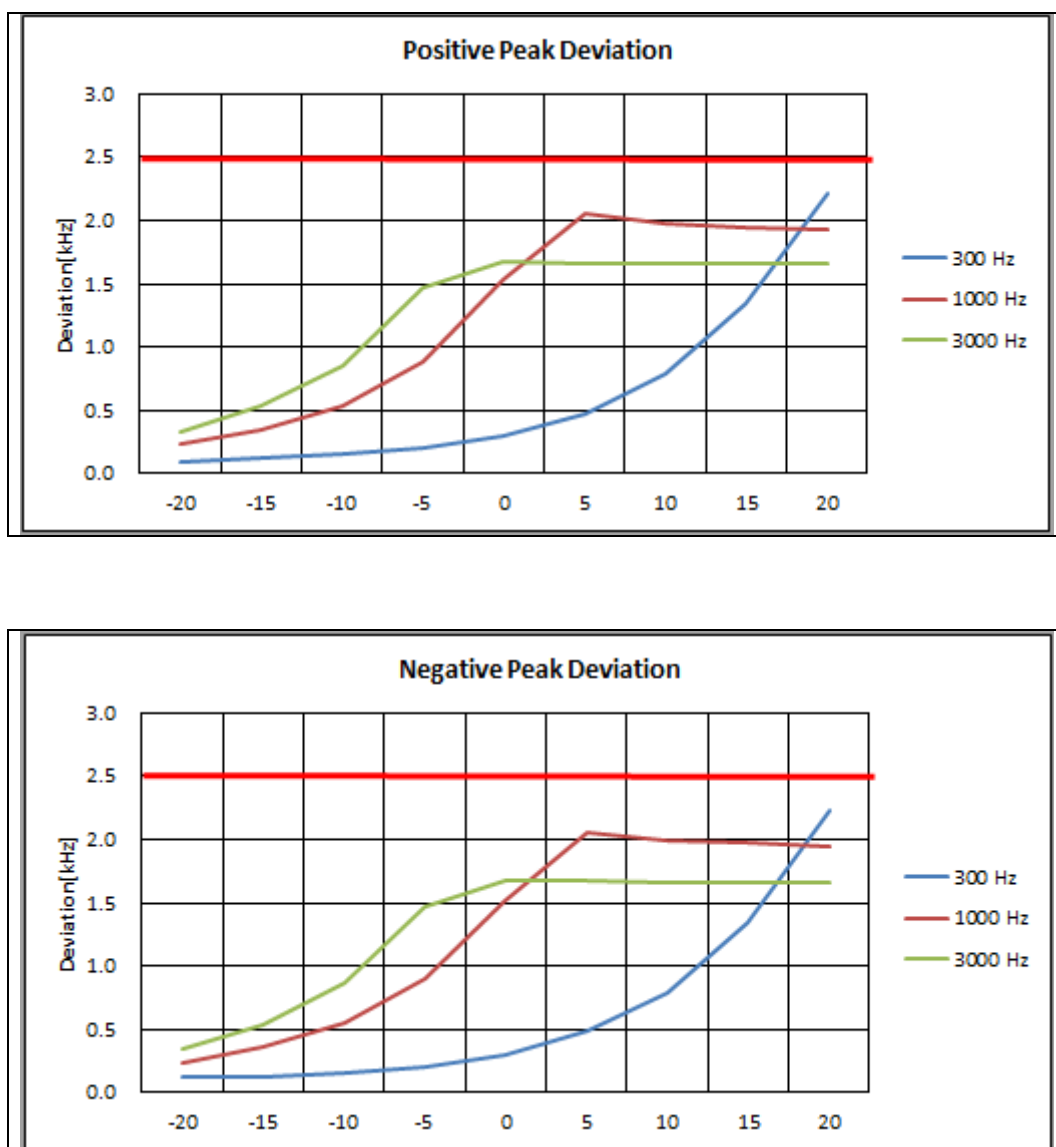
| Audio input level relative [dB] | Positive peak deviation [klz] |            |            | Negative peak deviation [klz] |            |            | Limit [klz] |
|---------------------------------|-------------------------------|------------|------------|-------------------------------|------------|------------|-------------|
|                                 | 300 [Hz]                      | 1 000 [Hz] | 3 000 [Hz] | 300 [Hz]                      | 1 000 [Hz] | 3 000 [Hz] |             |
| -20                             | 0.057                         | 0.116      | 0.171      | 0.060                         | 0.118      | 0.167      | 1.25        |
| -15                             | 0.064                         | 0.172      | 0.266      | 0.064                         | 0.178      | 0.265      |             |
| -10                             | 0.083                         | 0.272      | 0.439      | 0.083                         | 0.274      | 0.442      |             |
| -5                              | 0.103                         | 0.444      | 0.745      | 0.104                         | 0.440      | 0.738      |             |
| 0                               | 0.149                         | 0.762      | 0.748      | 0.141                         | 0.760      | 0.744      |             |
| 5                               | 0.225                         | 0.916      | 0.752      | 0.227                         | 0.911      | 0.745      |             |
| 10                              | 0.361                         | 0.879      | 0.745      | 0.362                         | 0.878      | 0.742      |             |
| 15                              | 0.602                         | 0.866      | 0.744      | 0.600                         | 0.870      | 0.742      |             |
| 20                              | 0.928                         | 0.865      | 0.742      | 0.937                         | 0.869      | 0.739      |             |

### 5.3.4 Test Plot

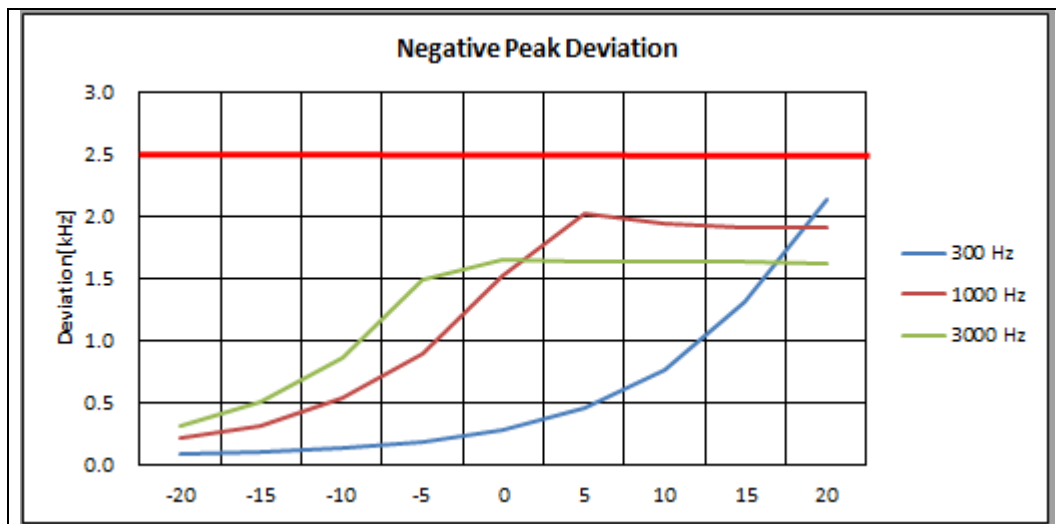
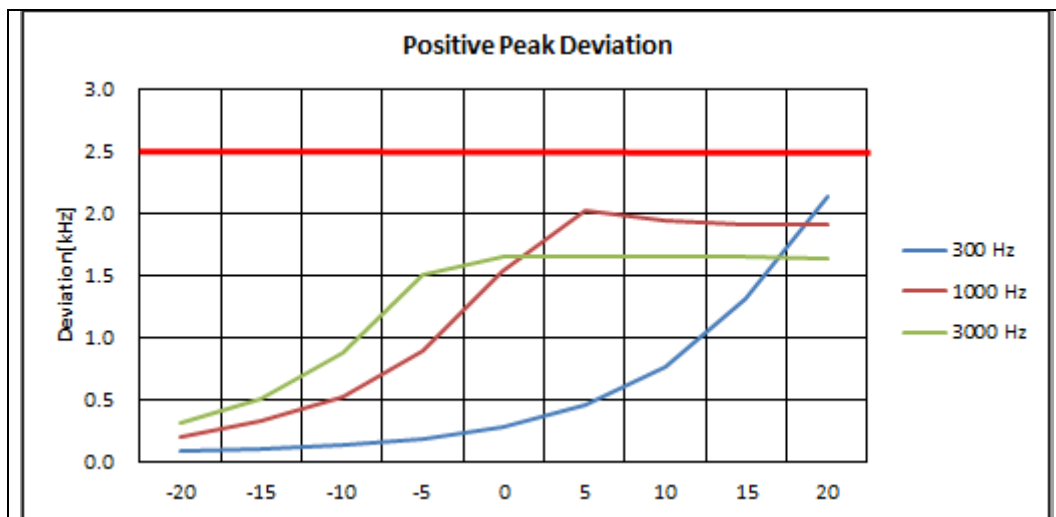
Figure 1. Plot of the Modulation Limiting

\* 12.5BW

-Target Power\_1W\_406.10 MHz

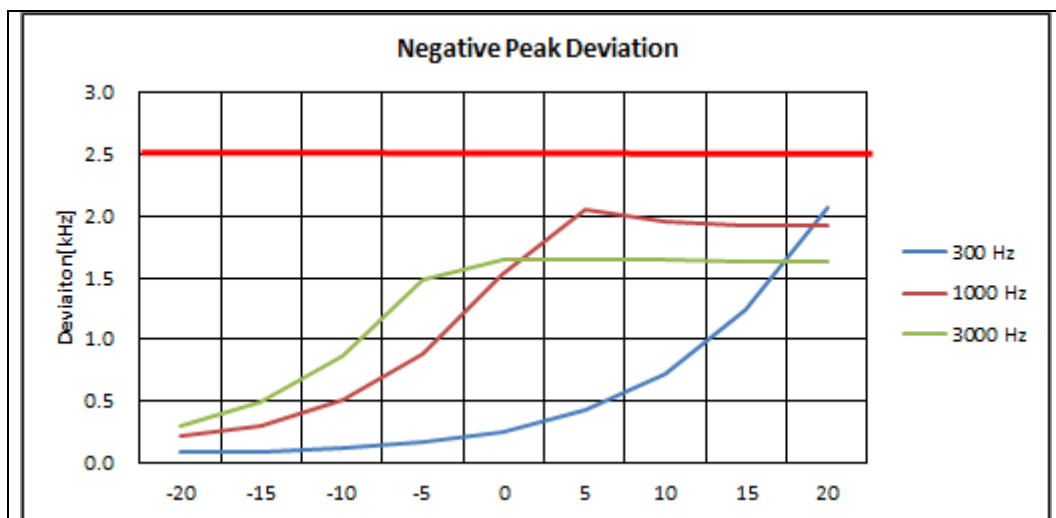
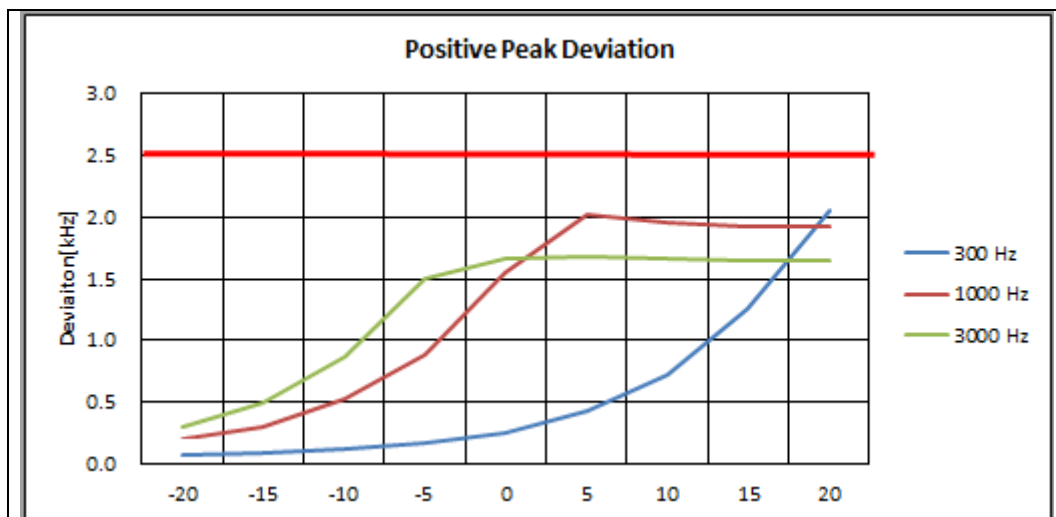


-Target Power\_1W\_459.00 MHz

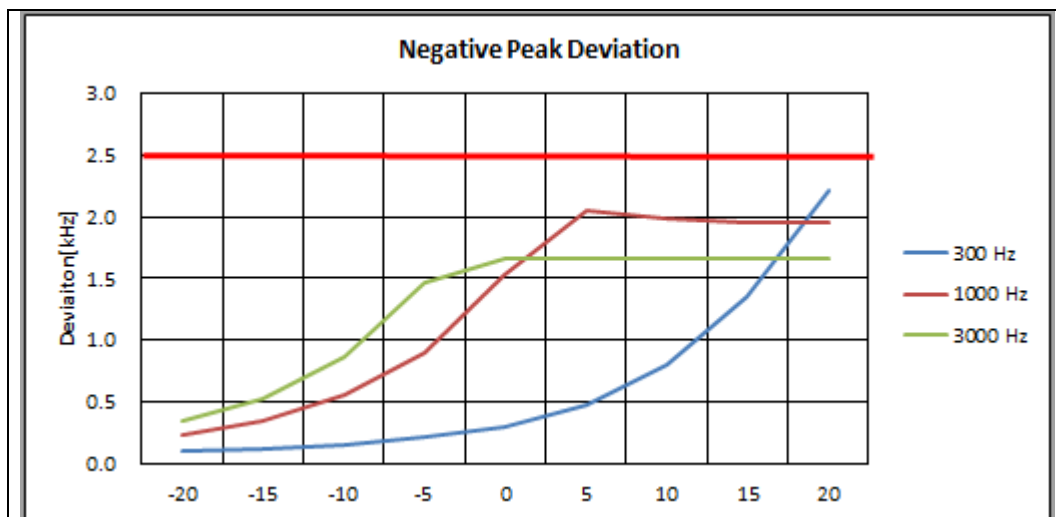
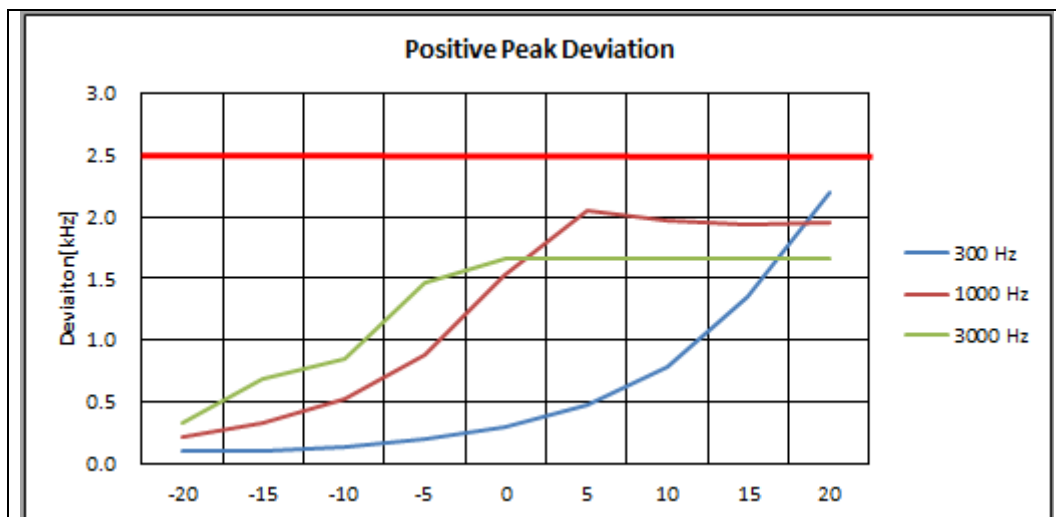




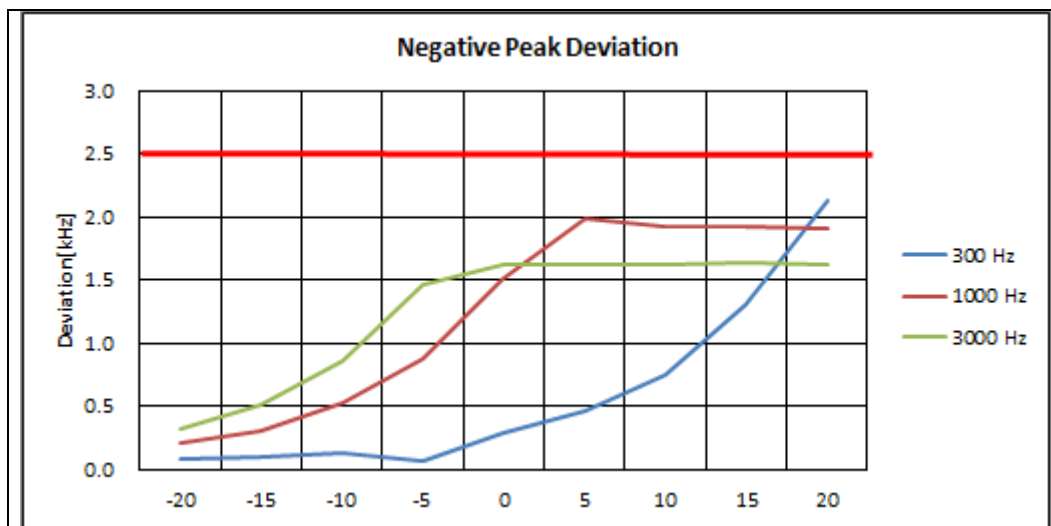
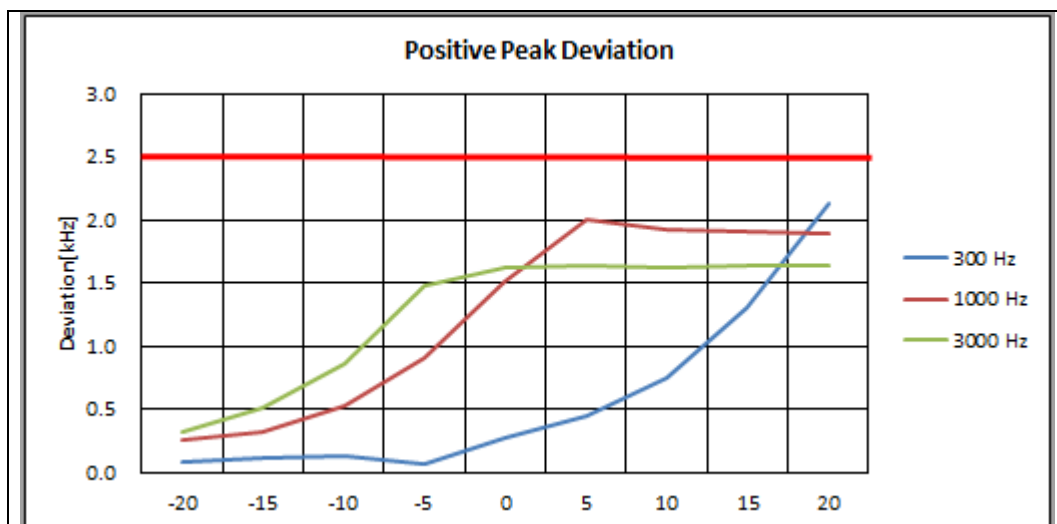
-Target Power\_1W\_512.00 MHz



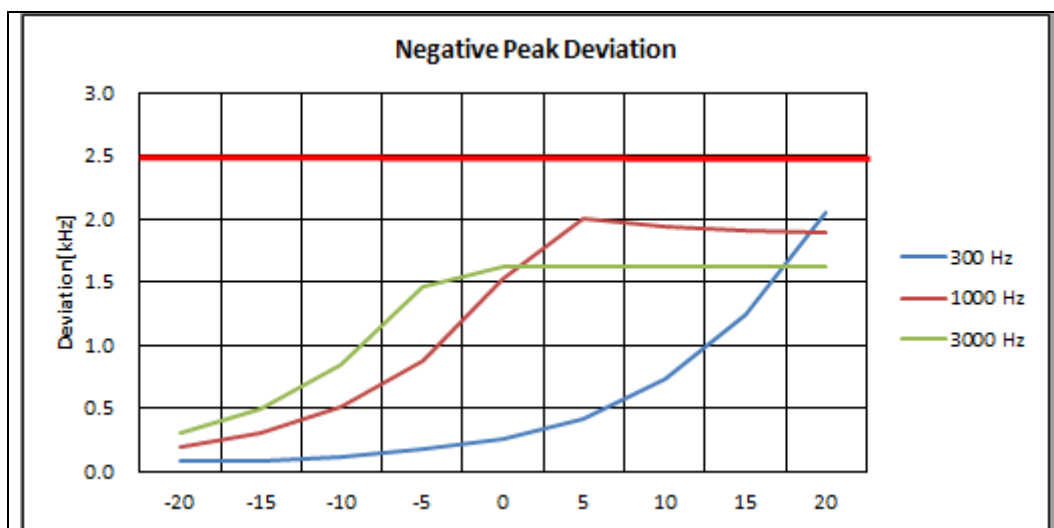
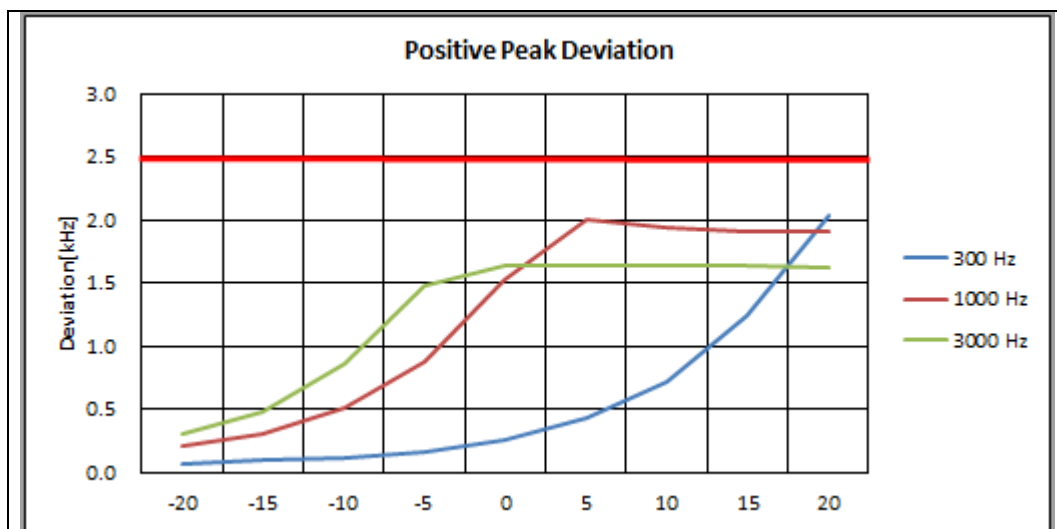
-Target Power\_4W\_406.10 MHz



-Target Power\_4W\_459.00 MHz

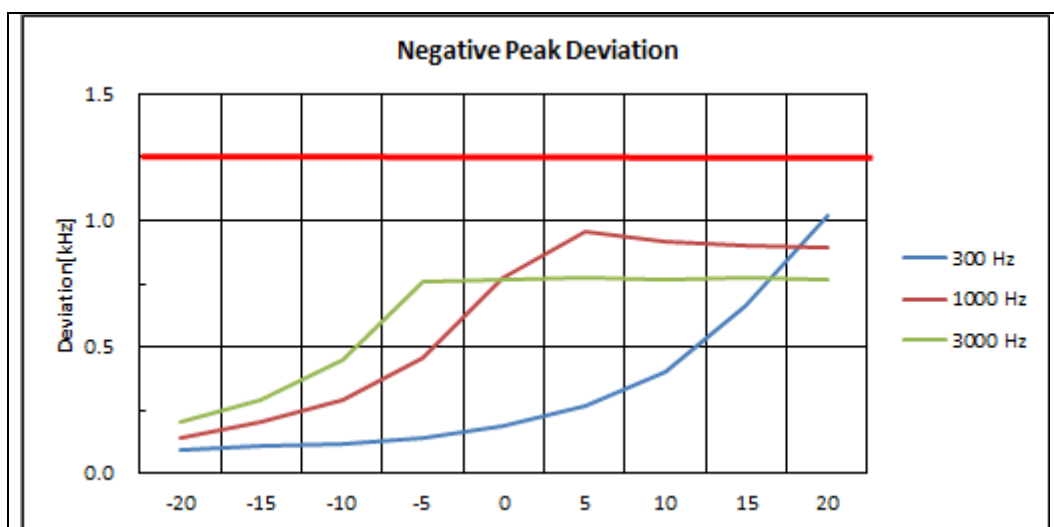
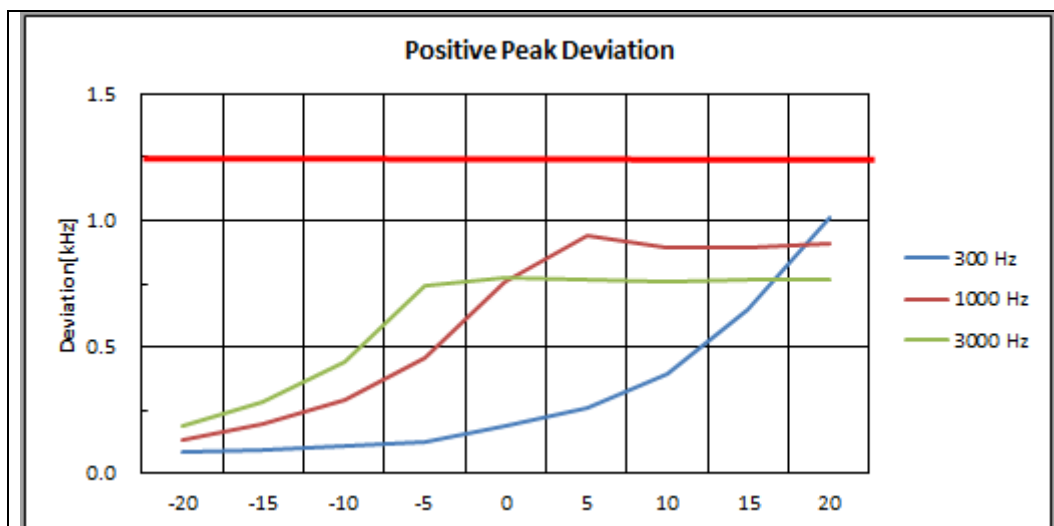


-Target Power\_4W\_512.00 MHz

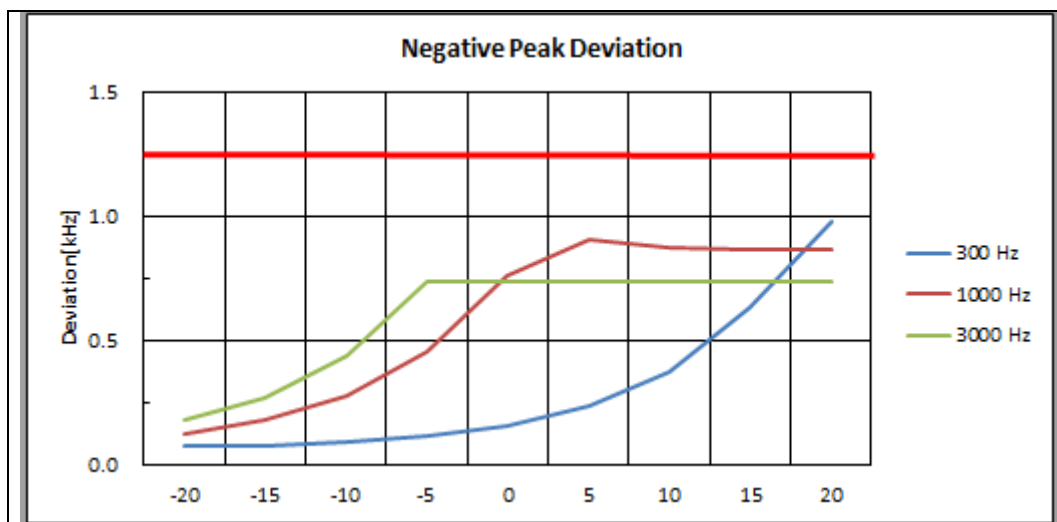
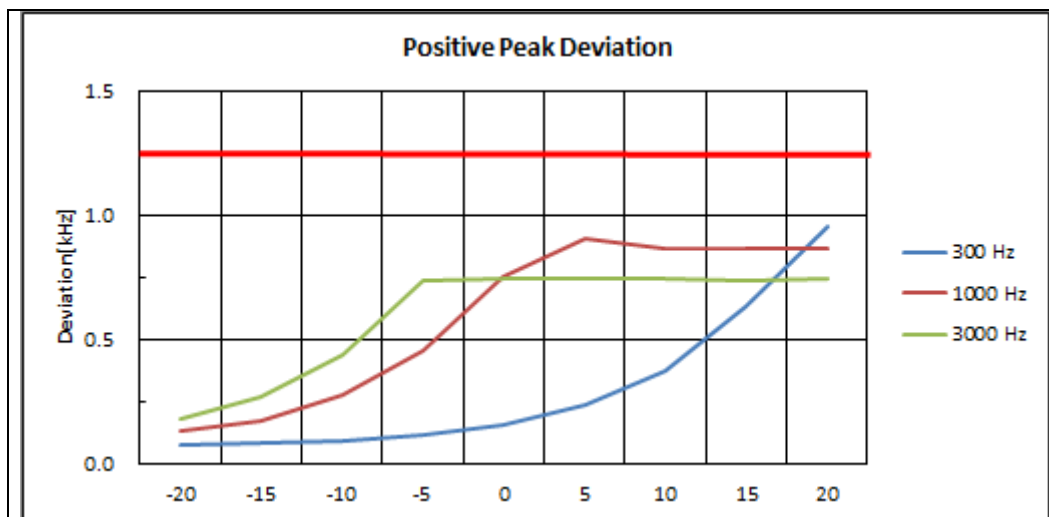


\* 6.25BW

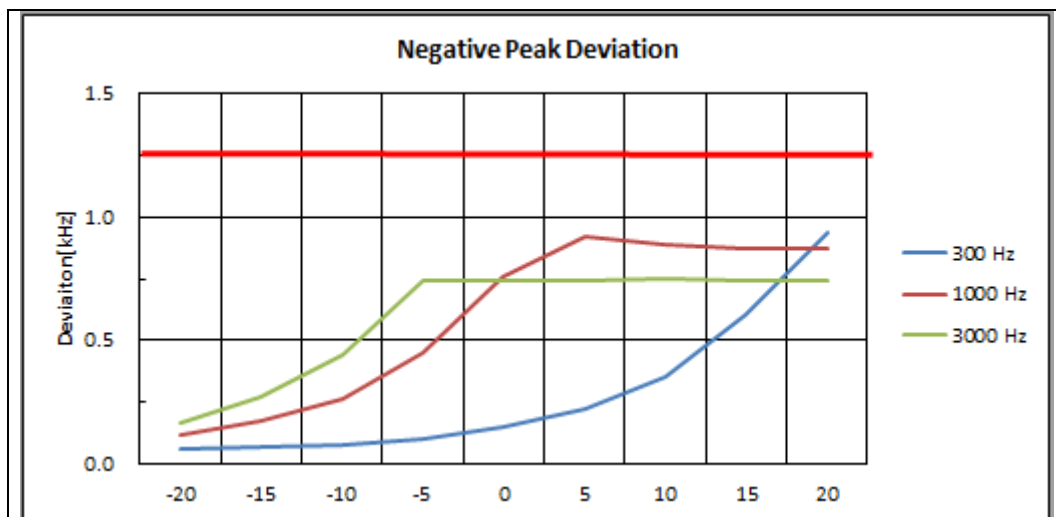
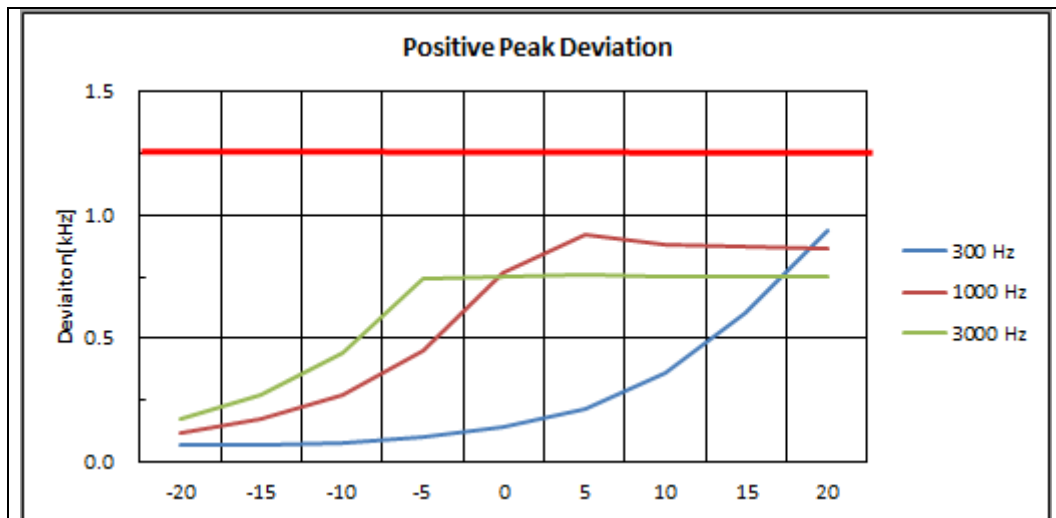
-Target Power\_1W\_406.10 MHz



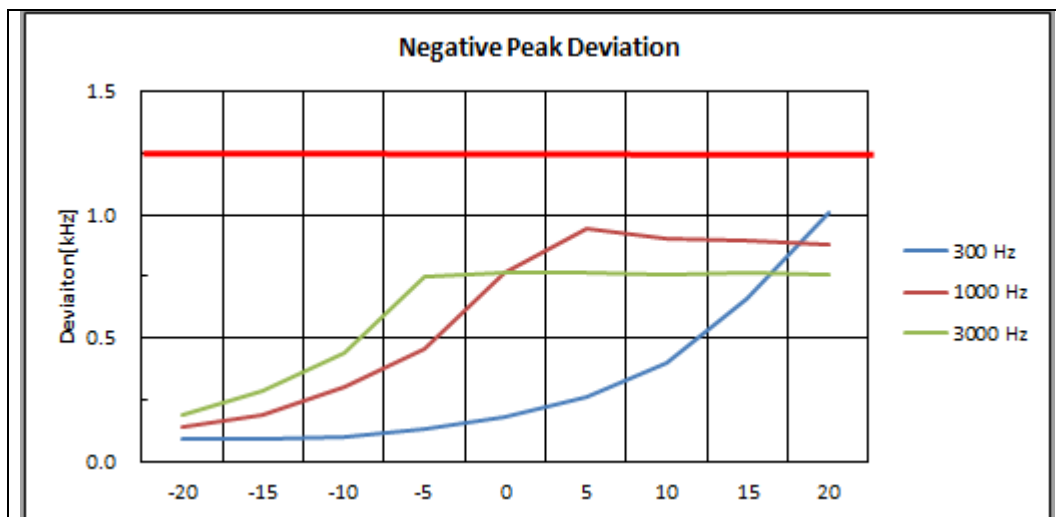
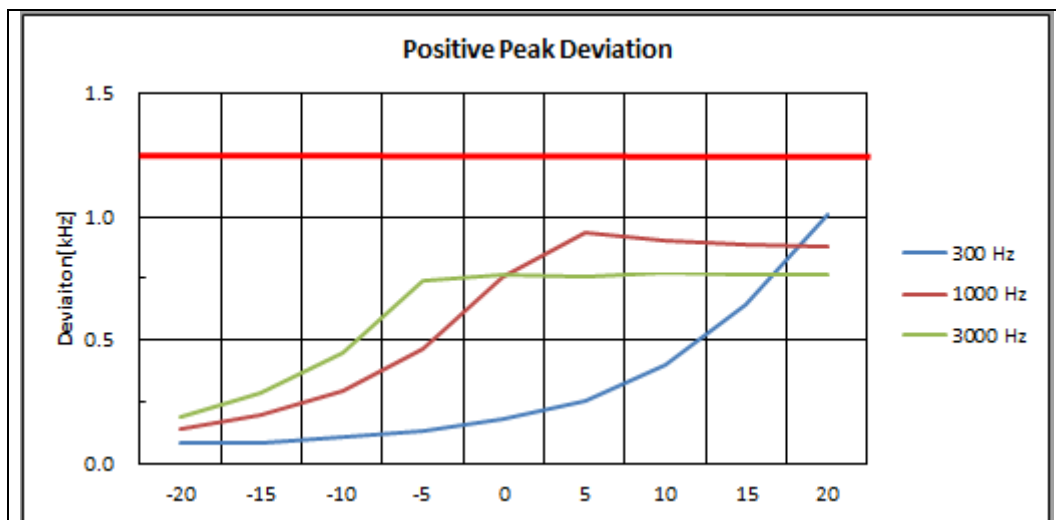
-Target Power\_1W\_459.00 MHz



-Target Power\_1W\_512.00 MHz

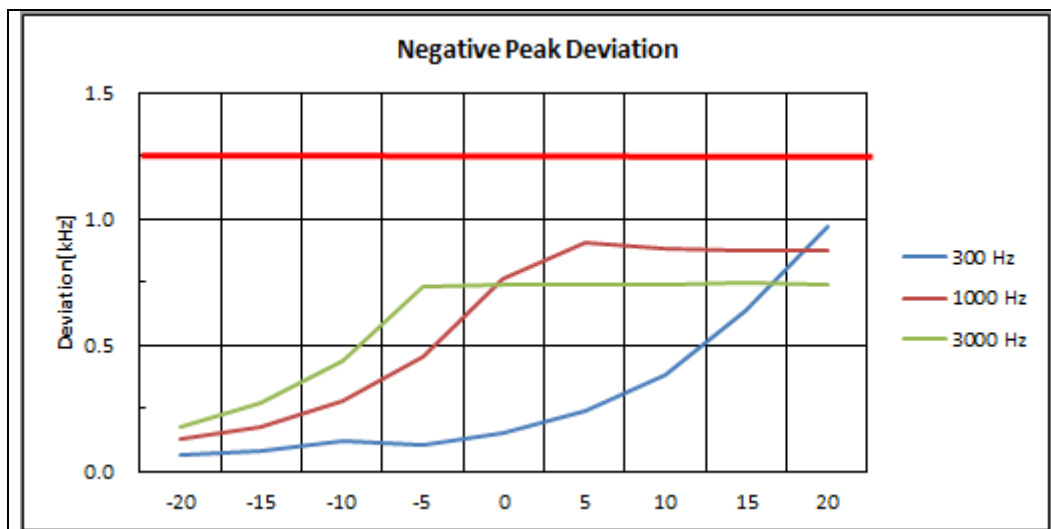
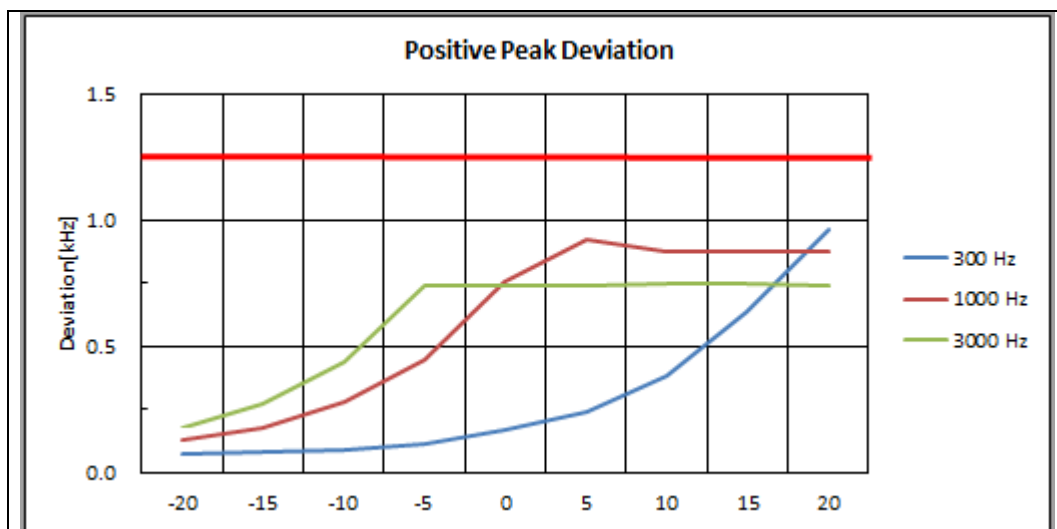


-Target Power\_4W\_406.10 MHz

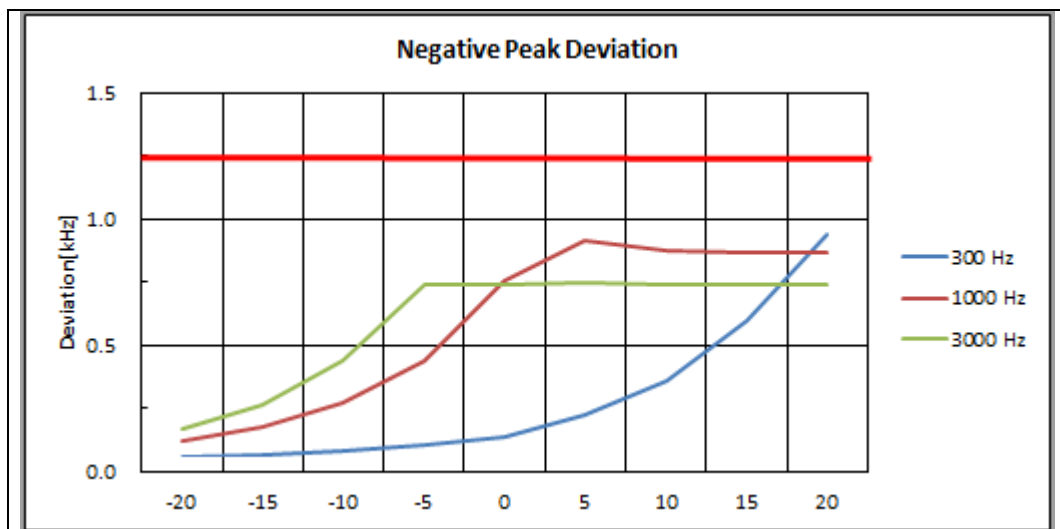
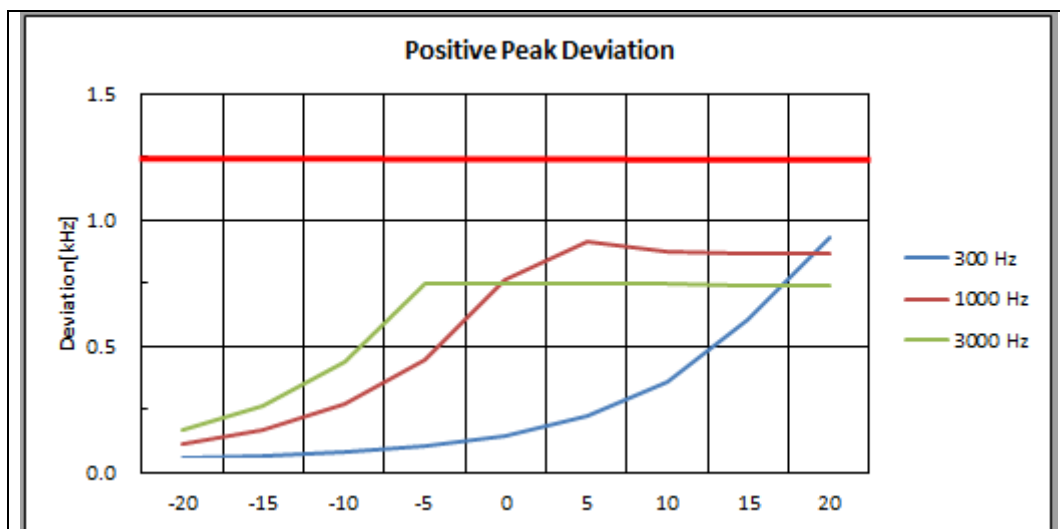




-Target Power\_4W\_459.00 MHz



-Target Power\_4W\_512.00 MHz



## 5.4 Audio Frequency Response

### 5.4.1 Regulation

According to TIA-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 characteristics as referenced to the 1000 Hz level. The exception is from 500 Hz to 300 Hz, where additional 6 dB per octave rolloff is allowed.

### 5.4.2 Measurement Procedure

1. The audio frequency response is the degree of closeness to which the frequency deviation of the transmitter follows a prescribed characteristic.
2. The frequency response of the audio modulation part is adjusted to get 20% of the rated system deviation.
3. The deviations obtained over the frequency range from 100 Hz to 5000 Hz are recorded and compared with the reference deviation as follows:

$$\text{Audio Frequency Response} = 20\log [\text{DEV}_{\text{Freq}} / \text{DEV}_{\text{ref}}]$$

### 5.4.3 Test Result

- Complied

\* 12.5BW

-Target Power\_1W\_406.10 Mhz

| Audio Frequency<br>[Hz] | Measured Deviation<br>[kHz] | Calculated Response<br>[dB] |
|-------------------------|-----------------------------|-----------------------------|
| 100                     | 0.08                        | -15.84                      |
| 200                     | 0.09                        | -15.63                      |
| 300                     | 0.13                        | -11.81                      |
| 400                     | 0.20                        | -8.37                       |
| 500                     | 0.23                        | -6.83                       |
| 600                     | 0.29                        | -4.94                       |
| 700                     | 0.34                        | -3.59                       |
| 800                     | 0.39                        | -2.33                       |
| 900                     | 0.45                        | -1.10                       |
| 1 000                   | <b>0.51</b>                 | <b>0.00</b>                 |
| 1 500                   | 0.79                        | 3.69                        |
| 2 000                   | 1.04                        | 6.15                        |
| 2 500                   | 1.15                        | 6.96                        |
| 3 000                   | 0.84                        | 4.24                        |
| 4 000                   | 0.09                        | -15.43                      |
| 5 000                   | 0.08                        | -15.94                      |

-Target Power\_1W\_459.00 Mhz

| Audio Frequency<br>[Hz] | Measured Deviation<br>[kHz] | Calculated Response<br>[dB] |
|-------------------------|-----------------------------|-----------------------------|
| 100                     | 0.07                        | -16.65                      |
| 200                     | 0.07                        | -17.51                      |
| 300                     | 0.13                        | -12.09                      |
| 400                     | 0.17                        | -9.47                       |
| 500                     | 0.23                        | -6.91                       |
| 600                     | 0.28                        | -5.12                       |
| 700                     | 0.33                        | -3.61                       |
| 800                     | 0.39                        | -2.21                       |
| 900                     | 0.45                        | -1.01                       |
| 1 000                   | <b>0.50</b>                 | <b>0.00</b>                 |
| 1 500                   | 0.78                        | 3.85                        |
| 2 000                   | 1.06                        | 6.44                        |
| 2 500                   | 1.15                        | 7.15                        |
| 3 000                   | 0.84                        | 4.47                        |
| 4 000                   | 0.07                        | -17.25                      |
| 5 000                   | 0.07                        | -16.76                      |

-Target Power\_1W\_512.00 MHz

| Audio Frequency<br>[Hz] | Measured Deviation<br>[kHz] | Calculated Response<br>[dB] |
|-------------------------|-----------------------------|-----------------------------|
| 100                     | 0.06                        | -18.38                      |
| 200                     | 0.06                        | -18.24                      |
| 300                     | 0.12                        | -12.57                      |
| 400                     | 0.17                        | -9.53                       |
| 500                     | 0.22                        | -7.31                       |
| 600                     | 0.27                        | -5.42                       |
| 700                     | 0.33                        | -3.85                       |
| 800                     | 0.38                        | -2.49                       |
| 900                     | 0.44                        | -1.21                       |
| 1 000                   | <b>0.51</b>                 | <b>0.00</b>                 |
| 1 500                   | 0.79                        | 3.87                        |
| 2 000                   | 1.05                        | 6.37                        |
| 2 500                   | 1.16                        | 7.18                        |
| 3 000                   | 0.84                        | 4.42                        |
| 4 000                   | 0.06                        | -18.10                      |
| 5 000                   | 0.06                        | -18.67                      |

-Target Power\_4W\_406.10 MHz

| Audio Frequency<br>[Hz] | Measured Deviation<br>[kHz] | Calculated Response<br>[dB] |
|-------------------------|-----------------------------|-----------------------------|
| 100                     | 0.08                        | -15.68                      |
| 200                     | 0.09                        | -15.58                      |
| 300                     | 0.15                        | -10.53                      |
| 400                     | 0.20                        | -8.28                       |
| 500                     | 0.25                        | -6.35                       |
| 600                     | 0.28                        | -5.10                       |
| 700                     | 0.34                        | -3.51                       |
| 800                     | 0.40                        | -2.19                       |
| 900                     | 0.45                        | -1.10                       |
| 1 000                   | <b>0.51</b>                 | <b>0.00</b>                 |
| 1 500                   | 0.79                        | 3.82                        |
| 2 000                   | 1.05                        | 6.26                        |
| 2 500                   | 1.15                        | 7.02                        |
| 3 000                   | 0.84                        | 4.32                        |
| 4 000                   | 0.09                        | -14.71                      |
| 5 000                   | 0.09                        | -15.28                      |

-Target Power\_4W\_459.00 MHz

| Audio Frequency<br>[Hz] | Measured Deviation<br>[kHz] | Calculated Response<br>[dB] |
|-------------------------|-----------------------------|-----------------------------|
| 100                     | 0.08                        | -15.79                      |
| 200                     | 0.07                        | -17.42                      |
| 300                     | 0.12                        | -12.20                      |
| 400                     | 0.18                        | -9.11                       |
| 500                     | 0.23                        | -6.98                       |
| 600                     | 0.28                        | -5.18                       |
| 700                     | 0.33                        | -3.72                       |
| 800                     | 0.40                        | -2.07                       |
| 900                     | 0.45                        | -0.98                       |
| 1 000                   | <b>0.51</b>                 | <b>0.00</b>                 |
| 1 500                   | 0.79                        | 3.86                        |
| 2 000                   | 1.05                        | 6.33                        |
| 2 500                   | 1.15                        | 7.17                        |
| 3 000                   | 0.83                        | 4.33                        |
| 4 000                   | 0.07                        | -16.68                      |
| 5 000                   | 0.07                        | -16.68                      |

-Target Power\_4W\_512.00 MHz

| Audio Frequency<br>[Hz] | Measured Deviation<br>[kHz] | Calculated Response<br>[dB] |
|-------------------------|-----------------------------|-----------------------------|
| 100                     | 0.06                        | -19.17                      |
| 200                     | 0.06                        | -18.87                      |
| 300                     | 0.12                        | -12.77                      |
| 400                     | 0.17                        | -9.63                       |
| 500                     | 0.22                        | -7.41                       |
| 600                     | 0.27                        | -5.38                       |
| 700                     | 0.33                        | -3.82                       |
| 800                     | 0.38                        | -2.56                       |
| 900                     | 0.45                        | -1.17                       |
| 1 000                   | <b>0.51</b>                 | <b>0.00</b>                 |
| 1 500                   | 0.79                        | 3.80                        |
| 2 000                   | 1.06                        | 6.36                        |
| 2 500                   | 1.15                        | 7.10                        |
| 3 000                   | 0.84                        | 4.30                        |
| 4 000                   | 0.07                        | -17.48                      |
| 5 000                   | 0.06                        | -18.72                      |

\* 6.25BW

-Target Power\_1W\_406.10 MHz

| Audio Frequency<br>[Hz] | Measured Deviation<br>[kHz] | Calculated Response<br>[dB] |
|-------------------------|-----------------------------|-----------------------------|
| 100                     | 0.08                        | -10.46                      |
| 200                     | 0.08                        | -10.24                      |
| 300                     | 0.09                        | -9.51                       |
| 400                     | 0.11                        | -7.32                       |
| 500                     | 0.14                        | -5.69                       |
| 600                     | 0.15                        | -4.66                       |
| 700                     | 0.18                        | -3.00                       |
| 800                     | 0.19                        | -2.63                       |
| 900                     | 0.22                        | -1.29                       |
| 1 000                   | <b>0.26</b>                 | <b>0.00</b>                 |
| 1 500                   | 0.36                        | 2.80                        |
| 2 000                   | 0.48                        | 5.36                        |
| 2 500                   | 0.52                        | 6.05                        |
| 3 000                   | 0.39                        | 3.61                        |
| 4 000                   | 0.08                        | -10.02                      |
| 5 000                   | 0.08                        | -10.80                      |

-Target Power\_1W\_459.00 MHz

| Audio Frequency<br>[Hz] | Measured Deviation<br>[kHz] | Calculated Response<br>[dB] |
|-------------------------|-----------------------------|-----------------------------|
| 100                     | 0.06                        | -12.74                      |
| 200                     | 0.06                        | -12.18                      |
| 300                     | 0.08                        | -10.46                      |
| 400                     | 0.10                        | -8.39                       |
| 500                     | 0.13                        | -6.16                       |
| 600                     | 0.17                        | -3.90                       |
| 700                     | 0.19                        | -2.96                       |
| 800                     | 0.20                        | -2.24                       |
| 900                     | 0.24                        | -0.80                       |
| 1 000                   | <b>0.26</b>                 | <b>0.00</b>                 |
| 1 500                   | 0.38                        | 3.25                        |
| 2 000                   | 0.51                        | 5.78                        |
| 2 500                   | 0.54                        | 6.41                        |
| 3 000                   | 0.40                        | 3.83                        |
| 4 000                   | 0.06                        | -12.88                      |
| 5 000                   | 0.06                        | -13.34                      |

-Target Power\_1W\_512.00 MHz

| Audio Frequency<br>[Hz] | Measured Deviation<br>[kHz] | Calculated Response<br>[dB] |
|-------------------------|-----------------------------|-----------------------------|
| 100                     | 0.06                        | -13.06                      |
| 200                     | 0.06                        | -12.61                      |
| 300                     | 0.07                        | -10.64                      |
| 400                     | 0.09                        | -8.85                       |
| 500                     | 0.12                        | -6.37                       |
| 600                     | 0.14                        | -5.04                       |
| 700                     | 0.17                        | -3.32                       |
| 800                     | 0.20                        | -2.05                       |
| 900                     | 0.22                        | -1.14                       |
| 1 000                   | <b>0.25</b>                 | <b>0.00</b>                 |
| 1 500                   | 0.37                        | 3.43                        |
| 2 000                   | 0.50                        | 6.02                        |
| 2 500                   | 0.54                        | 6.68                        |
| 3 000                   | 0.40                        | 4.06                        |
| 4 000                   | 0.06                        | -13.06                      |
| 5 000                   | 0.05                        | -13.71                      |

-Target Power\_4W\_406.10 MHz

| Audio Frequency<br>[Hz] | Measured Deviation<br>[kHz] | Calculated Response<br>[dB] |
|-------------------------|-----------------------------|-----------------------------|
| 100                     | 0.07                        | -10.95                      |
| 200                     | 0.08                        | -9.95                       |
| 300                     | 0.08                        | -9.85                       |
| 400                     | 0.12                        | -7.12                       |
| 500                     | 0.14                        | -5.66                       |
| 600                     | 0.16                        | -4.36                       |
| 700                     | 0.18                        | -3.08                       |
| 800                     | 0.20                        | -2.18                       |
| 900                     | 0.24                        | -0.73                       |
| 1 000                   | <b>0.26</b>                 | <b>0.00</b>                 |
| 1 500                   | 0.36                        | 2.89                        |
| 2 000                   | 0.47                        | 5.16                        |
| 2 500                   | 0.52                        | 6.02                        |
| 3 000                   | 0.39                        | 3.44                        |
| 4 000                   | 0.08                        | -10.06                      |
| 5 000                   | 0.07                        | -11.19                      |



-Target Power\_4W\_459.00 MHz

| Audio Frequency<br>[Hz] | Measured Deviation<br>[kHz] | Calculated Response<br>[dB] |
|-------------------------|-----------------------------|-----------------------------|
| 100                     | 0.06                        | -12.42                      |
| 200                     | 0.07                        | -11.48                      |
| 300                     | 0.08                        | -10.07                      |
| 400                     | 0.10                        | -7.96                       |
| 500                     | 0.13                        | -6.12                       |
| 600                     | 0.15                        | -4.49                       |
| 700                     | 0.17                        | -3.37                       |
| 800                     | 0.20                        | -2.29                       |
| 900                     | 0.24                        | -0.60                       |
| 1 000                   | <b>0.26</b>                 | <b>0.00</b>                 |
| 1 500                   | 0.38                        | 3.56                        |
| 2 000                   | 0.50                        | 5.87                        |
| 2 500                   | 0.56                        | 6.82                        |
| 3 000                   | 0.40                        | 4.00                        |
| 4 000                   | 0.06                        | -12.14                      |
| 5 000                   | 0.06                        | -12.28                      |

-Target Power\_4W\_512.00 MHz

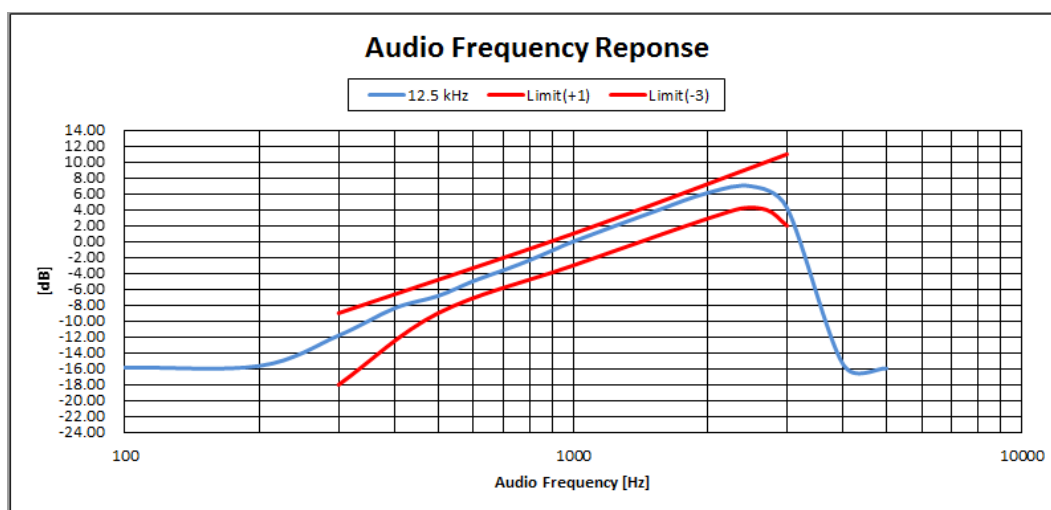
| Audio Frequency<br>[Hz] | Measured Deviation<br>[kHz] | Calculated Response<br>[dB] |
|-------------------------|-----------------------------|-----------------------------|
| 100                     | 0.05                        | -14.44                      |
| 200                     | 0.06                        | -12.79                      |
| 300                     | 0.07                        | -11.41                      |
| 400                     | 0.09                        | -8.60                       |
| 500                     | 0.12                        | -6.77                       |
| 600                     | 0.14                        | -5.02                       |
| 700                     | 0.17                        | -3.50                       |
| 800                     | 0.20                        | -2.22                       |
| 900                     | 0.23                        | -0.90                       |
| 1 000                   | <b>0.25</b>                 | <b>0.00</b>                 |
| 1 500                   | 0.38                        | 3.53                        |
| 2 000                   | 0.50                        | 5.85                        |
| 2 500                   | 0.55                        | 6.70                        |
| 3 000                   | 0.40                        | 4.02                        |
| 4 000                   | 0.05                        | -13.58                      |
| 5 000                   | 0.05                        | -13.91                      |

#### 5.4.4 Test Plot

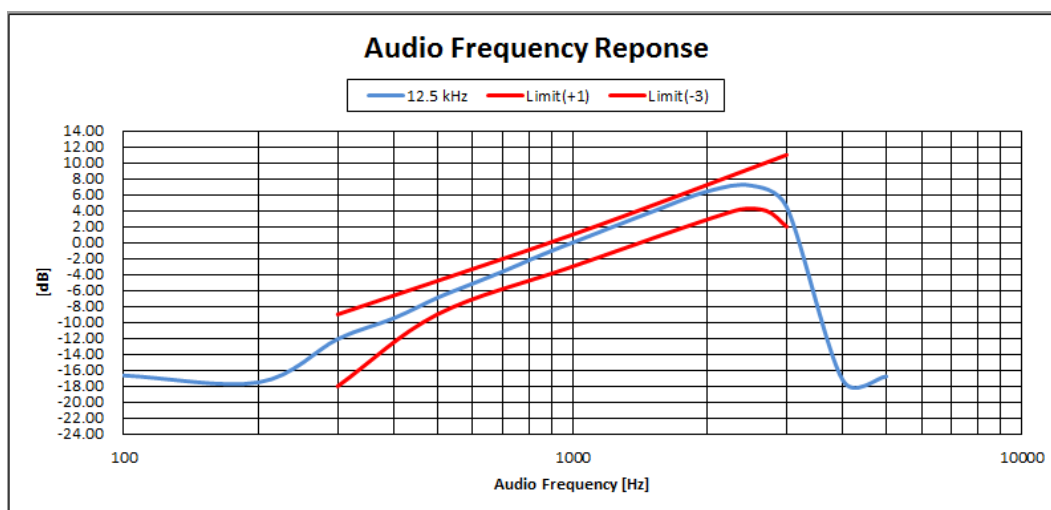
- Complied

\* 12.5BW

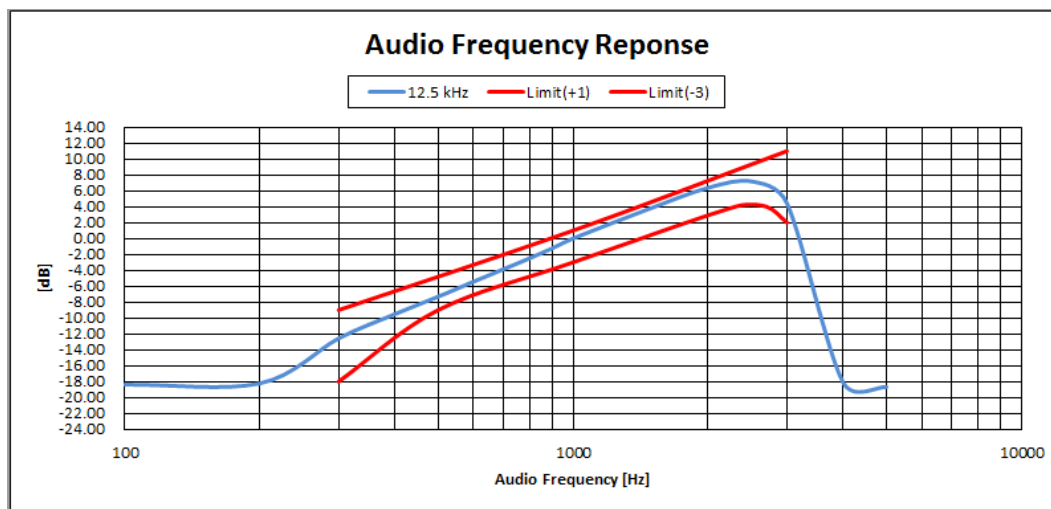
-Target Power\_1W\_406.10 MHz



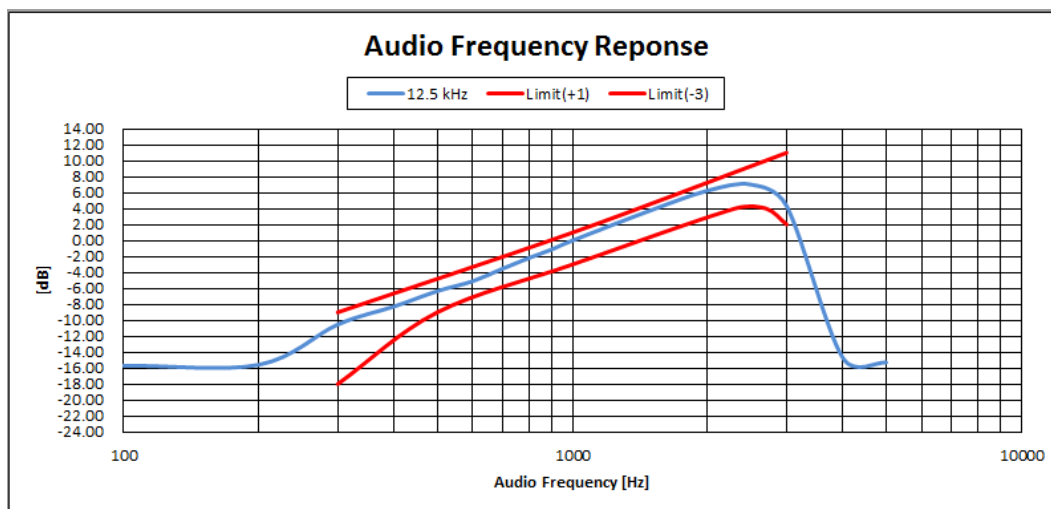
-Target Power\_1W\_459.00 MHz



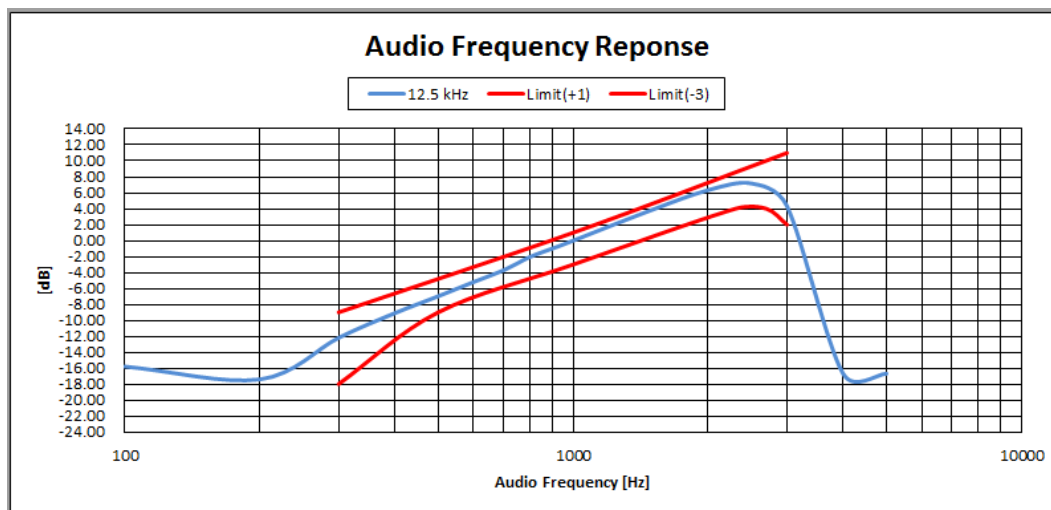
-Target Power\_1W\_512.00 MHz



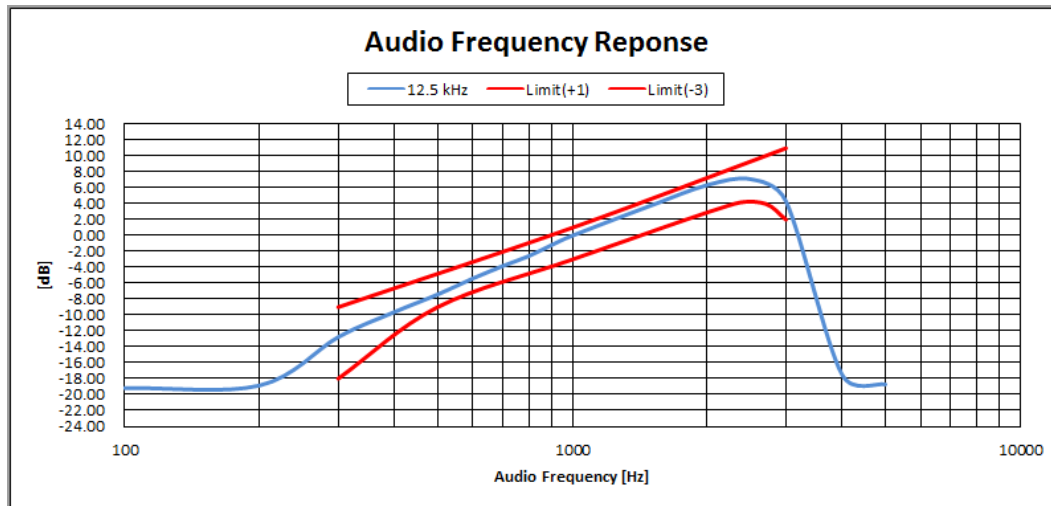
-Target Power\_4W\_406.10 MHz



-Target Power\_4W\_459.00 MHz

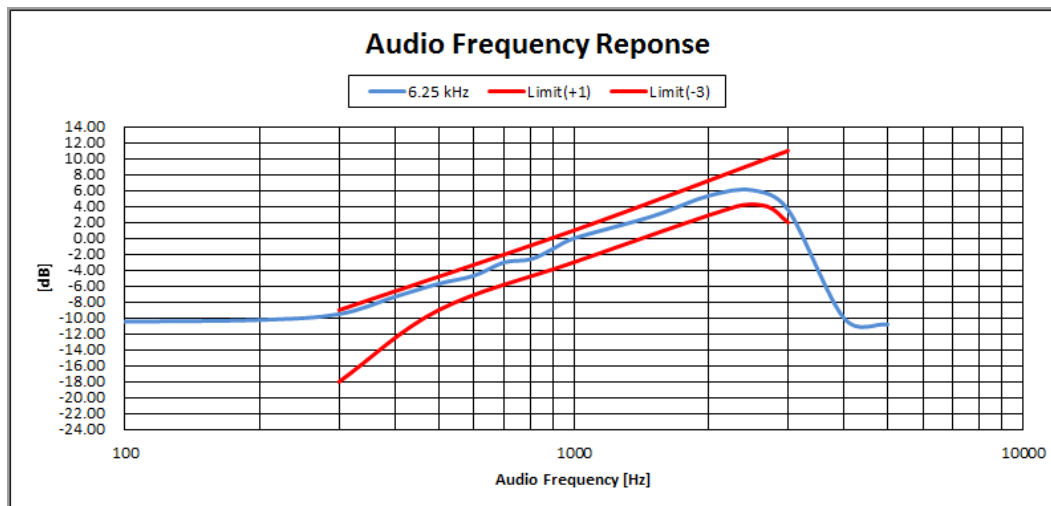


-Target Power\_4W\_512.00 MHz

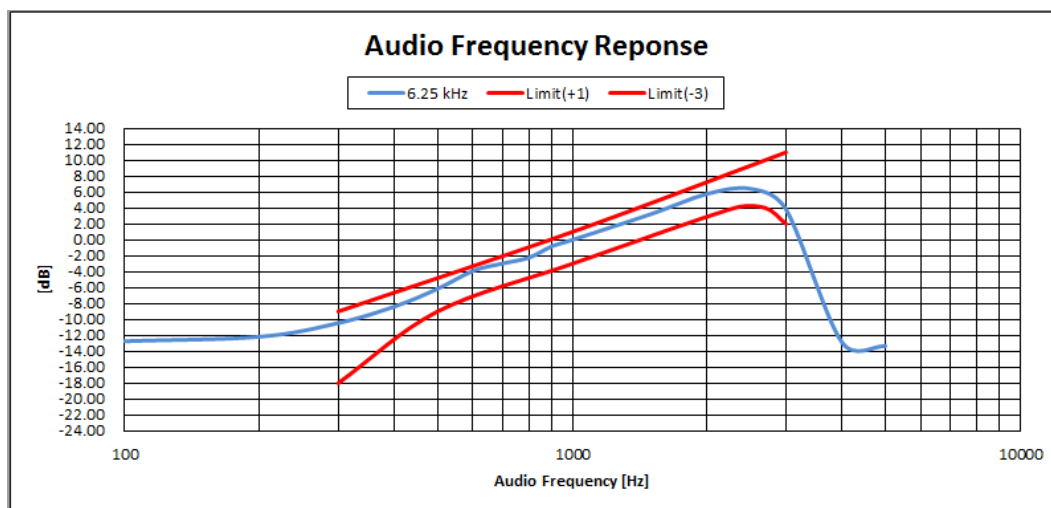


\* 6.25BW

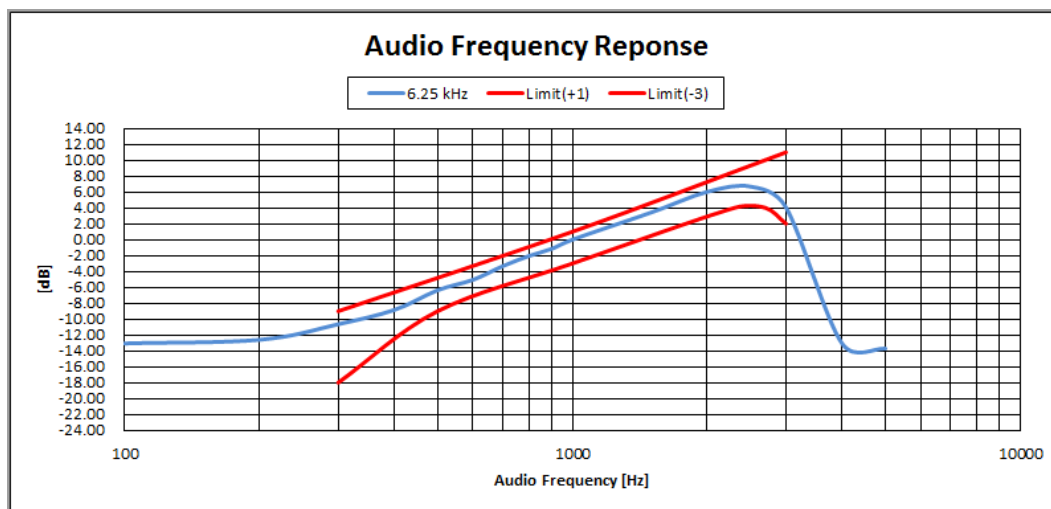
-Target Power\_1W\_406.10 MHz



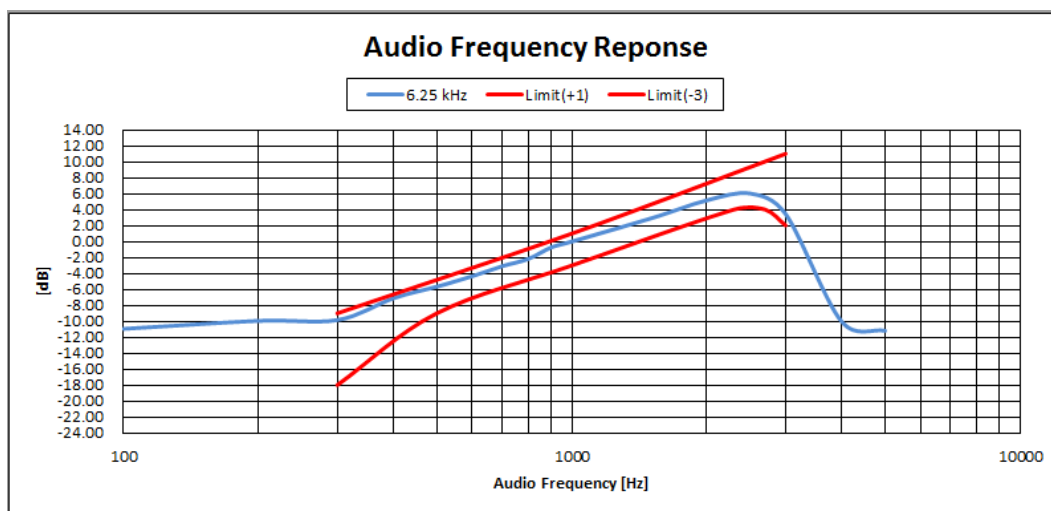
-Target Power\_1W\_459.00 MHz



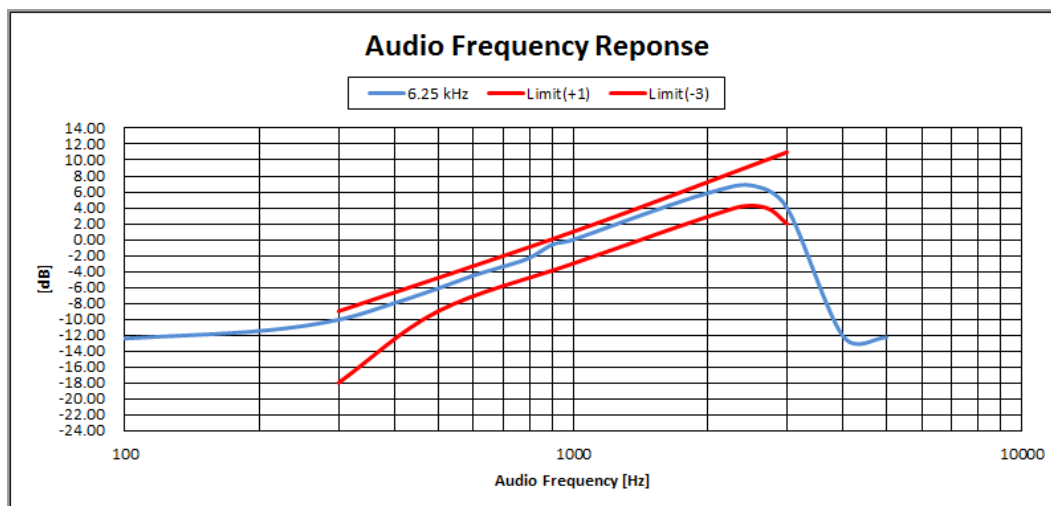
-Target Power\_1W\_512.00 MHz



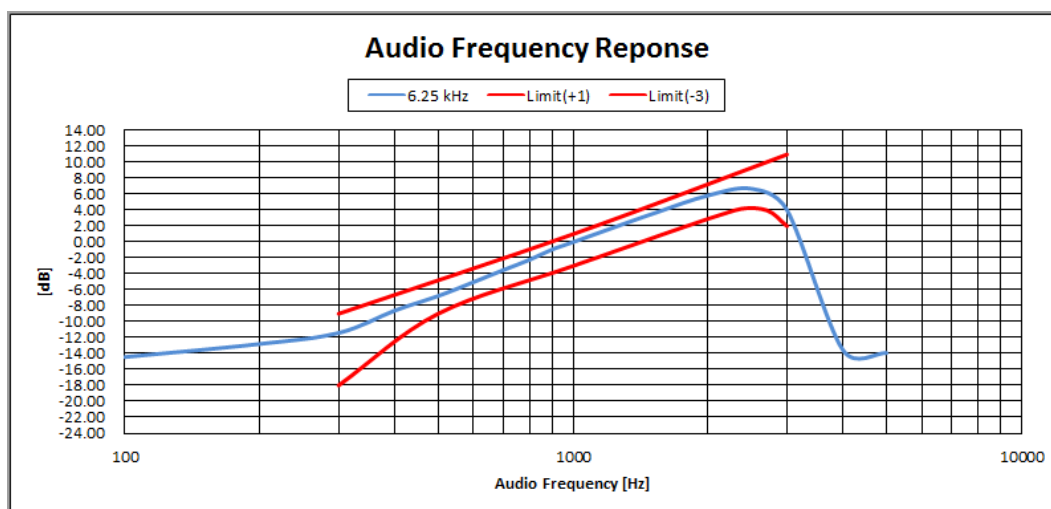
-Target Power\_4W\_406.10 MHz



-Target Power\_4W\_459.00 MHz



-Target Power\_4W\_512.00 MHz



## 5.5 Audio Low Pass Filter Frequency Response

### 5.5.1 Regulation

According to TIA-603-D, for equipment operating on channels between 896 MHz through 901 MHz, between 935 MHz through 940 MHz, and 12.5 or 15 kHz spaced channels in the frequency range 138-174 MHz and 406-512 MHz.

### 5.5.2 Measurement Procedure

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



### 5.5.3 Test Result

- Complied

\* 12.5BW

-Target Power\_1W\_406.10 MHz

| Audio Frequency<br>[kHz] | Calculated Response<br>[dB] | Limit<br>[dB] |
|--------------------------|-----------------------------|---------------|
| 1                        | 0.0                         | 0.0           |
| 2                        | -3.3                        | 0.0           |
| 3                        | -5.8                        | 0.0           |
| 4                        | -15.5                       | -12.5         |
| 5                        | -33.4                       | -22.2         |
| 6                        | -38.5                       | -30.1         |
| 7                        | -38.9                       | -36.8         |
| 8                        | <-50                        | -42.6         |
| 9                        | <-50                        | -47.7         |
| 10                       | <-55                        | -52.3         |
| 20                       | <-85                        | -82.4         |

-Target Power\_1W\_459.00 MHz

| Audio Frequency<br>[kHz] | Calculated Response<br>[dB] | Limit<br>[dB] |
|--------------------------|-----------------------------|---------------|
| 1                        | 0.0                         | 0.0           |
| 2                        | -3.2                        | 0.0           |
| 3                        | -5.9                        | 0.0           |
| 4                        | -15.6                       | -12.5         |
| 5                        | -33.6                       | -22.2         |
| 6                        | -39.0                       | -30.1         |
| 7                        | -39.7                       | -36.8         |
| 8                        | <-50                        | -42.6         |
| 9                        | <-50                        | -47.7         |
| 10                       | <-55                        | -52.3         |
| 20                       | <-85                        | -82.4         |

-Target Power\_1W\_512.00 MHz

| Audio Frequency<br>[kHz] | Calculated Response<br>[dB] | Limit<br>[dB] |
|--------------------------|-----------------------------|---------------|
| 1                        | 0.0                         | 0.0           |
| 2                        | -3.2                        | 0.0           |
| 3                        | -5.8                        | 0.0           |
| 4                        | -15.5                       | -12.5         |
| 5                        | -33.3                       | -22.2         |
| 6                        | -38.6                       | -30.1         |
| 7                        | -39.1                       | -36.8         |
| 8                        | <-50                        | -42.6         |
| 9                        | <-50                        | -47.7         |
| 10                       | <-55                        | -52.3         |
| 20                       | <-85                        | -82.4         |

-Target Power\_4W\_406.10 MHz

| Audio Frequency<br>[kHz] | Calculated Response<br>[dB] | Limit<br>[dB] |
|--------------------------|-----------------------------|---------------|
| 1                        | 0.0                         | 0.0           |
| 2                        | -3.2                        | 0.0           |
| 3                        | -5.9                        | 0.0           |
| 4                        | -15.3                       | -12.5         |
| 5                        | -33.2                       | -22.2         |
| 6                        | -43.2                       | -30.1         |
| 7                        | -44.6                       | -36.8         |
| 8                        | <-50                        | -42.6         |
| 9                        | <-50                        | -47.7         |
| 10                       | <-55                        | -52.3         |
| 20                       | <-85                        | -82.4         |

-Target Power\_4W\_459.00 MHz

| Audio Frequency<br>[kHz] | Calculated Response<br>[dB] | Limit<br>[dB] |
|--------------------------|-----------------------------|---------------|
| 1                        | 0.0                         | 0.0           |
| 2                        | -3.3                        | 0.0           |
| 3                        | -5.9                        | 0.0           |
| 4                        | -15.7                       | -12.5         |
| 5                        | -34.5                       | -22.2         |
| 6                        | -43.3                       | -30.1         |
| 7                        | -45.1                       | -36.8         |
| 8                        | <-50                        | -42.6         |
| 9                        | <-50                        | -47.7         |
| 10                       | <-55                        | -52.3         |
| 20                       | <-85                        | -82.4         |

-Target Power\_4W\_512.00 MHz

| Audio Frequency<br>[kHz] | Calculated Response<br>[dB] | Limit<br>[dB] |
|--------------------------|-----------------------------|---------------|
| 1                        | 0.0                         | 0.0           |
| 2                        | -3.3                        | 0.0           |
| 3                        | -5.8                        | 0.0           |
| 4                        | -15.5                       | -12.5         |
| 5                        | -33.4                       | -22.2         |
| 6                        | -43.2                       | -30.1         |
| 7                        | -44.6                       | -36.8         |
| 8                        | <-50                        | -42.6         |
| 9                        | <-50                        | -47.7         |
| 10                       | <-55                        | -52.3         |
| 20                       | <-85                        | -82.4         |

\* 6.25BW

-Target Power\_1W\_406.10 Mhz

| Audio Frequency<br>[kHz] | Calculated Response<br>[dB] | Limit<br>[dB] |
|--------------------------|-----------------------------|---------------|
| 1                        | 0.0                         | 0.0           |
| 2                        | -2.5                        | 0.0           |
| 3                        | -5.8                        | 0.0           |
| 4                        | -15.6                       | -12.5         |
| 5                        | -34.0                       | -22.2         |
| 6                        | -40.8                       | -30.1         |
| 7                        | -41.5                       | -36.8         |
| 8                        | <-50                        | -42.6         |
| 9                        | <-50                        | -47.7         |
| 10                       | <-55                        | -52.3         |
| 20                       | <-85                        | -82.4         |

-Target Power\_1W\_459.00 Mhz

| Audio Frequency<br>[kHz] | Calculated Response<br>[dB] | Limit<br>[dB] |
|--------------------------|-----------------------------|---------------|
| 1                        | 0.0                         | 0.0           |
| 2                        | -2.4                        | 0.0           |
| 3                        | -5.7                        | 0.0           |
| 4                        | -15.5                       | -12.5         |
| 5                        | -33.6                       | -22.2         |
| 6                        | -39.3                       | -30.1         |
| 7                        | -39.8                       | -36.8         |
| 8                        | <-50                        | -42.6         |
| 9                        | <-50                        | -47.7         |
| 10                       | <-55                        | -52.3         |
| 20                       | <-85                        | -82.4         |

-Target Power\_1W\_512.00 Mhz

| Audio Frequency<br>[kHz] | Calculated Response<br>[dB] | Limit<br>[dB] |
|--------------------------|-----------------------------|---------------|
| 1                        | 0.0                         | 0.0           |
| 2                        | -2.4                        | 0.0           |
| 3                        | -5.7                        | 0.0           |
| 4                        | -15.6                       | -12.5         |
| 5                        | -33.6                       | -22.2         |
| 6                        | -38.7                       | -30.1         |
| 7                        | -39.4                       | -36.8         |
| 8                        | <-50                        | -42.6         |
| 9                        | <-50                        | -47.7         |
| 10                       | <-55                        | -52.3         |
| 20                       | <-85                        | -82.4         |

-Target Power\_4W\_406.10 MHz

| Audio Frequency<br>[kHz] | Calculated Response<br>[dB] | Limit<br>[dB] |
|--------------------------|-----------------------------|---------------|
| 1                        | 0.0                         | 0.0           |
| 2                        | -2.5                        | 0.0           |
| 3                        | -5.8                        | 0.0           |
| 4                        | -15.7                       | -12.5         |
| 5                        | -34.5                       | -22.2         |
| 6                        | -43.7                       | -30.1         |
| 7                        | -45.1                       | -36.8         |
| 8                        | <-50                        | -42.6         |
| 9                        | <-50                        | -47.7         |
| 10                       | <-55                        | -52.3         |
| 20                       | <-85                        | -82.4         |

-Target Power\_4W\_459.00 MHz

| Audio Frequency<br>[kHz] | Calculated Response<br>[dB] | Limit<br>[dB] |
|--------------------------|-----------------------------|---------------|
| 1                        | 0.0                         | 0.0           |
| 2                        | -2.4                        | 0.0           |
| 3                        | -5.7                        | 0.0           |
| 4                        | -15.4                       | -12.5         |
| 5                        | -34.3                       | -22.2         |
| 6                        | -43.4                       | -30.1         |
| 7                        | -44.7                       | -36.8         |
| 8                        | <-50                        | -42.6         |
| 9                        | <-50                        | -47.7         |
| 10                       | <-55                        | -52.3         |
| 20                       | <-85                        | -82.4         |

-Target Power\_4W\_512.00 MHz

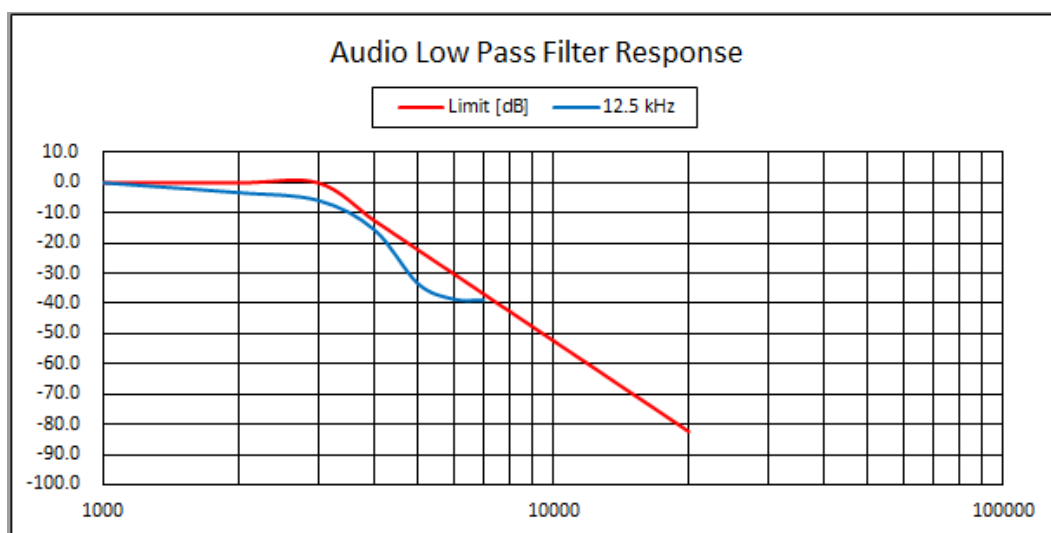
| Audio Frequency<br>[kHz] | Calculated Response<br>[dB] | Limit<br>[dB] |
|--------------------------|-----------------------------|---------------|
| 1                        | 0.0                         | 0.0           |
| 2                        | -2.4                        | 0.0           |
| 3                        | -5.7                        | 0.0           |
| 4                        | -15.6                       | -12.5         |
| 5                        | -33.4                       | -22.2         |
| 6                        | -43.4                       | -30.1         |
| 7                        | -44.8                       | -36.8         |
| 8                        | <-50                        | -42.6         |
| 9                        | <-50                        | -47.7         |
| 10                       | <-55                        | -52.3         |
| 20                       | <-85                        | -82.4         |

## 5.5.4 Test Plots

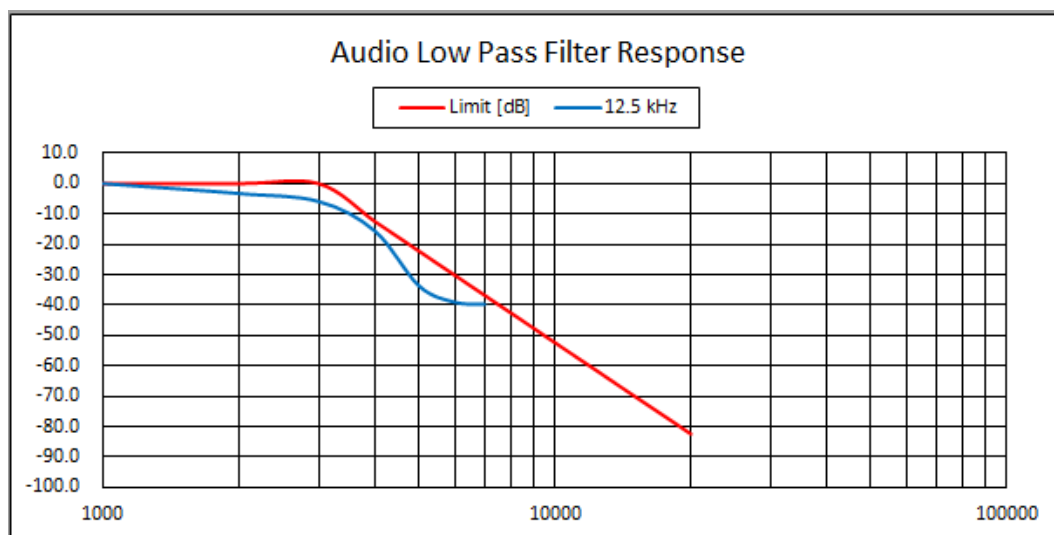
- Complied

\* 12.5BW

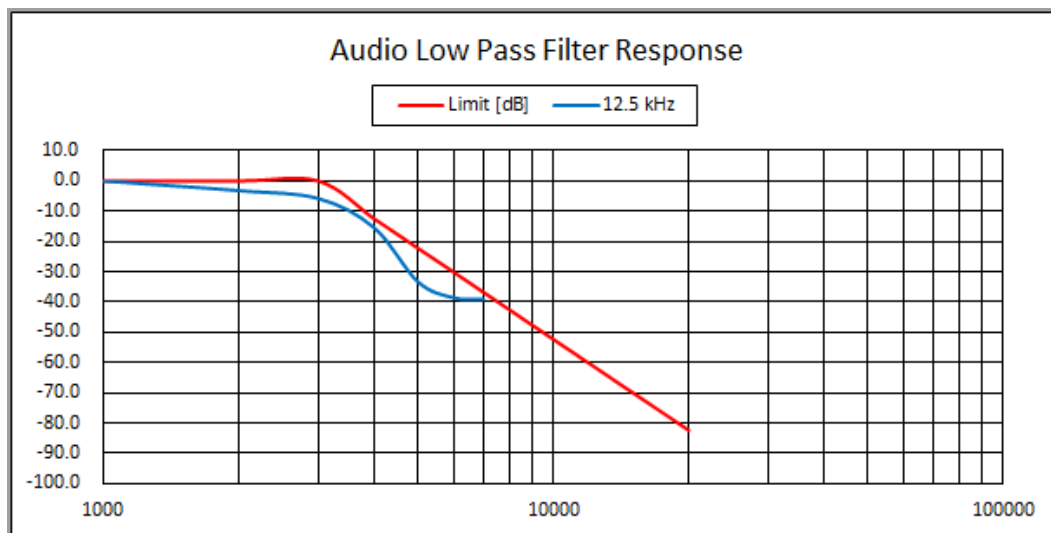
-Target Power\_1W\_406.10 MHz



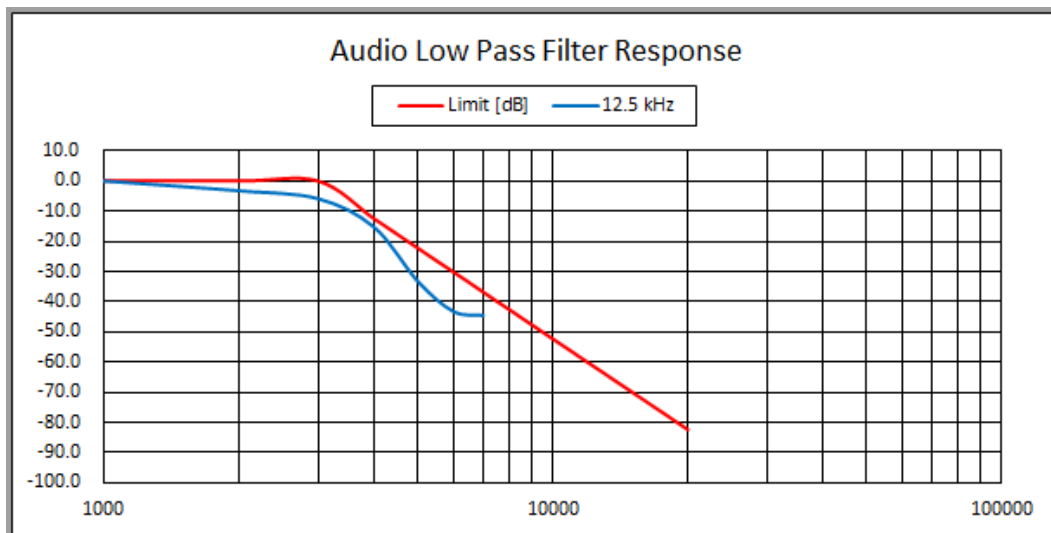
-Target Power\_1W\_459.00 MHz



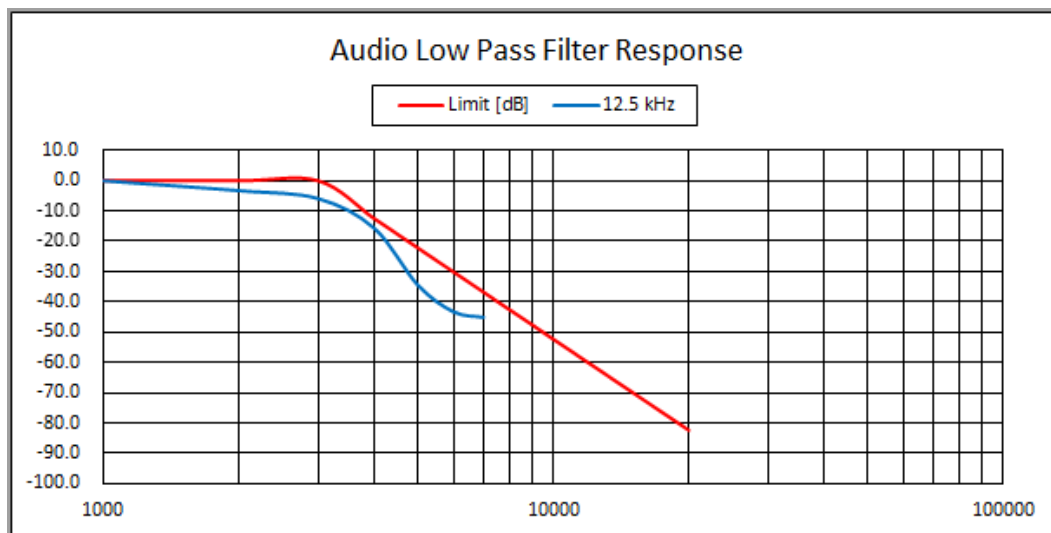
-Target Power\_1W\_512.00 MHz



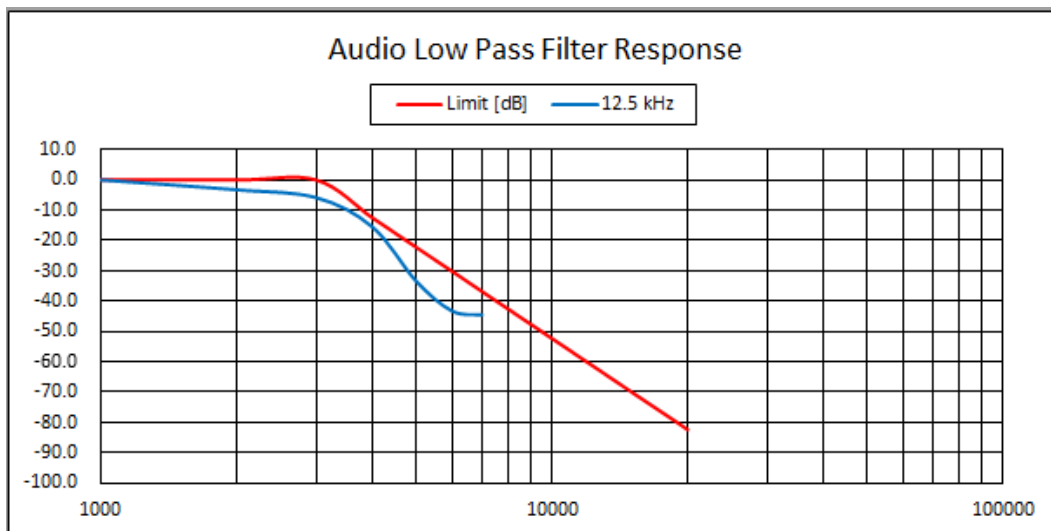
-Target Power\_4W\_406.10 MHz



-Target Power\_4W\_459.00 MHz

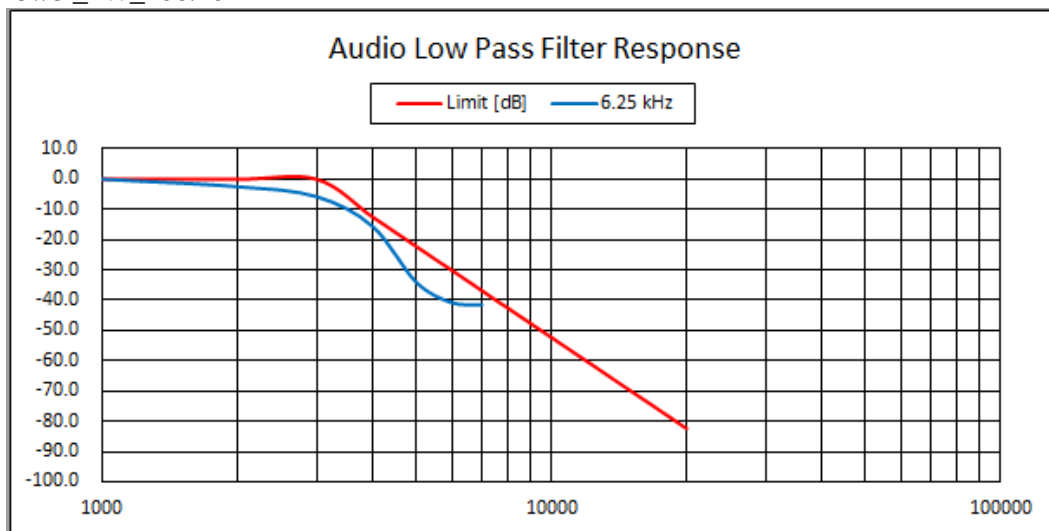


-Target Power\_4W\_512.00 MHz

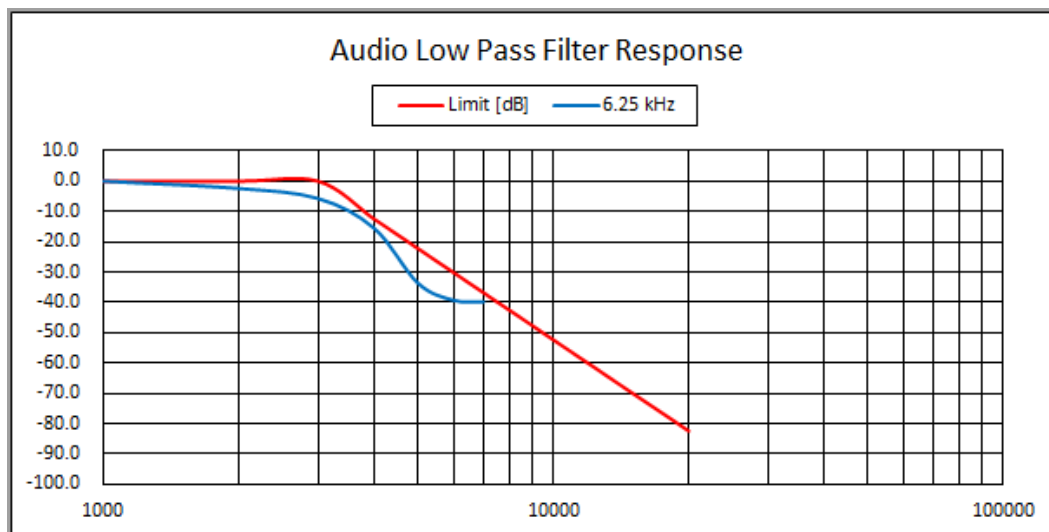


\* 6.25BW

-Target Power\_1W\_406.10 MHz

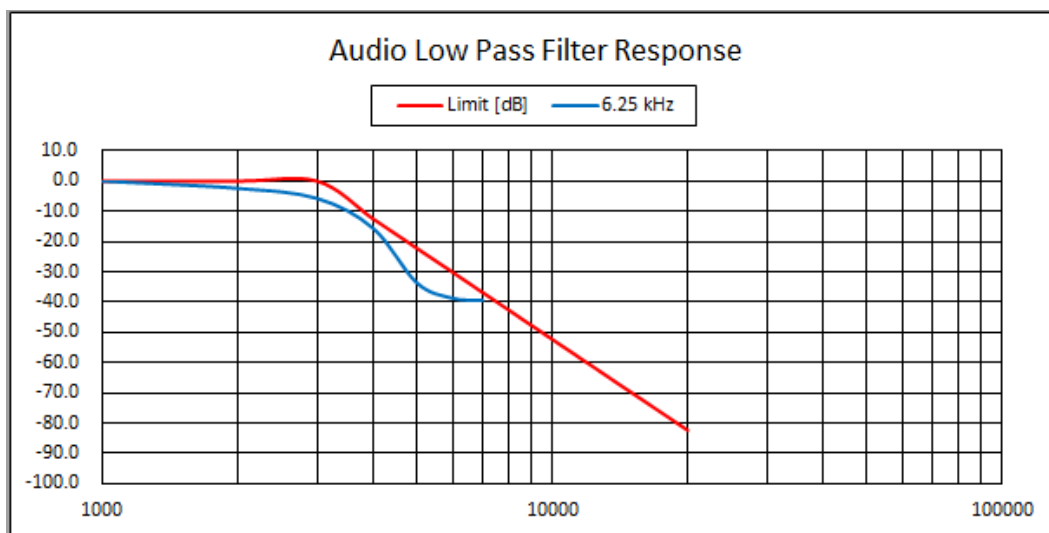


-Target Power\_1W\_459.00 MHz

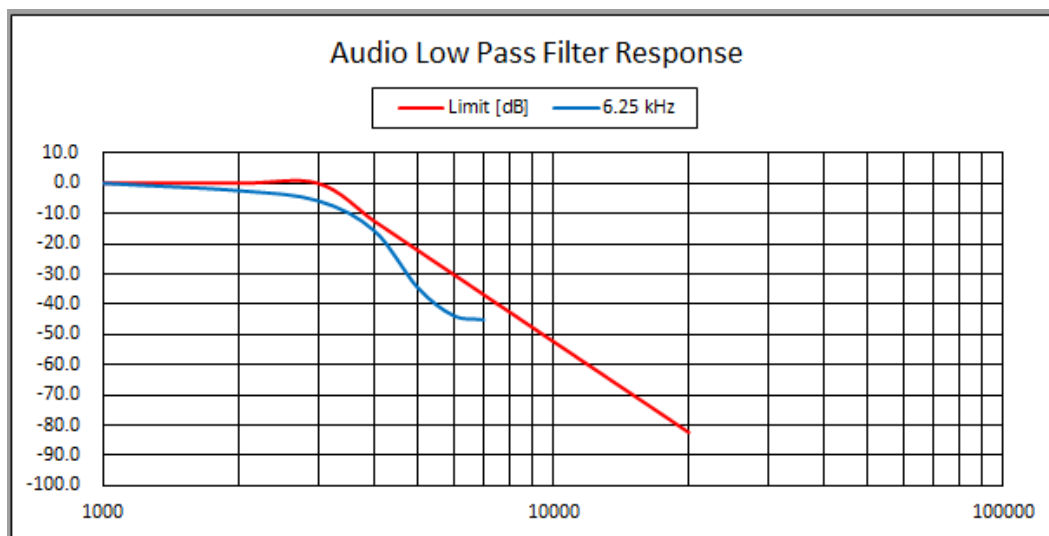




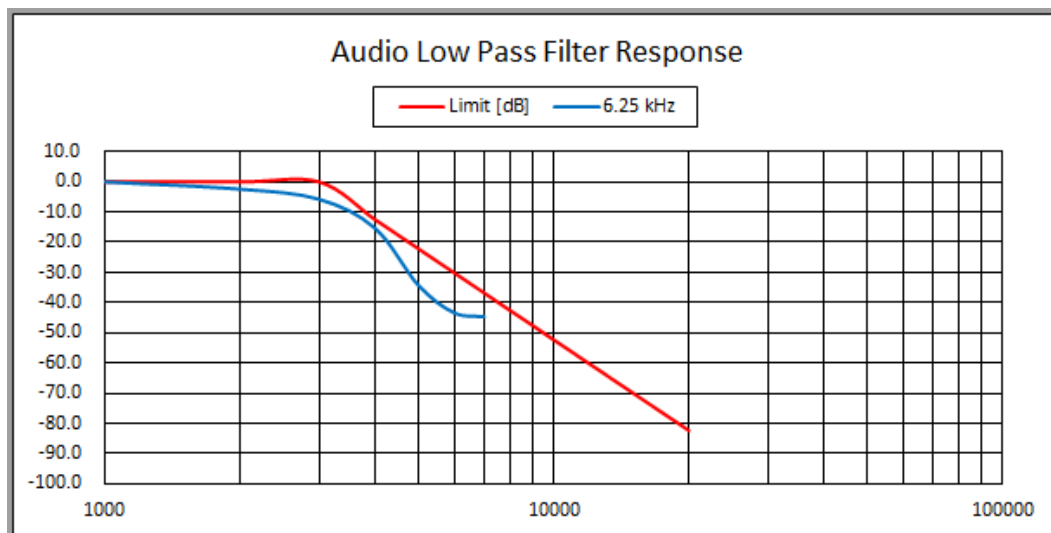
-Target Power\_1W\_512.00 MHz



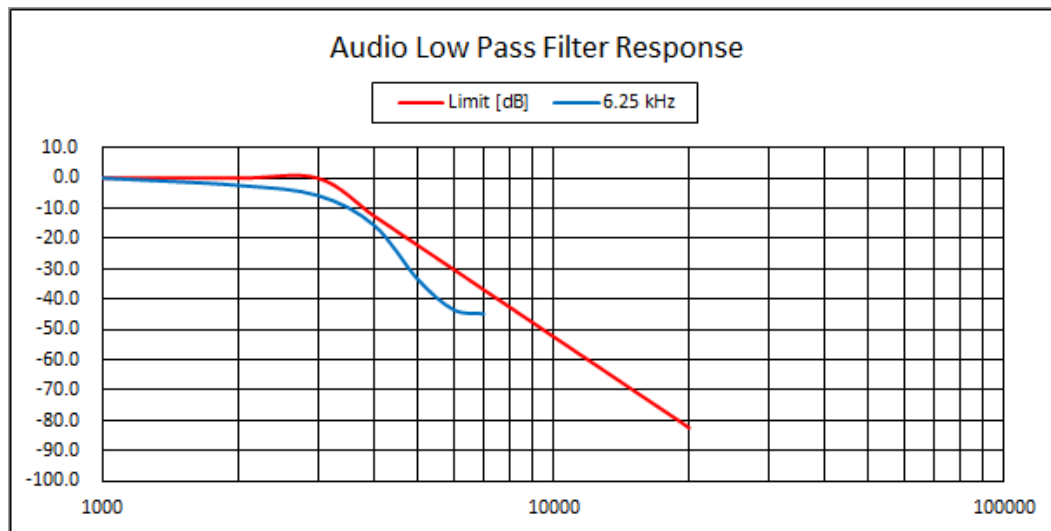
-Target Power\_4W\_406.10 MHz



-Target Power\_4W\_459.00 MHz



-Target Power\_4W\_512.00 MHz



## 5.6 Occupied Bandwidth and Emission Mask

### 5.6.1 Regulation

According to §90.210(d), Emission Mask D—12.5 kHz channel bandwidth equipment. For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

- (1) On any frequency from the center of the authorized bandwidth  $f_0$  to 5.625 kHz removed from  $f_0$ :  
Zero dB.
- (2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 5.625 kHz but no more than 12.5 kHz: At least  $7.27(f_d - 2.88 \text{ kHz})$  dB.
- (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.
- (4) The reference level for showing compliance with the emission mask shall be established using a resolution bandwidth sufficiently wide (usually two or three times the channel bandwidth) to capture the true peak emission of the equipment under test. In order to show compliance with the emission mask up to and including 50 kHz removed from the edge of the authorized bandwidth, adjust the resolution bandwidth to 100 Hz with the measuring instrument in a peak hold mode. A sufficient number of sweeps must be measured to insure that the emission profile is developed. If video filtering is used, its bandwidth must not be less than the instrument resolution bandwidth. For emissions beyond 50 kHz from the edge of the authorized bandwidth, see paragraph (o) of this section. If it can be shown that use of the above instrumentation settings do not accurately represent the true interference potential of the equipment under test, an alternate procedure may be used provided prior Commission approval is obtained.

Emission Mask E—6.25 kHz channel bandwidth equipment. For transmitters designed to operate with a 6.25 kHz or less bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

- (1) On any frequency from the center of the authorized bandwidth  $f_0$  to 3.0 kHz removed from  $f_0$ :  
Zero dB.
- (2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 3.0 kHz but no more than 4.6 kHz: At least  $30 + 16.67(f_d - 3 \text{ kHz})$  dB or  $55 + 10 \log(P)$  or 65 dB, whichever is the lesser attenuation.
- (3) On any frequency removed from the center of the authorized bandwidth by more than 4.6 kHz:  
At least  $55 + 10 \log(P)$  dB or 65 dB, whichever is the lesser attenuation.

(4) The reference level for showing compliance with the emission mask shall be established using a resolution bandwidth sufficiently wide (usually two or three times the channel bandwidth) to capture the true peak emission of the equipment under test. In order to show compliance with the emission mask up to and including 50 kHz removed from the edge of the authorized bandwidth, adjust the resolution bandwidth to 100 Hz with the measuring instrument in a peak hold mode. A sufficient number of sweeps must be measured to insure that the emission profile is developed. If video filtering is used, its bandwidth must not be less than the instrument resolution bandwidth. For emissions beyond 50 kHz from the edge of the authorized bandwidth, see paragraph (o) of this section. If it can be shown that use of the above instrumentation settings do not accurately represent the true interference potential of the equipment under test, an alternate procedure may be used provided prior Commission approval is obtained.

### 5.6.2 Measurement Procedure

1. The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission.
2. The transmitter is modulated by a 2500 Hz tone at an input level 16 dB greater than that necessary to produce 50 percent modulation.
3. The input level shall be established at the frequency of maximum response of the audio modulating circuit.

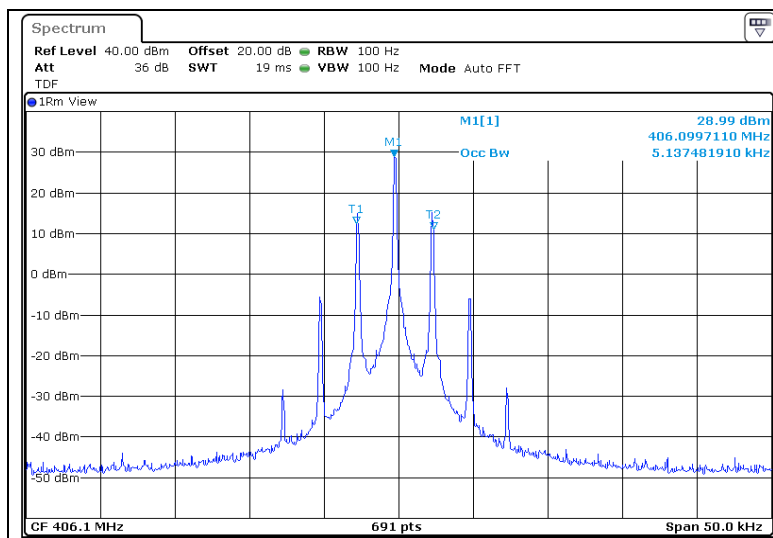
### 5.6.3 Test Result

- Complied

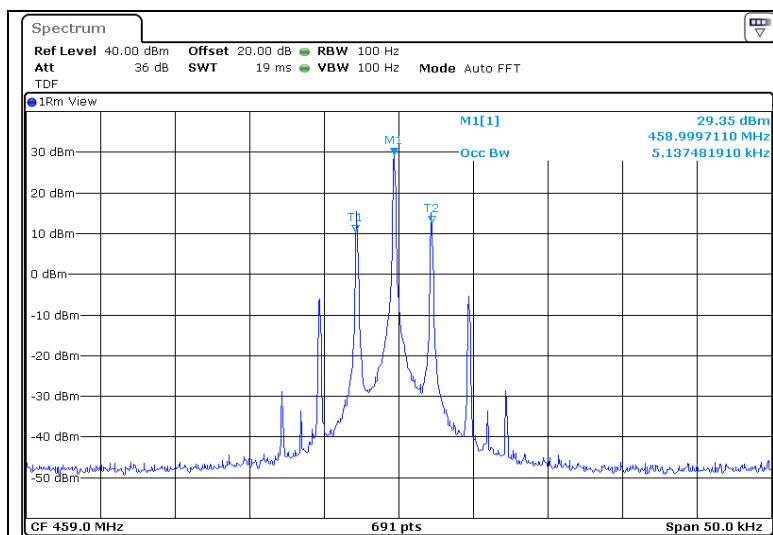
Figure 4. plot of Occupied Bandwidth and Emission Mask

\* 99% Bandwidth\_12.5BW

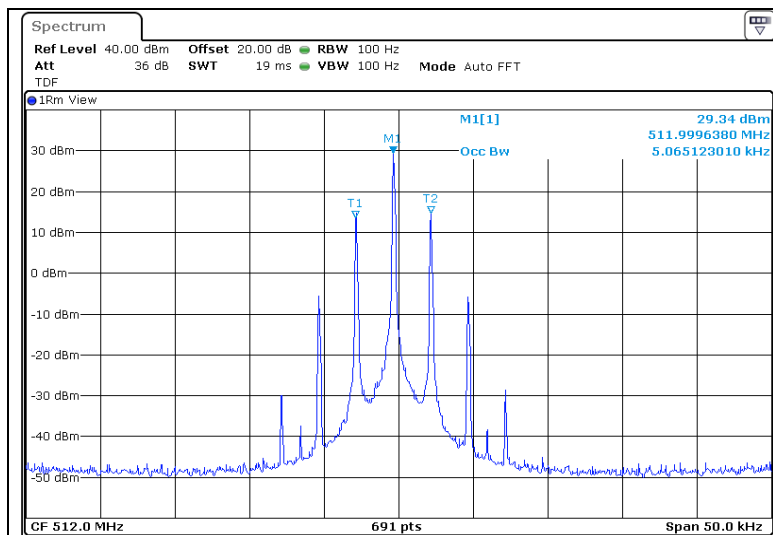
-Target Power\_1W\_406.10 MHz



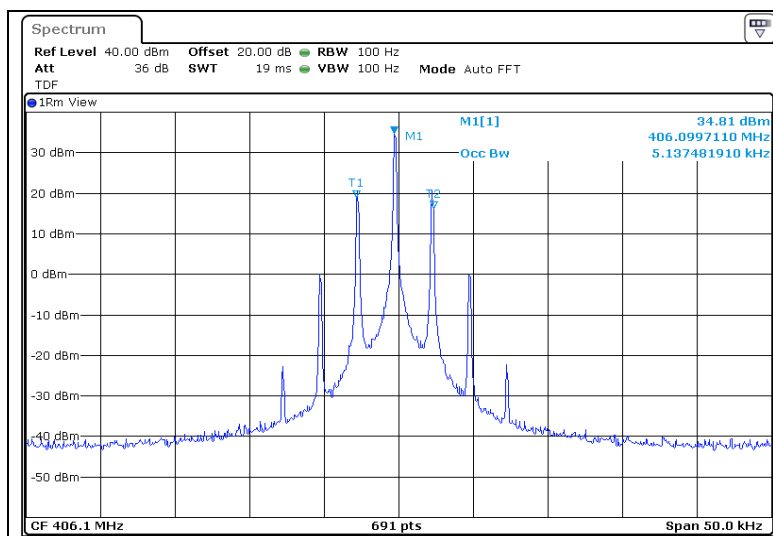
-Target Power\_1W\_459.00 MHz



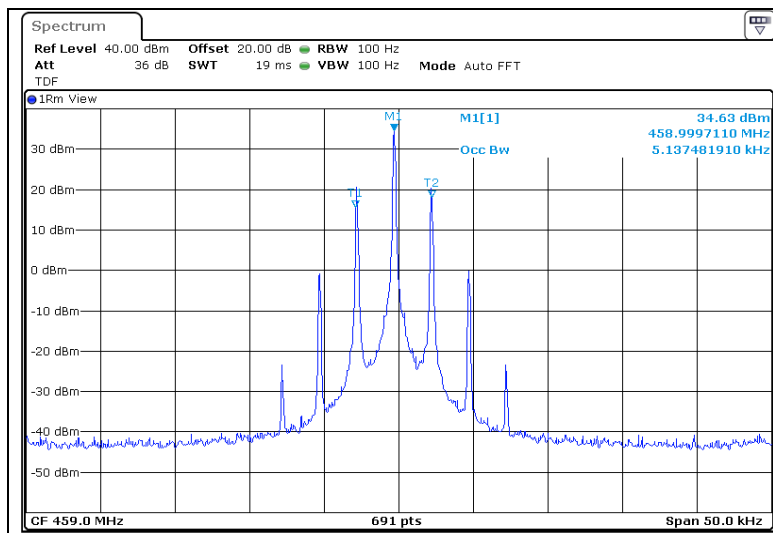
-Target Power\_1W\_512.00 MHz



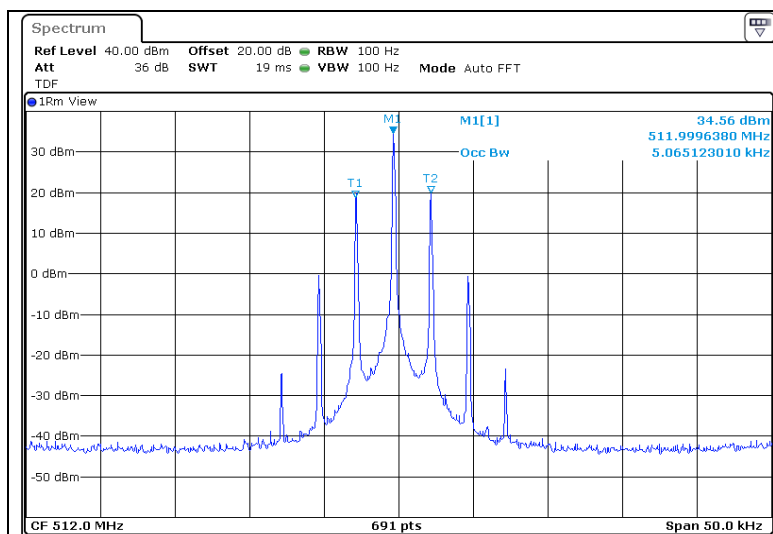
-Target Power\_4W\_406.10 MHz



-Target Power\_4W\_459.00 MHz

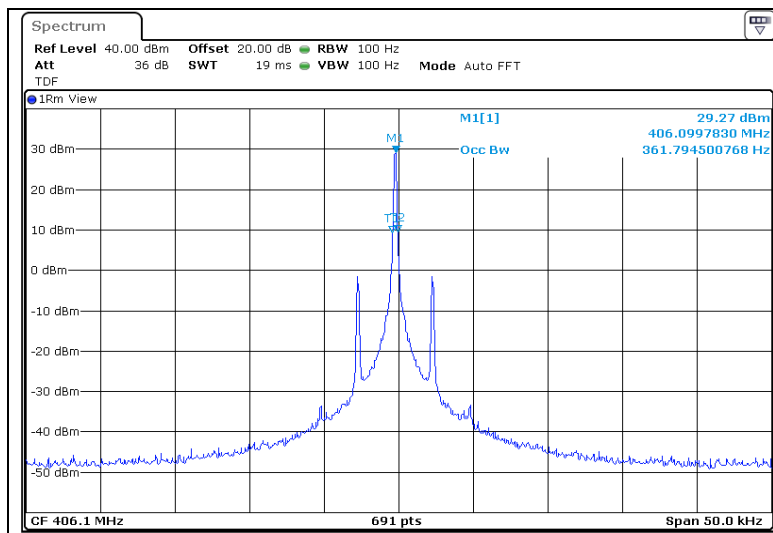


-Target Power\_4W\_512.00 MHz

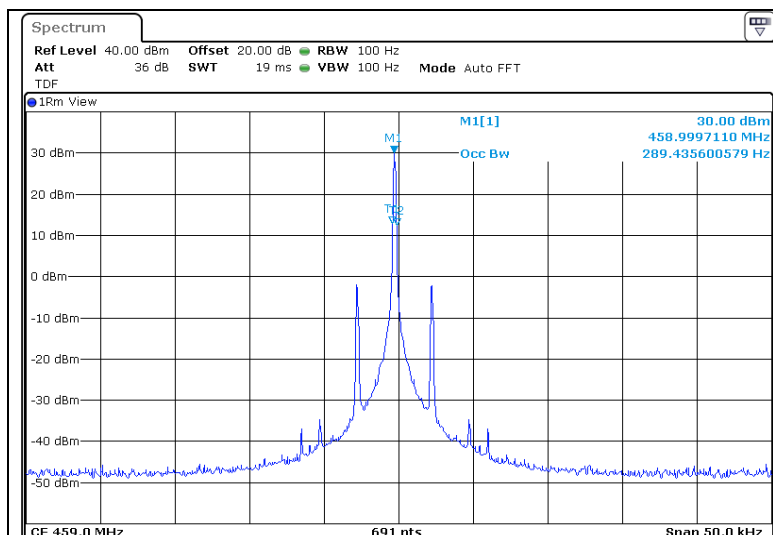


\* 99% Bandwidth\_6.25BW

-Target Power\_1W\_406.10 MHz

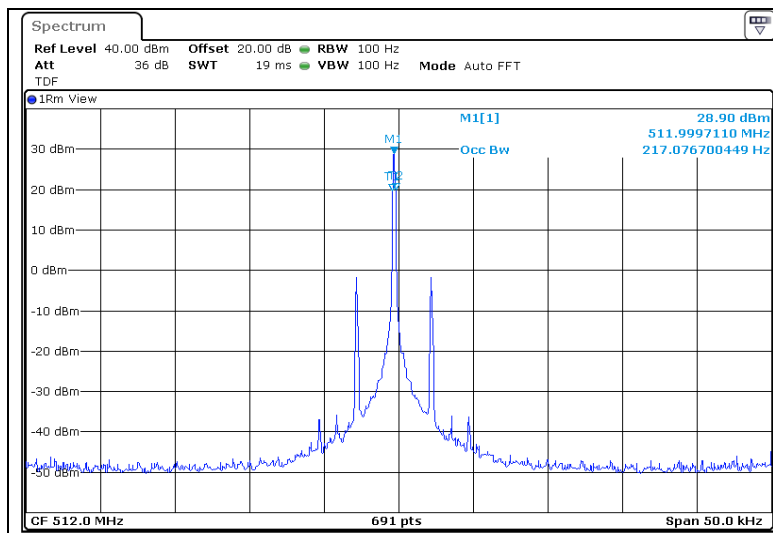


-Target Power\_1W\_459.00 MHz

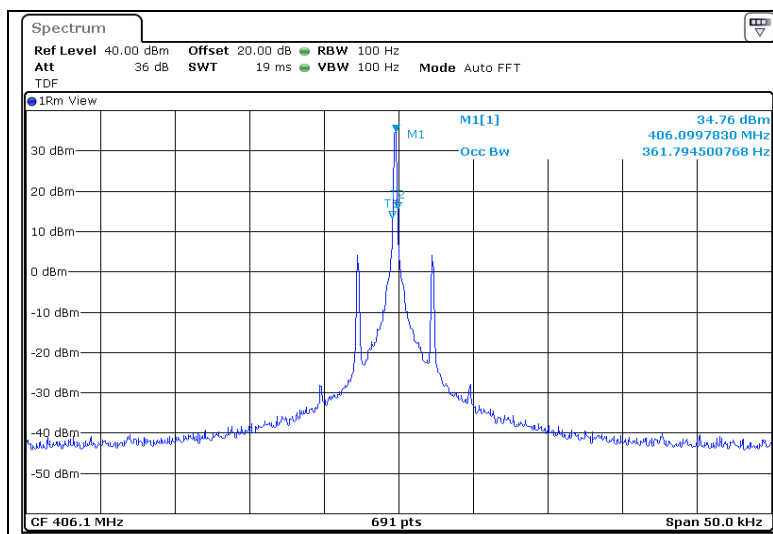




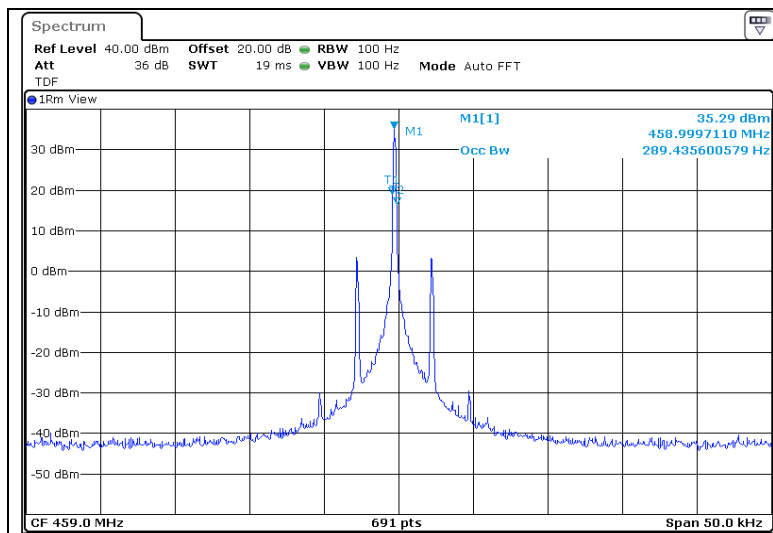
-Target Power\_1W\_512.00 MHz



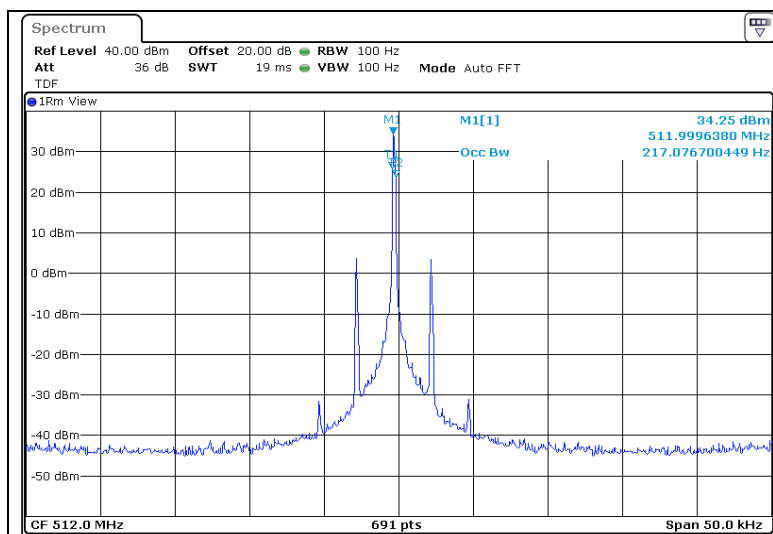
-Target Power\_4W\_406.10 MHz



-Target Power\_4W\_459.00 MHz

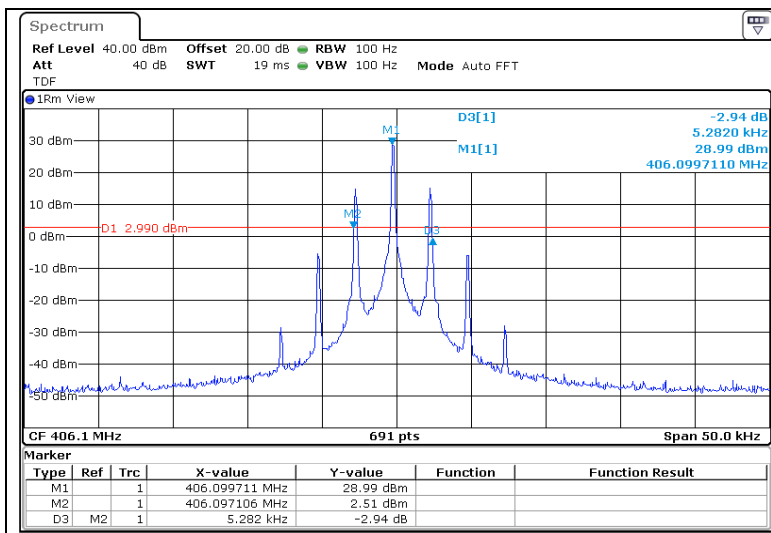


-Target Power\_4W\_512.00 MHz

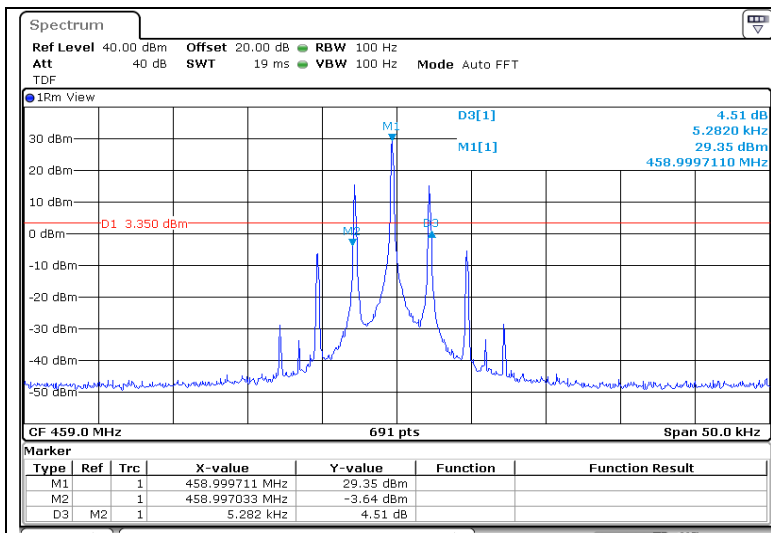


\* 26dB Bandwidth\_12.5BW

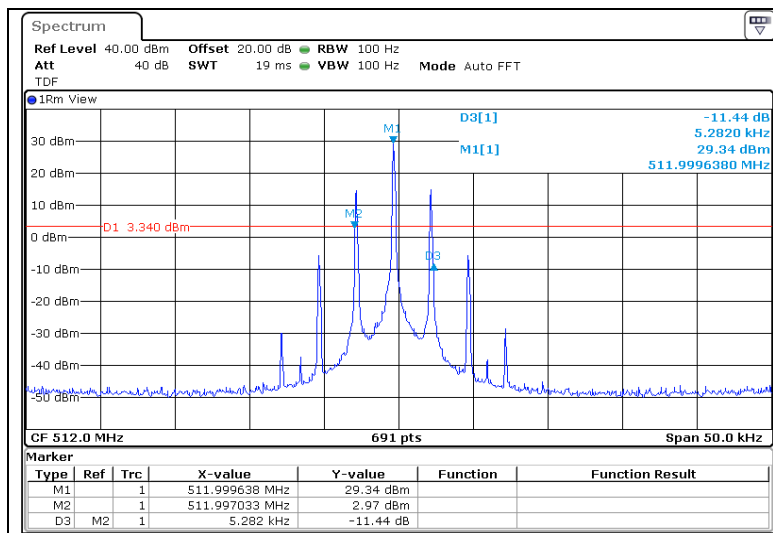
-Target Power\_1W\_406.10 MHz



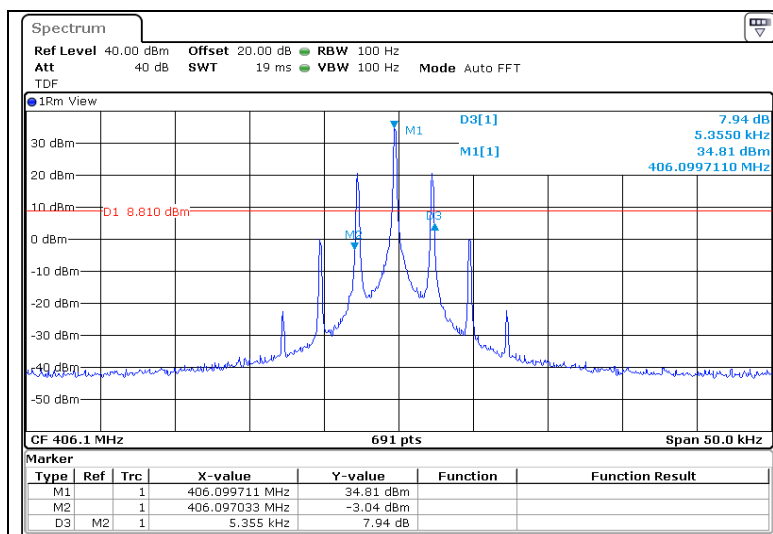
-Target Power\_1W\_459.00 MHz



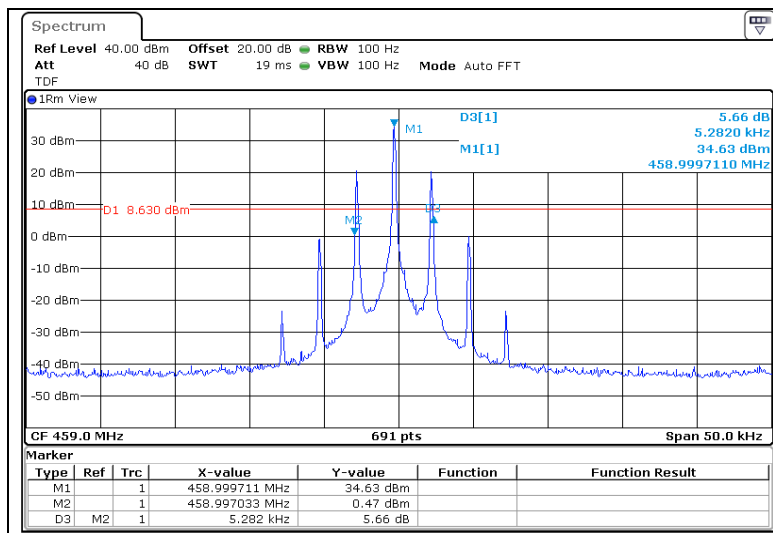
-Target Power\_1W\_512.00 MHz



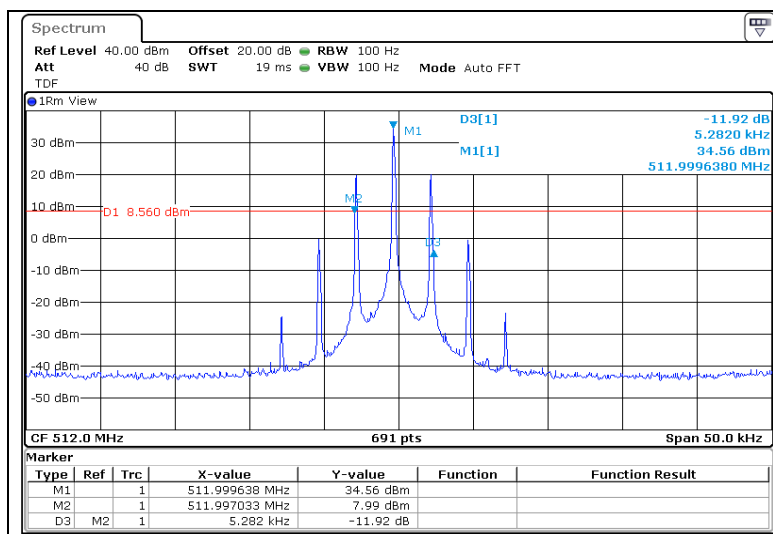
-Target Power\_4W\_406.10 MHz



-Target Power\_4W\_459.00 MHz

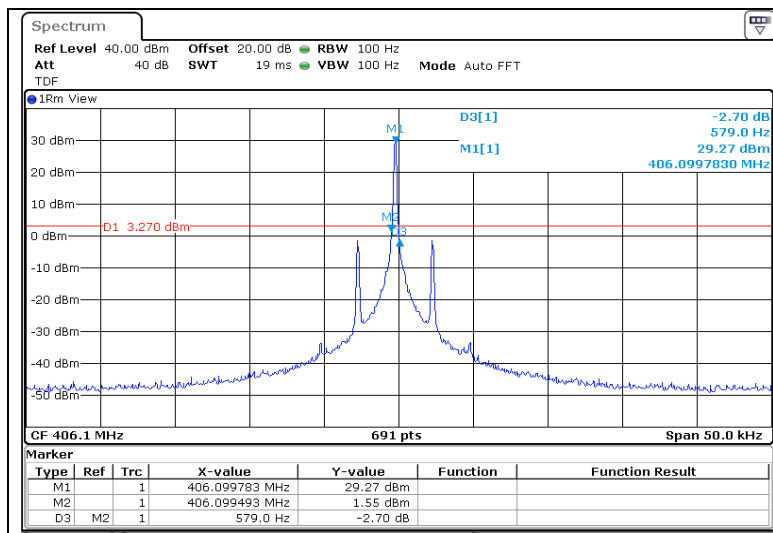


-Target Power\_4W\_512.00 MHz

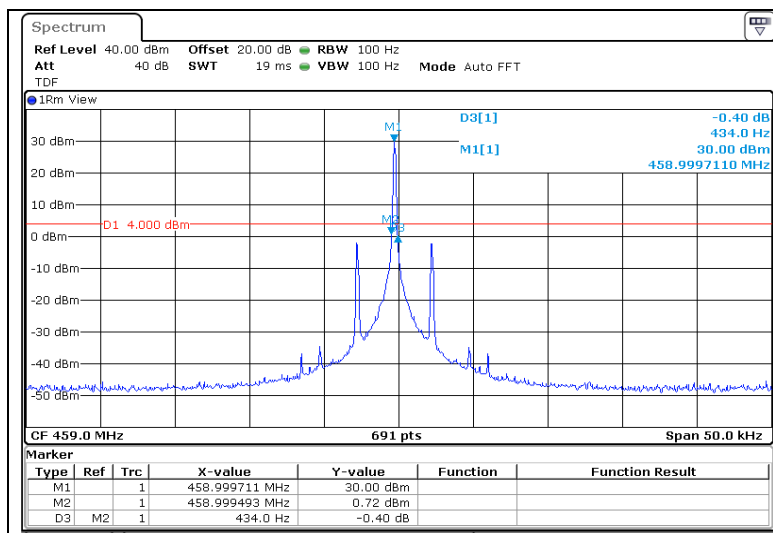


\* 26dB Bandwidth\_6.25BW

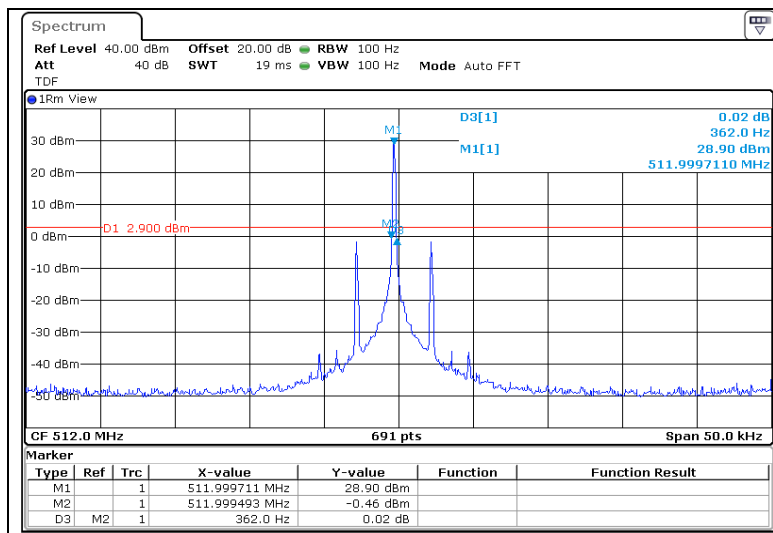
-Target Power\_1W\_406.10 MHz



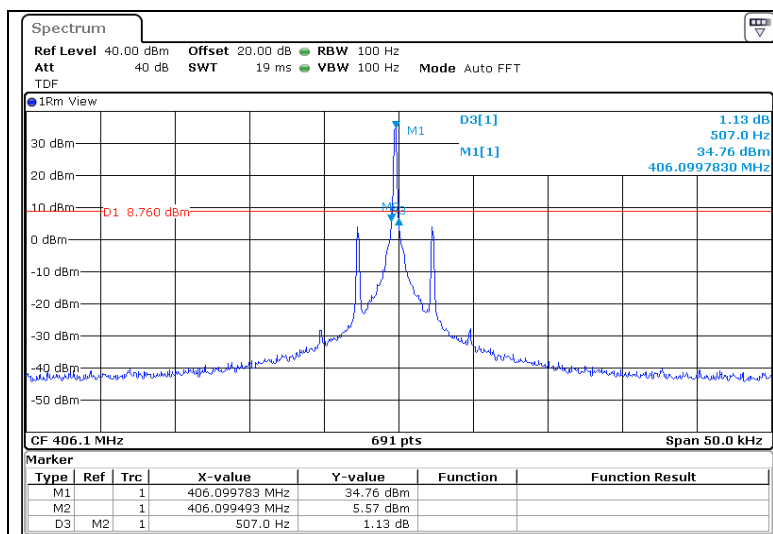
-Target Power\_1W\_459.00 MHz



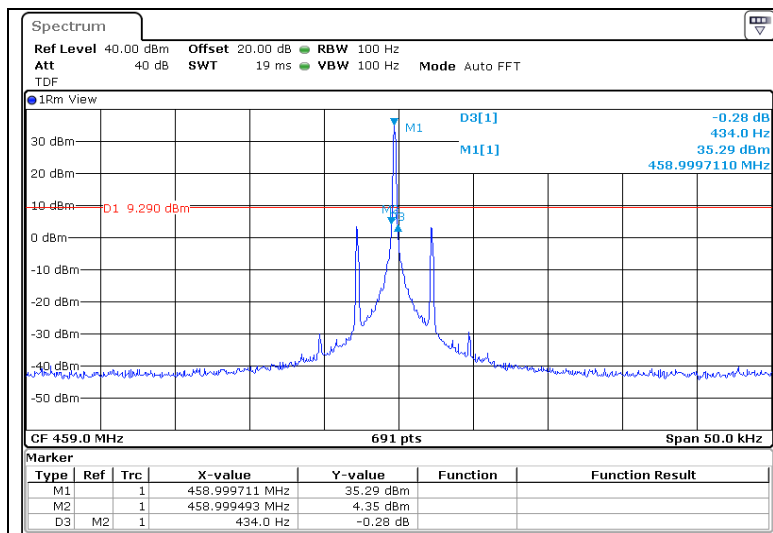
-Target Power\_1W\_512.00 MHz



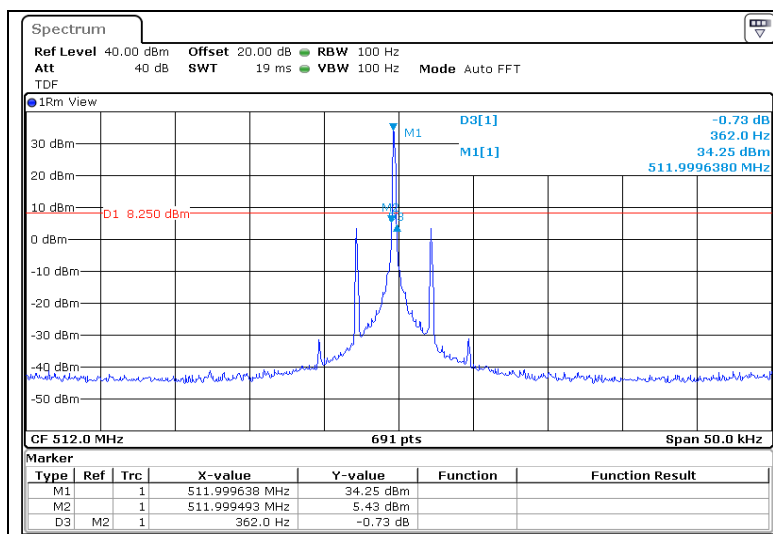
-Target Power\_4W\_406.10 MHz



-Target Power\_4W\_459.00 MHz



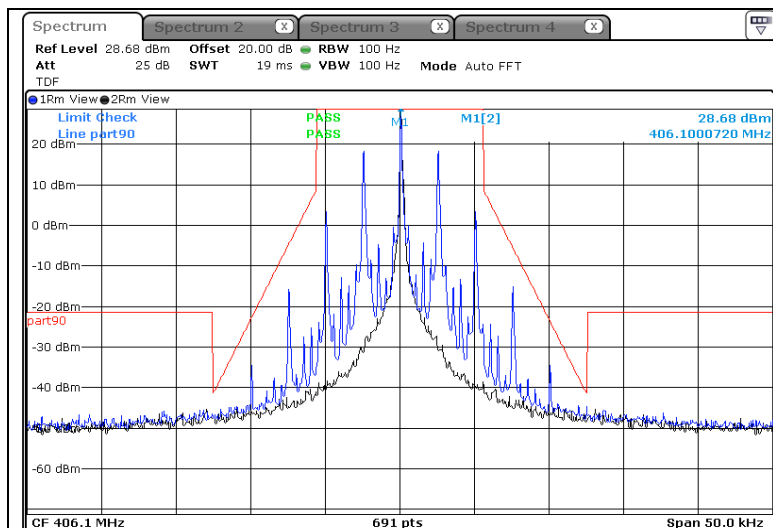
-Target Power\_4W\_512.00 MHz



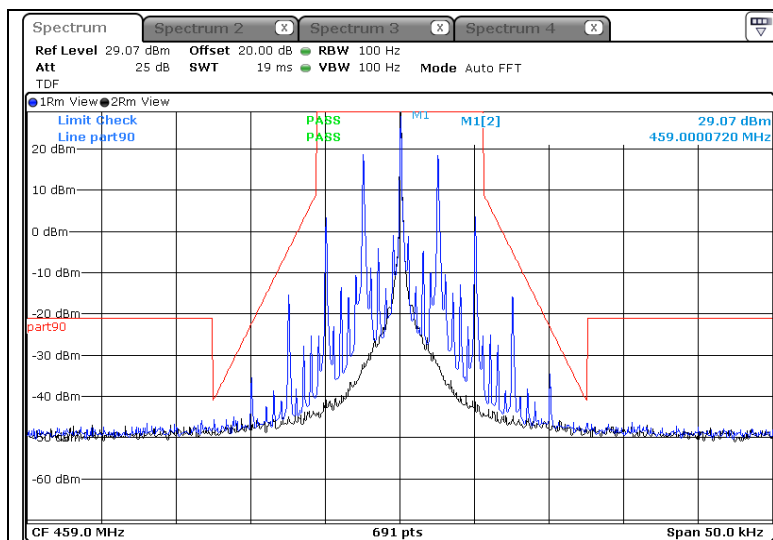


\* Emission Mask\_12.5BW

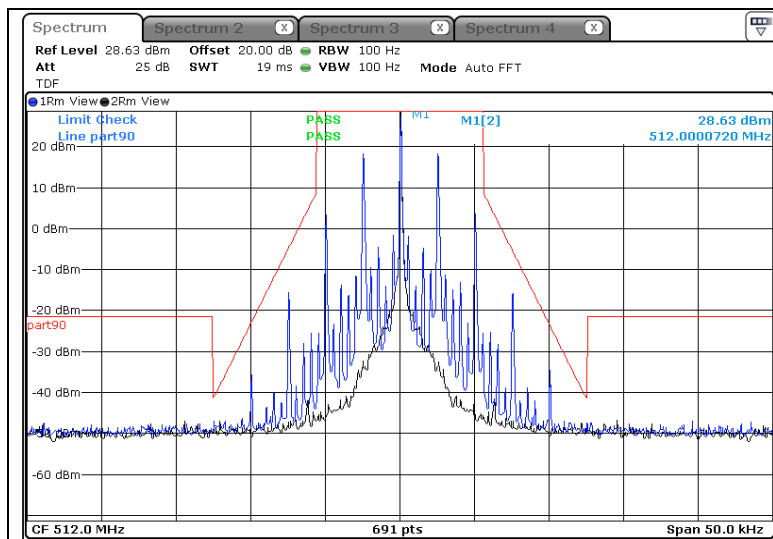
-Target Power\_1W\_406.10 MHz



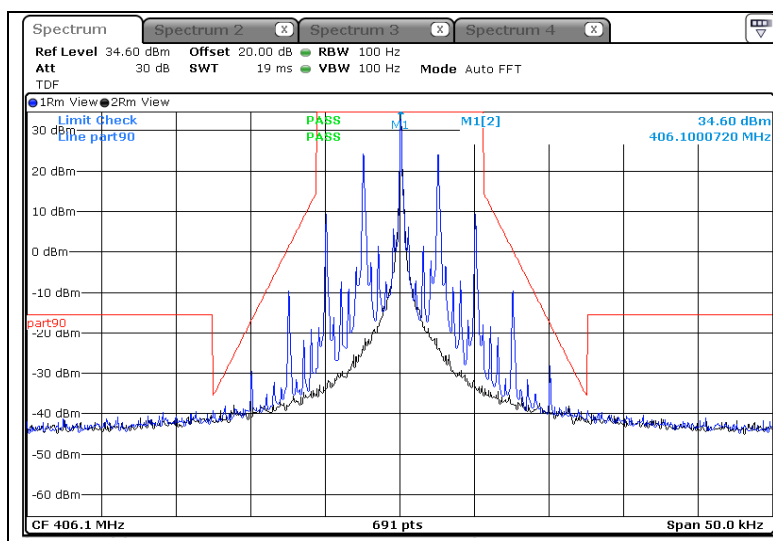
-Target Power\_1W\_459.00 MHz



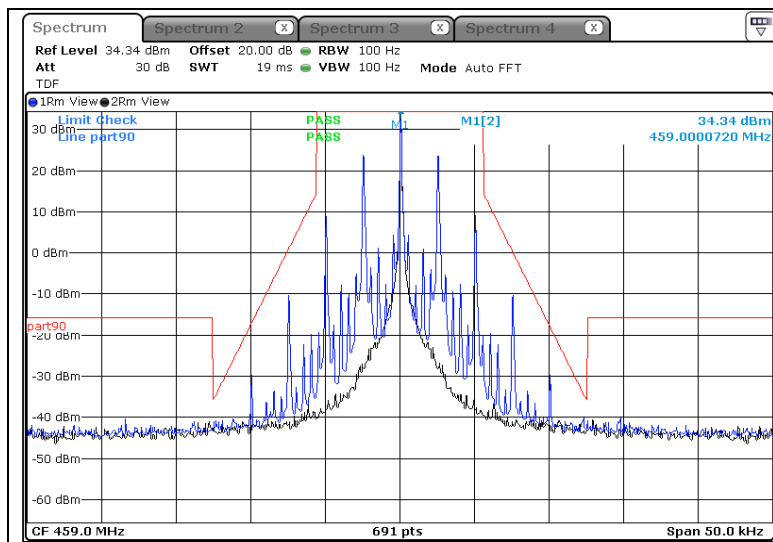
-Target Power\_1W\_512.00 MHz



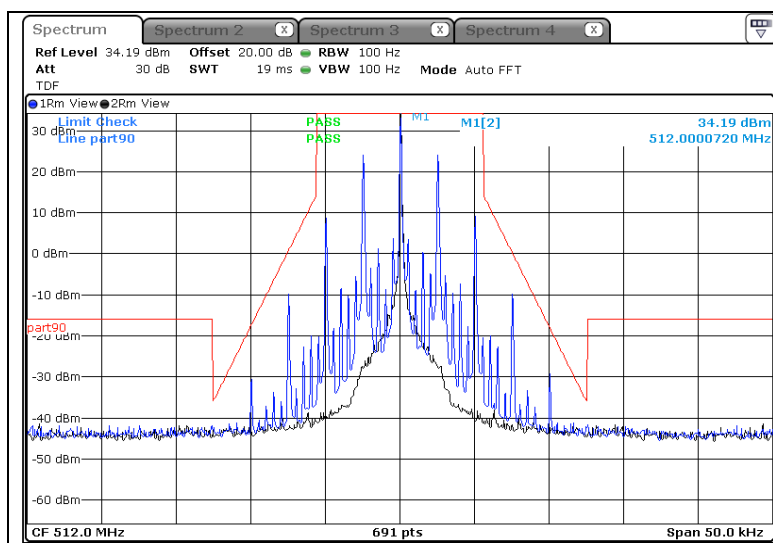
-Target Power\_4W\_406.10 MHz



-Target Power\_4W\_459.00 MHz

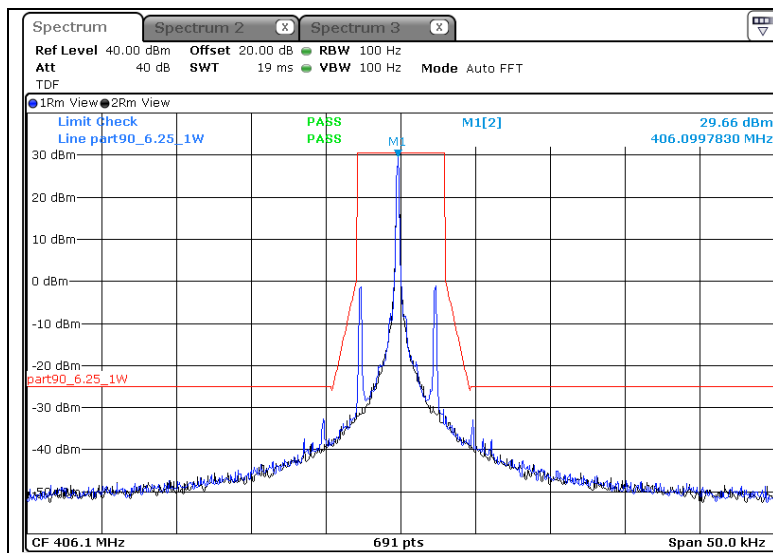


-Target Power\_4W\_512.00 MHz

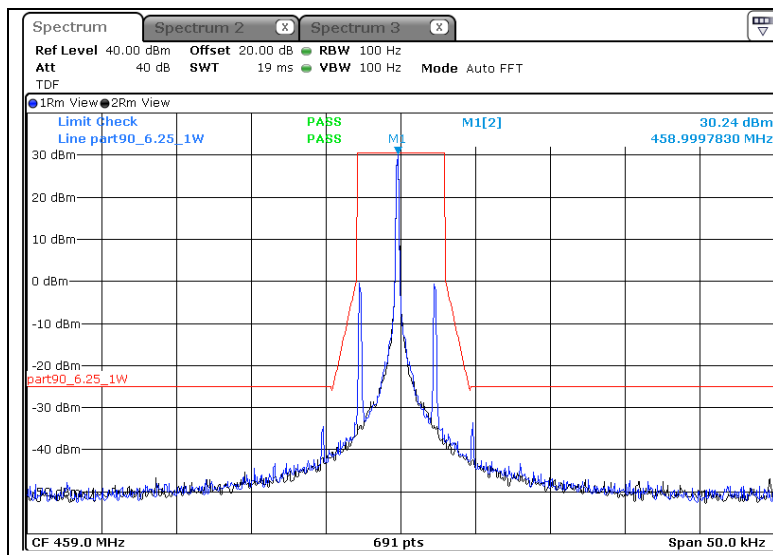


\* Emission Mask\_6.25BW

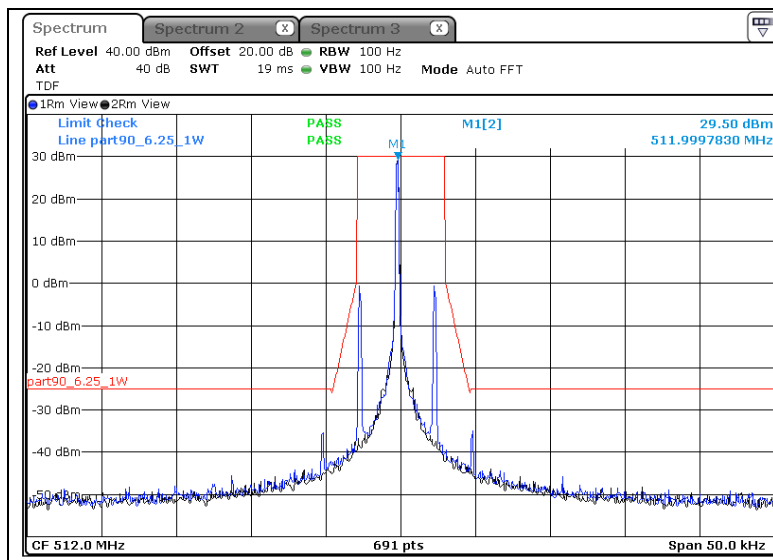
-Target Power\_1W\_406.10 MHz



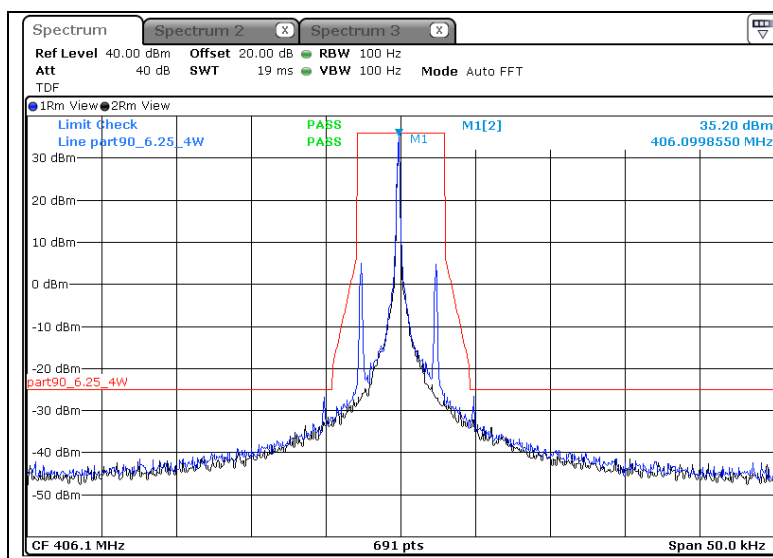
-Target Power\_1W\_459.00 MHz



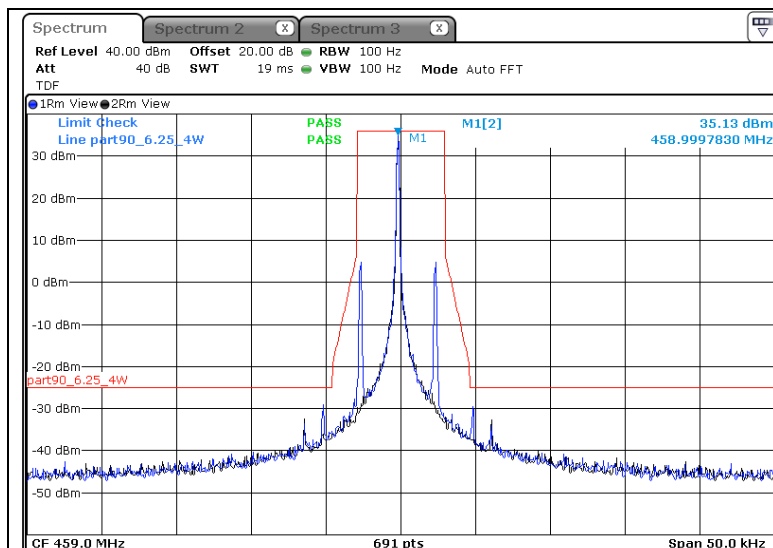
-Target Power\_1W\_512.00 MHz



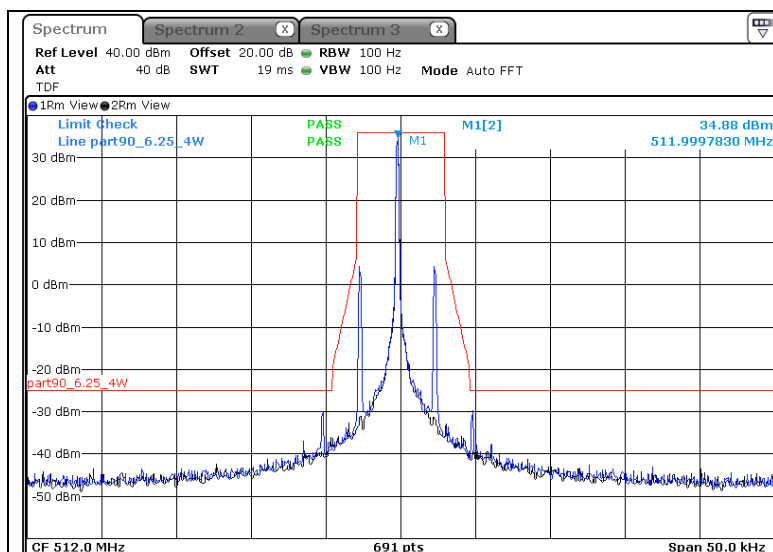
-Target Power\_4W\_406.10 MHz



-Target Power\_4W\_459.00 MHz



-Target Power\_4W\_512.00 MHz



## 5.7 Transient Frequency Behaviour of the Transmitter

### 5.7.1 Regulation

According to §90.214, Transmitters designed to operate in the 150-174 MHz and 421-512 MHz frequency bands must maintain transient frequencies within the maximum frequency difference limits during the time intervals indicated:

| Time intervals <sup>1 2</sup>                                                       | Maximum frequency difference <sup>3</sup> | All equipment  |                |
|-------------------------------------------------------------------------------------|-------------------------------------------|----------------|----------------|
|                                                                                     |                                           | 150 to 174 MHz | 421 to 512 MHz |
| Transient Frequency Behavior for Equipment Designed to Operate on 25 kHz Channels   |                                           |                |                |
| t <sub>1</sub> <sup>4</sup>                                                         | ±25.0 kHz                                 | 5.0 ms         | 10.0 ms        |
| t <sub>2</sub>                                                                      | ±12.5 kHz                                 | 20.0 ms        | 25.0 ms        |
| t <sub>3</sub> <sup>4</sup>                                                         | ±25.0 kHz                                 | 5.0 ms         | 10.0 ms        |
| Transient Frequency Behavior for Equipment Designed to Operate on 12.5 kHz Channels |                                           |                |                |
| t <sub>1</sub> <sup>4</sup>                                                         | ±12.5 kHz                                 | 5.0 ms         | 10.0 ms        |
| t <sub>2</sub>                                                                      | ±6.25 kHz                                 | 20.0 ms        | 25.0 ms        |
| t <sub>3</sub> <sup>4</sup>                                                         | ±12.5 kHz                                 | 5.0 ms         | 10.0 ms        |
| Transient Frequency Behavior for Equipment Designed to Operate on 6.25 kHz Channels |                                           |                |                |
| t <sub>1</sub> <sup>4</sup>                                                         | ±6.25 kHz                                 | 5.0 ms         | 10.0 ms        |
| t <sub>2</sub>                                                                      | ±3.125 kHz                                | 20.0 ms        | 25.0 ms        |
| t <sub>3</sub> <sup>4</sup>                                                         | ±6.25 kHz                                 | 5.0 ms         | 10.0 ms        |

<sup>1</sup>  $t_{on}$  is the instant when a 1 kHz test signal is completely suppressed, including any capture time due to phasing.

$t_1$  is the time period immediately following  $t_{on}$ .

$t_2$  is the time period immediately following  $t_1$ .

$t_3$  is the time period from the instant when the transmitter is turned off until  $t_{off}$ .

$t_{off}$  is the instant when the 1 kHz test signal starts to rise.

<sup>2</sup> During the time from the end of  $t_2$  to the beginning of  $t_3$ , the frequency difference must not exceed the limits specified in §90.213.

<sup>3</sup> Difference between the actual transmitter frequency and the assigned transmitter frequency.

<sup>4</sup> If the transmitter carrier output power rating is 6 watts or less, the frequency difference during this time period may exceed the maximum frequency difference for this time period.

### 5.7.2 Measurement Procedure

1. Set the test receiver to measure FM deviation with the audio bandwidth set at  $\leq 50$  Hz to  $\geq 15,000$  Hz, and tune the RF frequency to the transmitter assigned frequency.
2. Set the signal generator to the assigned transmitter frequency and modulate it with a 1 kHz tone at  $\pm 25$  kHz deviation and set its output level to -100 dBm.
3. Key the transmitter.
4. Supply sufficient attenuation via the RF attenuator to provide an input level to the test receiver that is 40 dB below the test receiver maximum allowed input power when the transmitter is operating at its rated power level.
5. Unkey the transmitter.
6. Adjust the RF level of the signal generator to provide RF power into the RF power meter equal to the level. This signal generator RF level shall be maintained throughout the rest of the measurement.
7. Connect the output of the RF combiner network to the input of the Modulation analyzer.
8. Set the horizontal sweep rate on the storage oscilloscope to 10 milliseconds per division and adjust the display to continuously view the 1000 Hz tone. Adjust the vertical amplitude control of the oscilloscope to display the 1000 Hz at  $\pm 4$  divisions vertically centered on the display.
9. Key the transmitter and observe the stored display. Once the modulation Analyzer demodulator has been captured by the transmitter power, the display will show the frequency difference from the assigned frequency to the actual transmitter frequency versus time. The instant when the 1 kHz test signal is completely suppressed (including any capture time due to phasing) is considered to be  $t_{on}$ . The trace should be maintained within the allowed divisions during the period  $t_1$  and  $t_2$ . See the figure in the appropriate standards section.
10. During the time from the end of  $t_2$  to the beginning of  $t_3$  the frequency difference should not exceed the limits set by the FCC in 47 CFR 90.214 and outlined in 3.2.2. The allowed limit is equal to the transmitter frequency times its FCC frequency tolerance times  $\pm 4$  display divisions divided by 25 kHz.
11. Key the transmitter and observe the stored display. The trace should be maintained within the allowed divisions after the end of  $t_2$  and remain within it until the end of the trace. See the figure in the appropriate standards sections.
12. To test the transient frequency behavior during the period  $t_3$  the transmitter shall be keyed.
13. Adjust the oscilloscope trigger controls so it will trigger on a decreasing magnitude from the Modulation analyzer, at 1 division from the right side of the display, when the transmitter is turned off. Set the controls to store the display. The moment when the 1 kHz test signal starts to rise is considered to provide to  $t_{off}$ .
14. The transmitter shall be unkeyed.
15. Observe the display. The trace should remain within the allowed divisions during period  $t_3$ . See the figures in the appropriate standards section.



### 5.7.3 Test Result

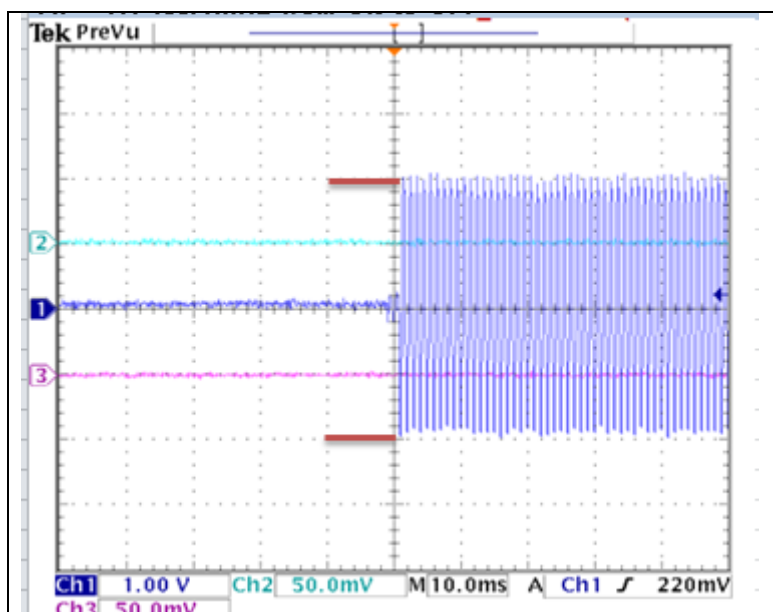
- Complied

Figure 4. plot of Transient Frequency Behaviour of the Transmitter

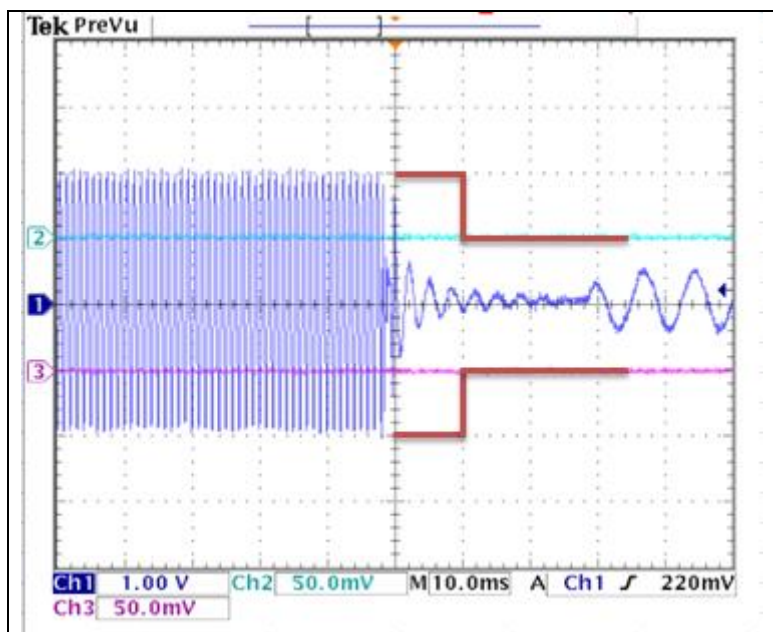
\* 12.5BW

-Target Power\_1W\_406.10 MHz

-On to Off

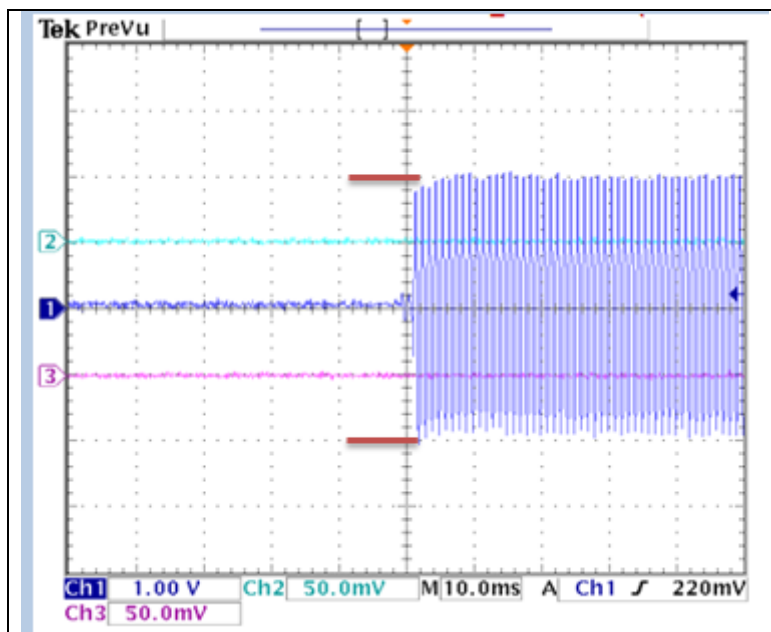


-Off to On

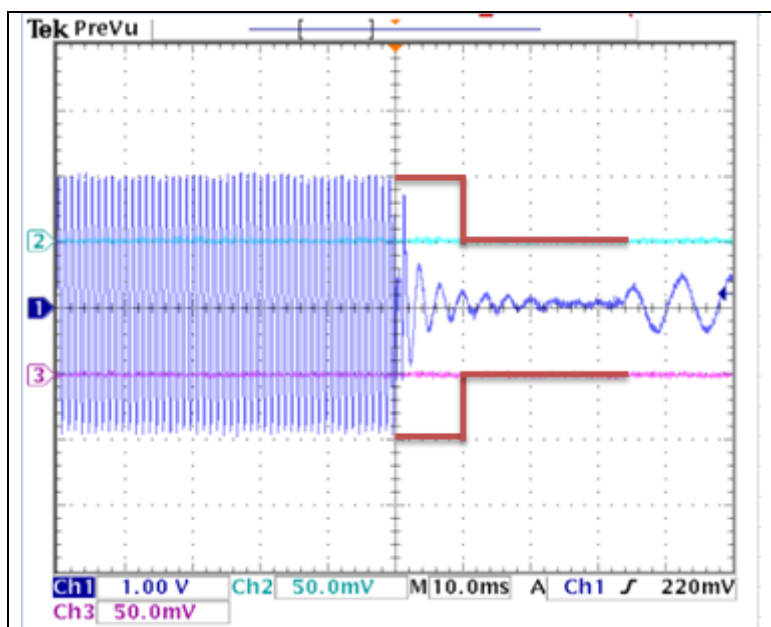


-Target Power\_1W\_459.00 MHz

-On to Off

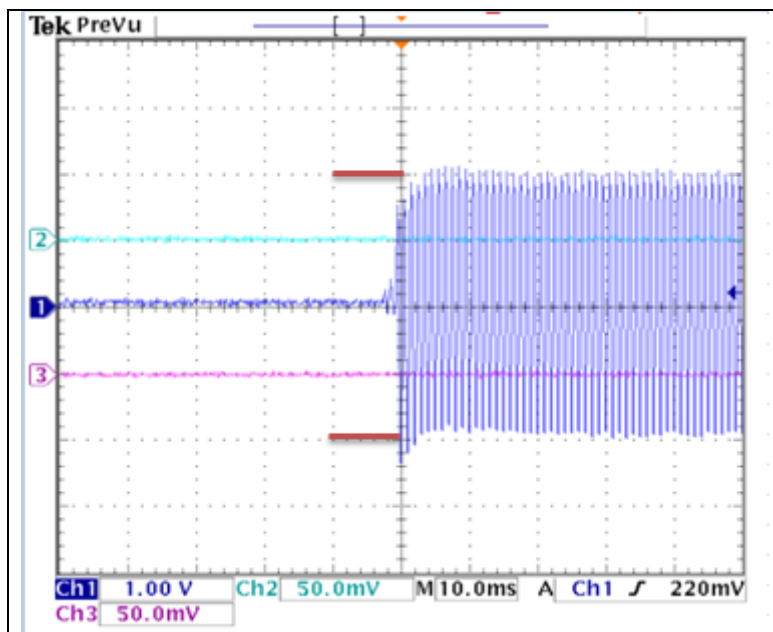


-Off to On

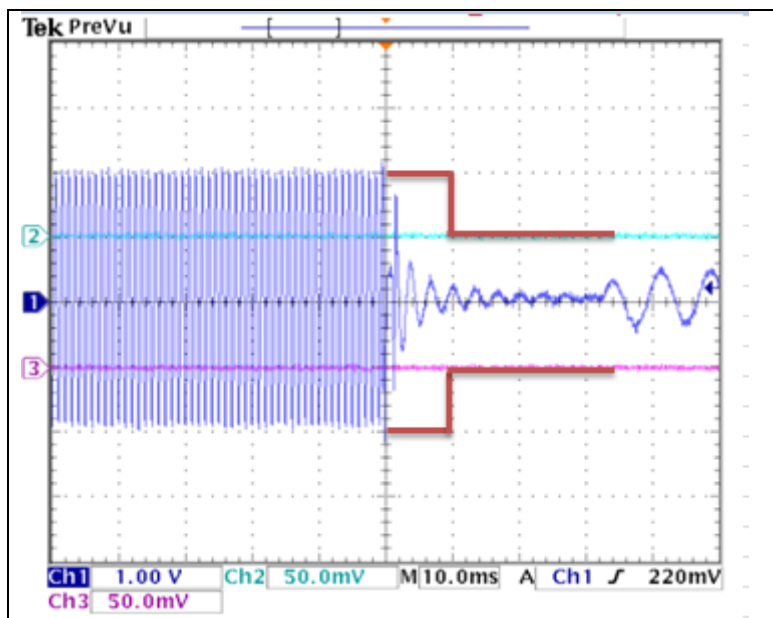


-Target Power\_1W\_512.00 MHz

-On to Off

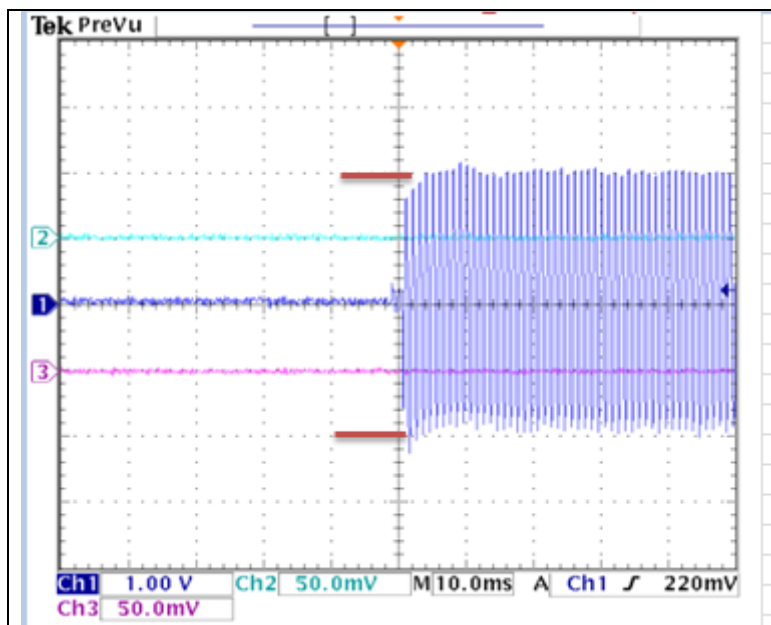


-Off to On

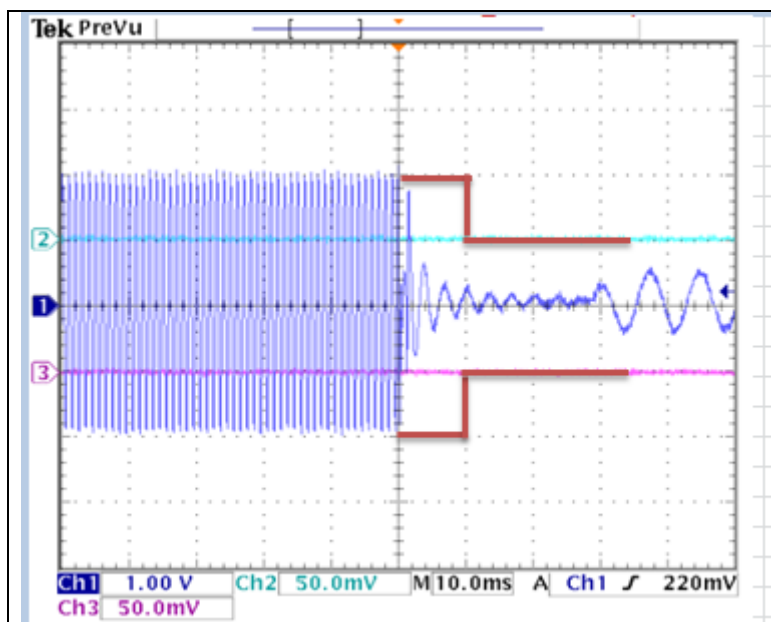


-Target Power\_4W\_406.10 MHz

-On to Off

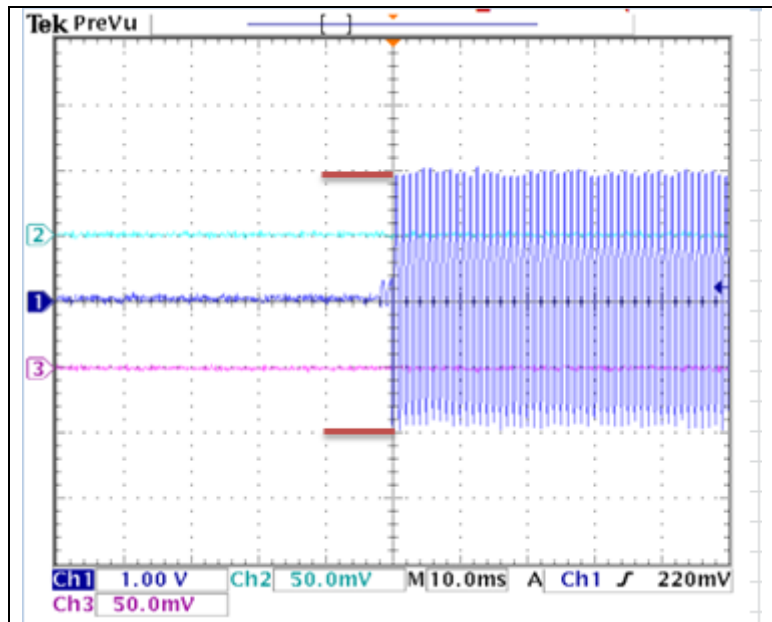


-Off to On

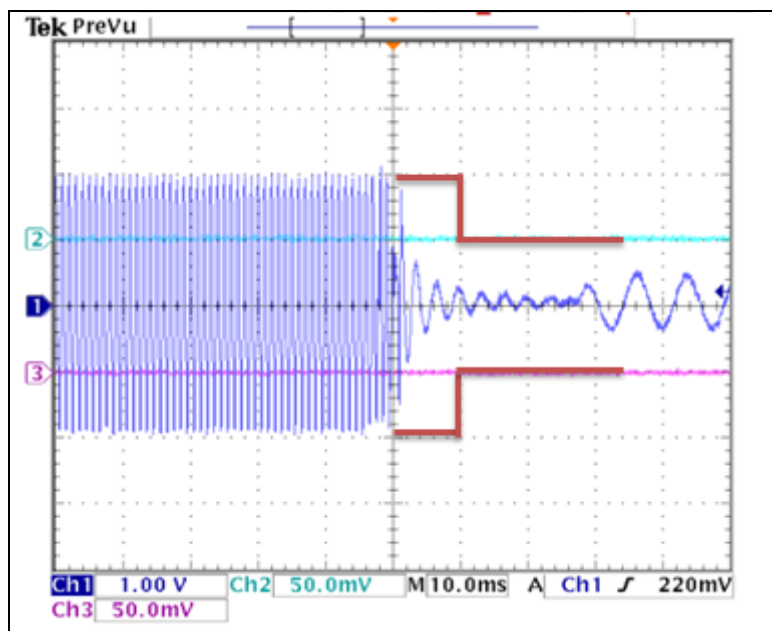


-Target Power\_4W\_459.00 MHz

-On to Off

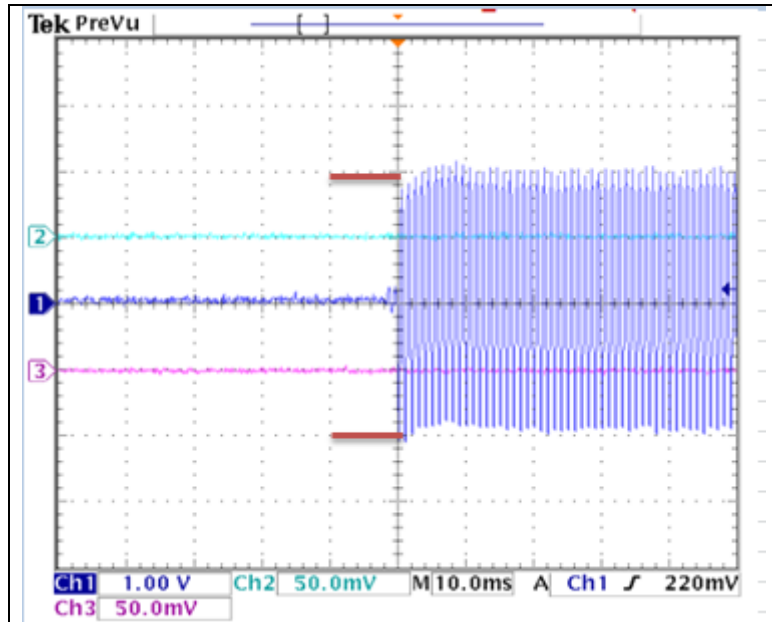


-Off to On

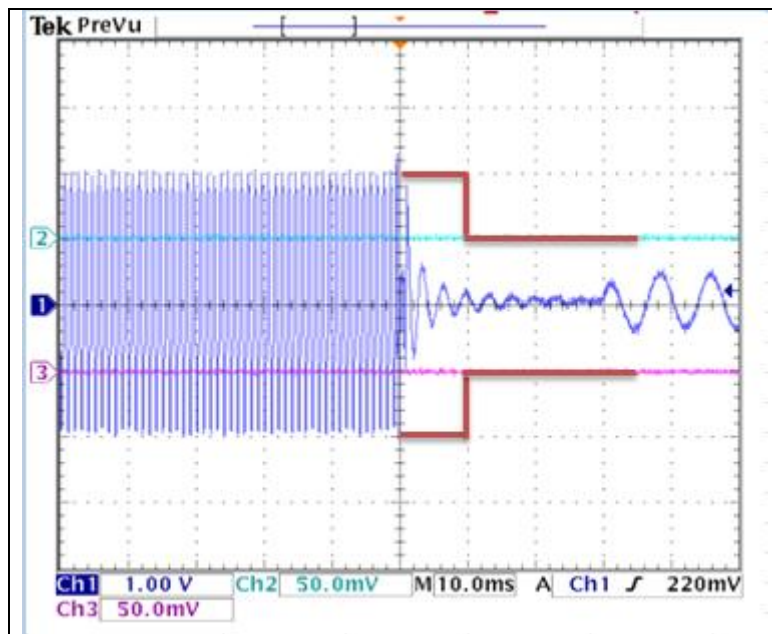


-Target Power\_4W\_512.00 MHz

-On to Off



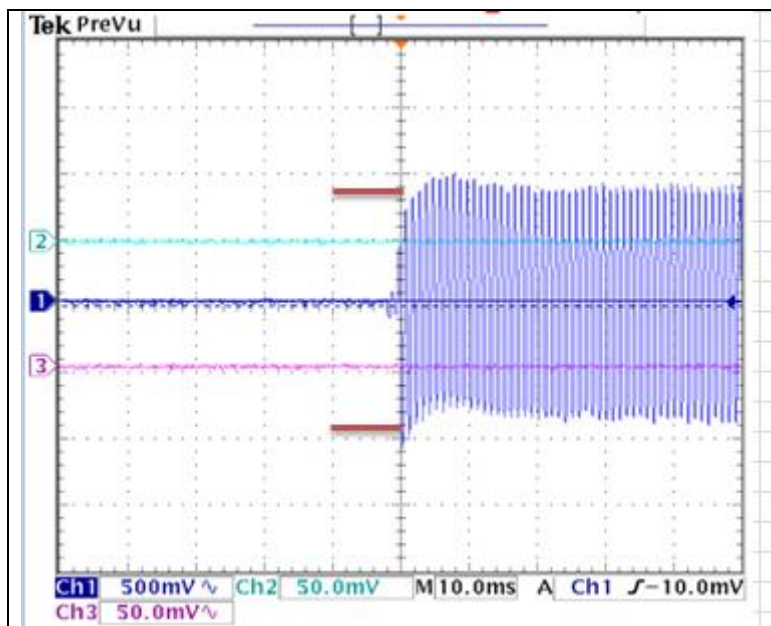
-Off to On



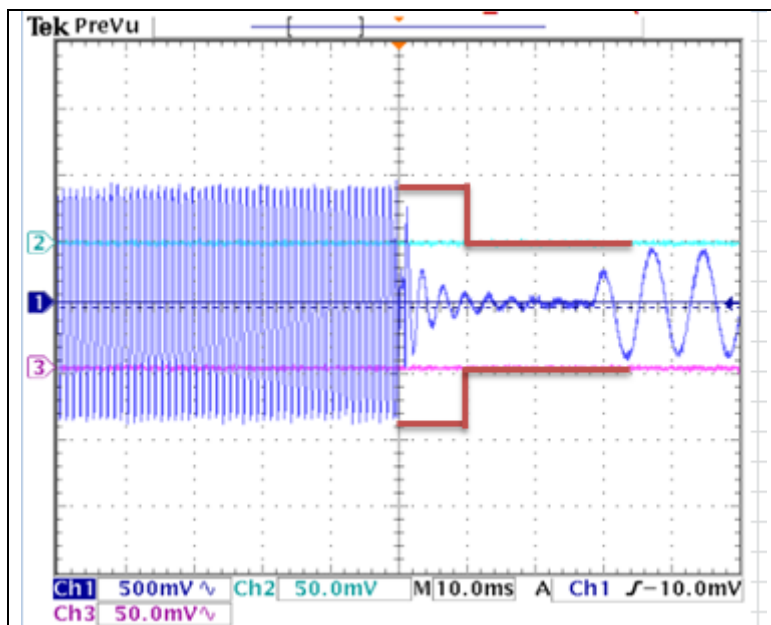
\* 6.25BW

-Target Power\_1W\_406.10 MHz

-On to Off

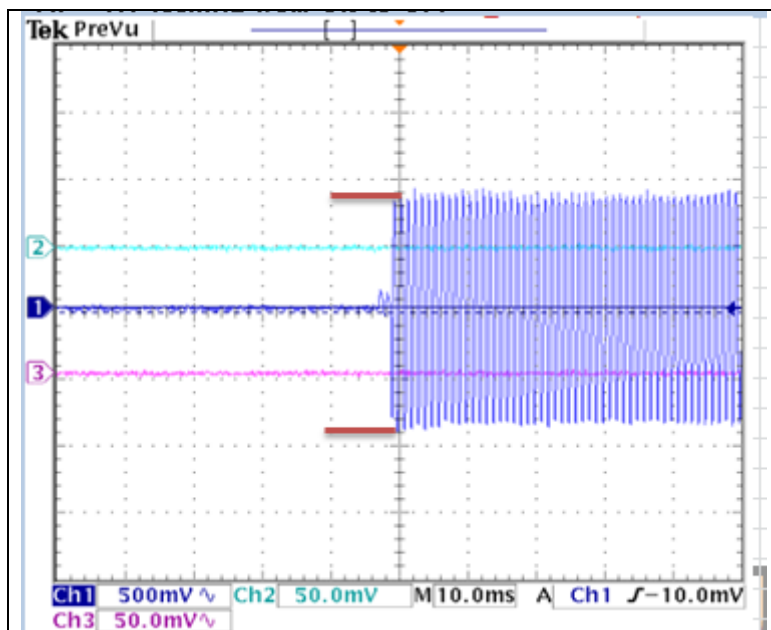


-Off to On

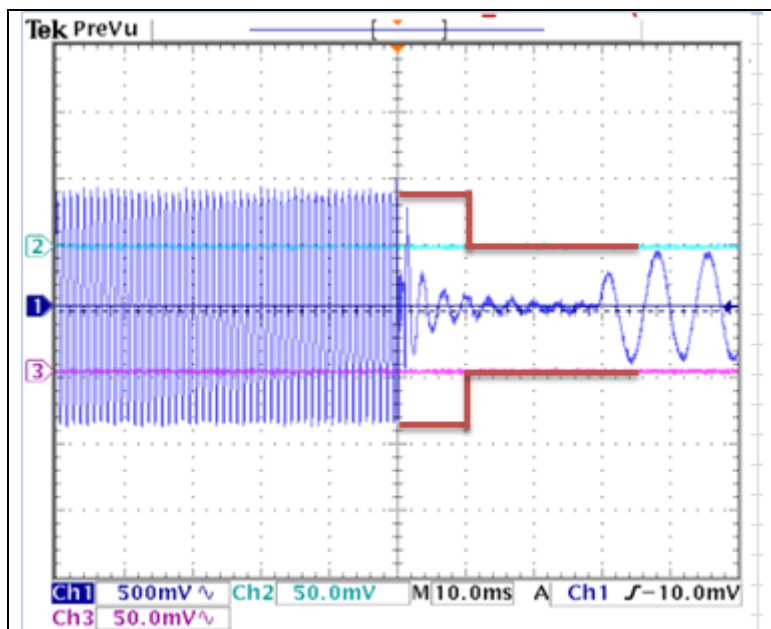


-Target Power\_1W\_459.00 MHz

-On to Off



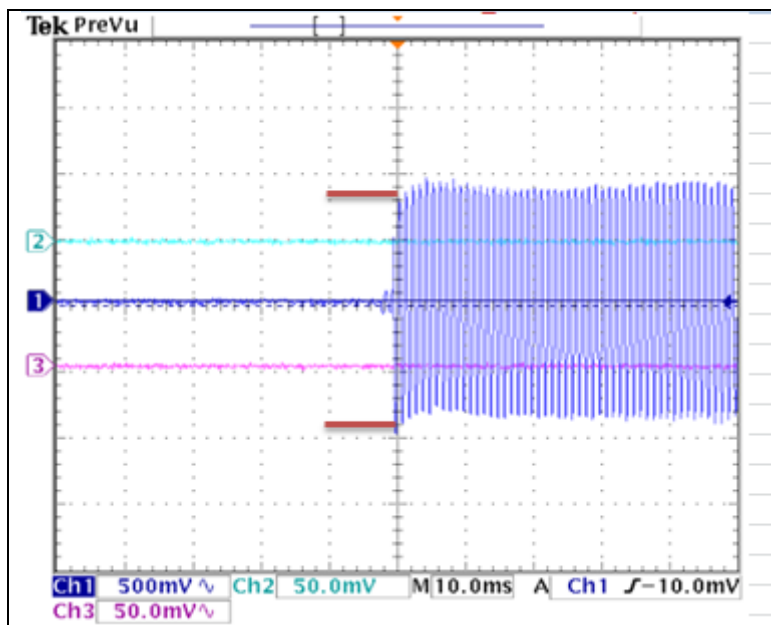
-Off to On



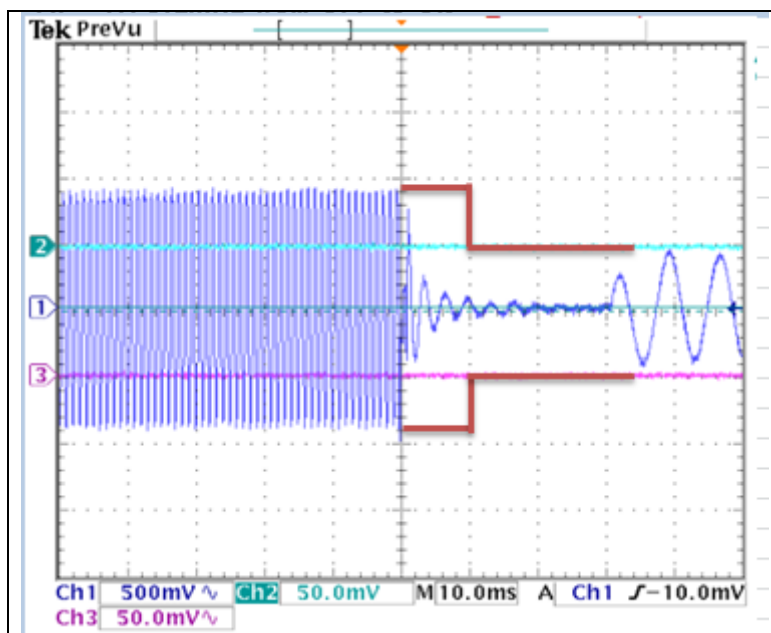


-Target Power\_1W\_512.00 MHz

-On to Off

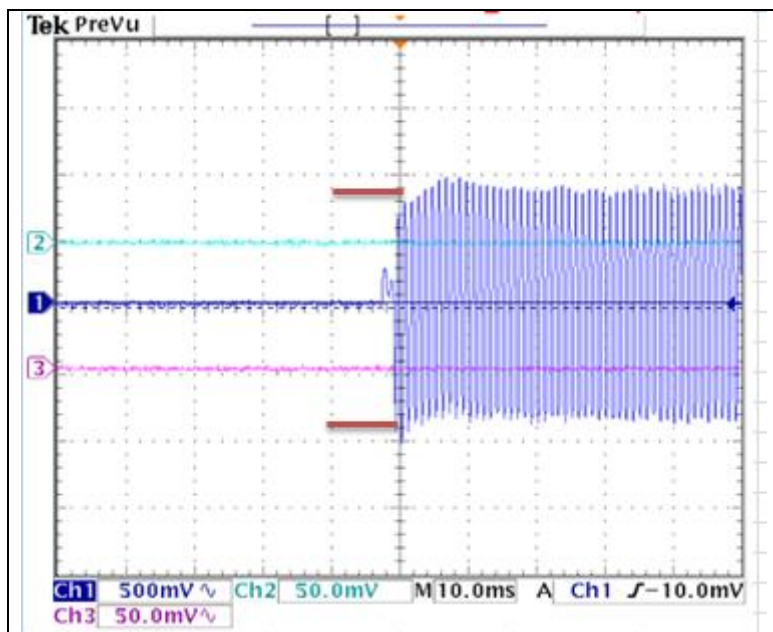


-Off to On

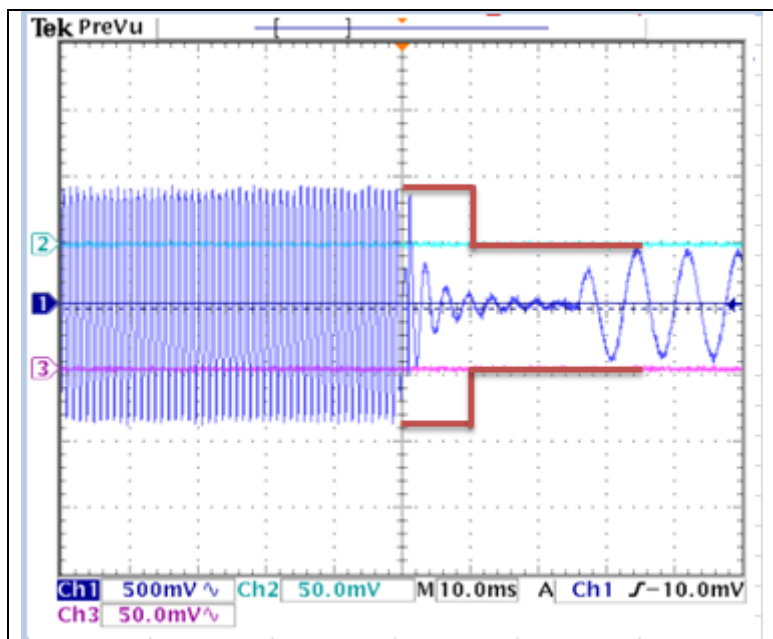


-Target Power\_4W\_406.10 MHz

-On to Off

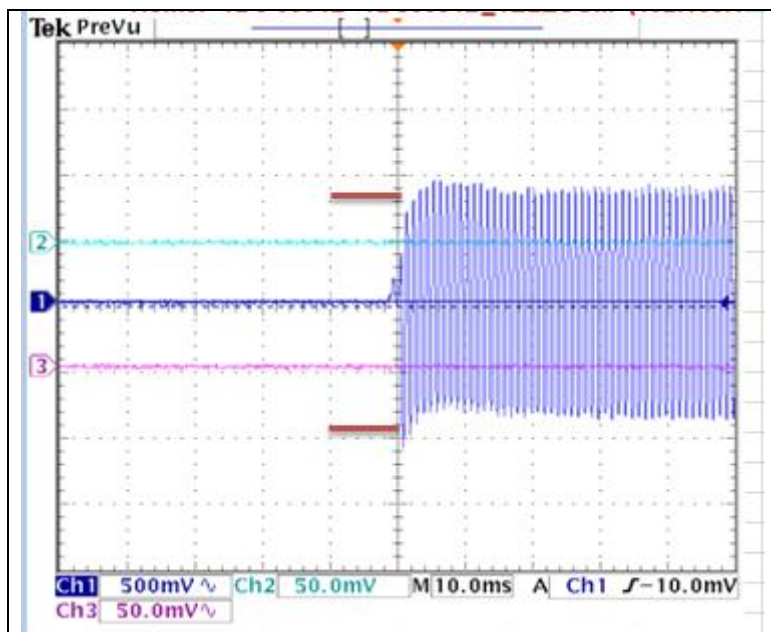


-Off to On

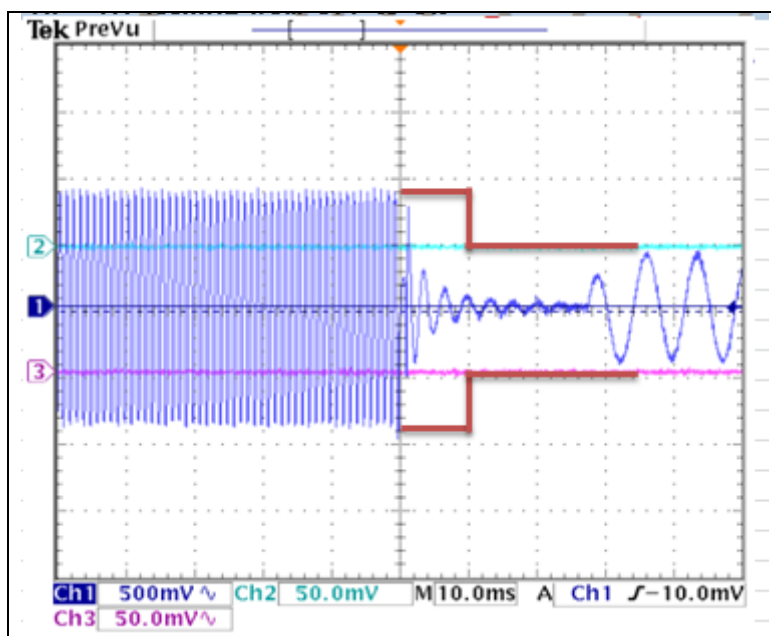


-Target Power\_4W\_459.00 MHz

-On to Off

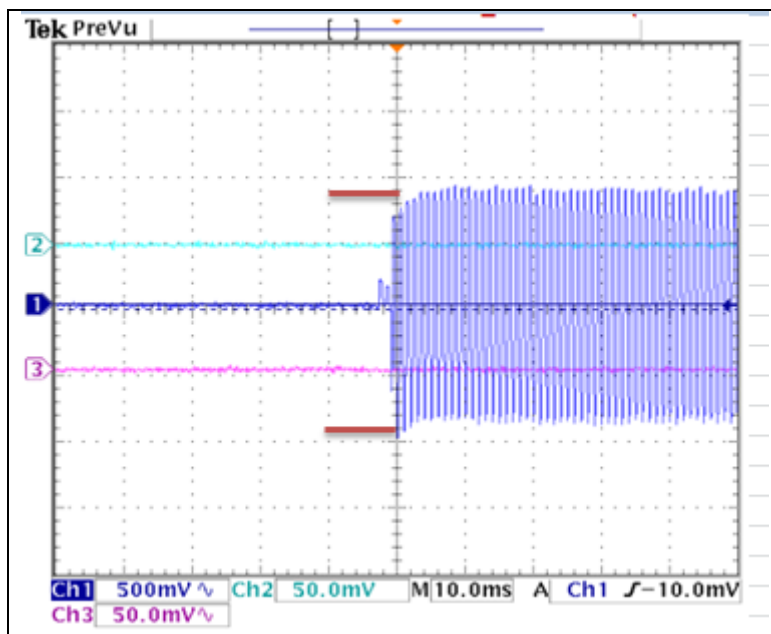


-Off to On

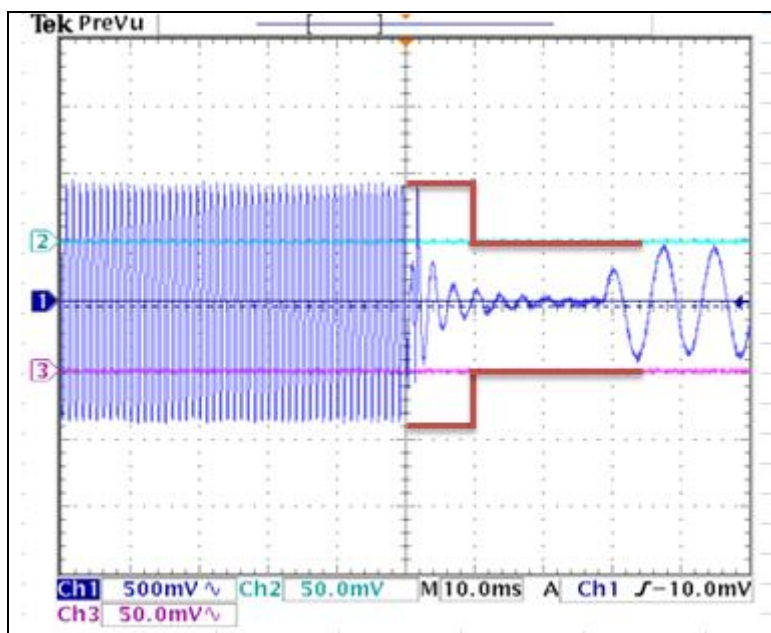


-Target Power\_4W\_512.00 MHz

-On to Off



-Off to On



## 5.8 Conducted Spurious Emission

### 5.8.1 Regulation

According to §90.210, For 12.5 kHz channel : Spurious attenuated in dB= 50+ 10log(Power output in watts) Alternatively, an equivalent absolute level of -20 dBm is taken.

### 5.7.2 Measurement Procedure

1. Conducted spurious emissions are emissions at the antenna terminal on frequencies outside the operating band. The test is performed according the principle below using a computer controlled test set-up.
2. The transmitter is modulated with 2500 Hz sine wave at an input level 16 dB greater than that necessary to produce 50% of rated system deviation.

### 5.8.3 Test Result

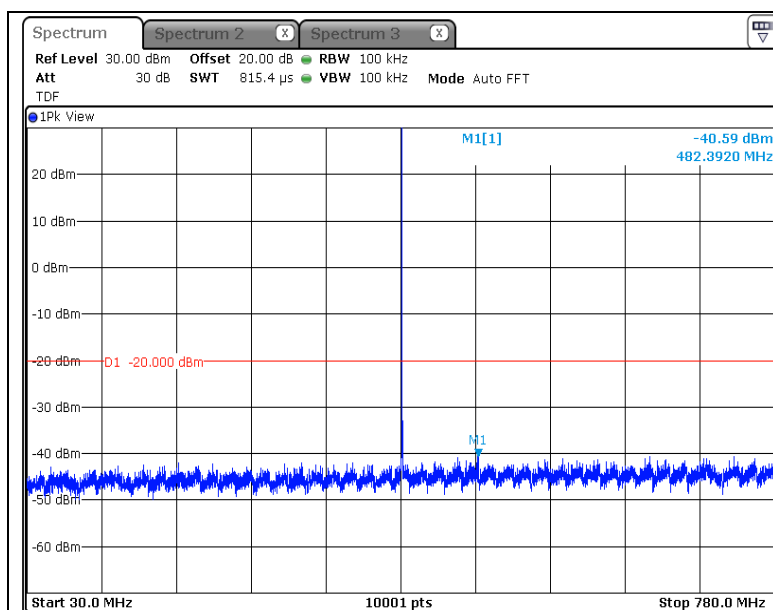
- Complied

Figure 4. plot of Conducted Spurious Emission

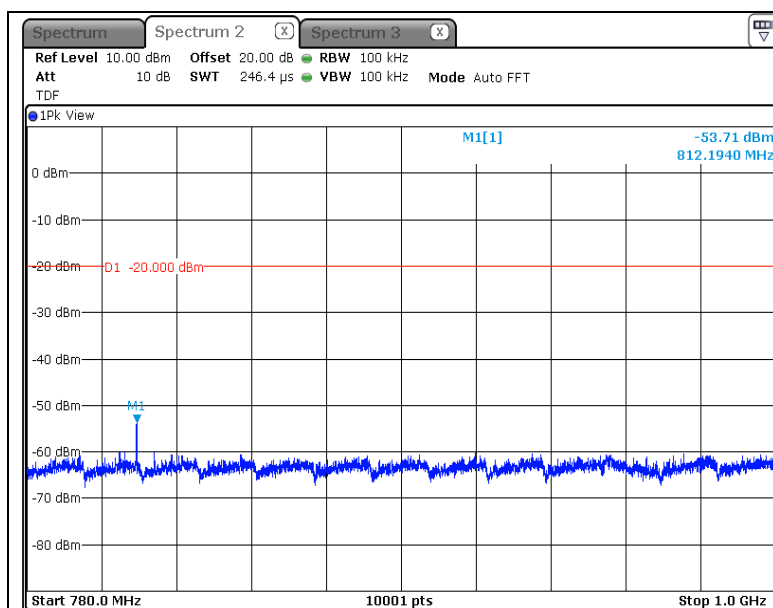
\* 12.5BW

-Target Power\_1W\_406.10 MHz

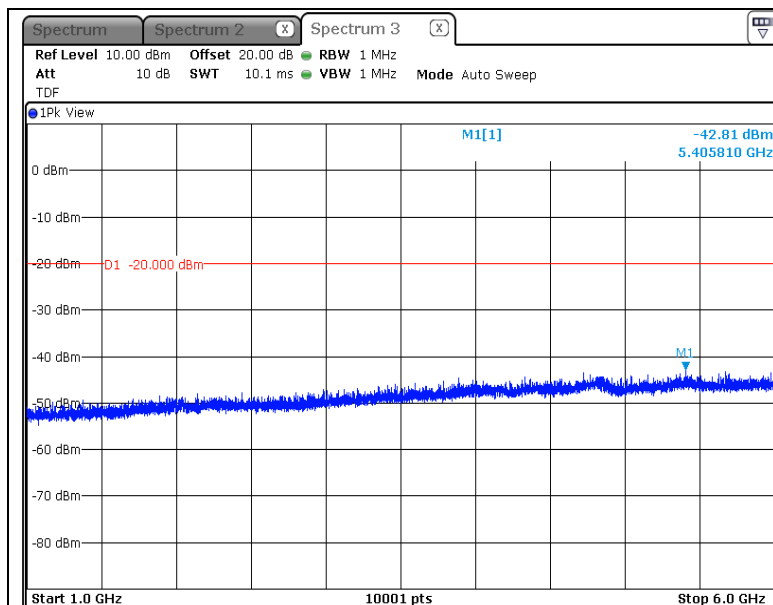
-30 MHz ~ 780 MHz



-780 MHz ~ 1 GHz

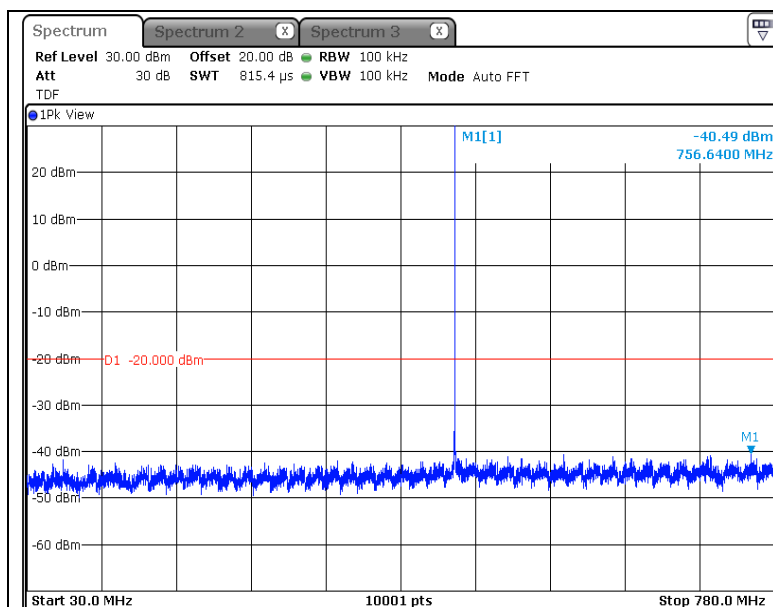


-1 GHz ~ 6 GHz

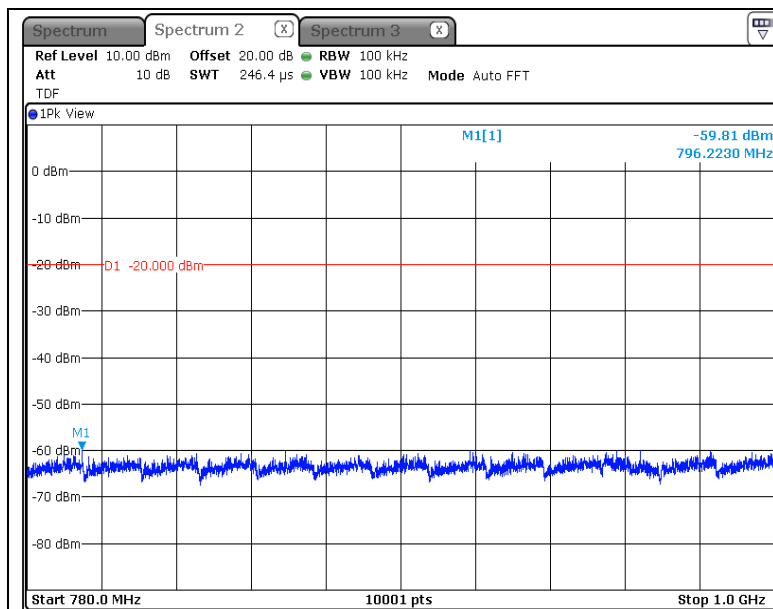


-Target Power\_1W\_459.00 MHz

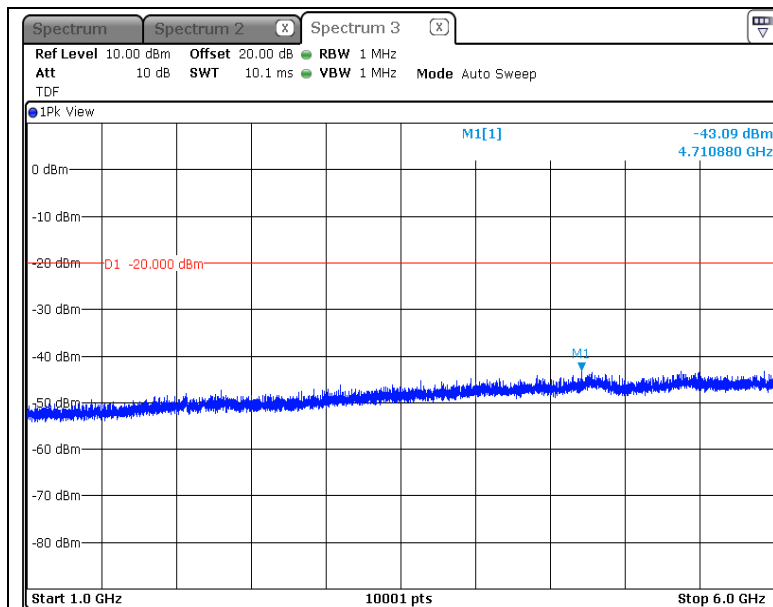
-30 MHz ~ 780 MHz



-780 MHz ~ 1 GHz



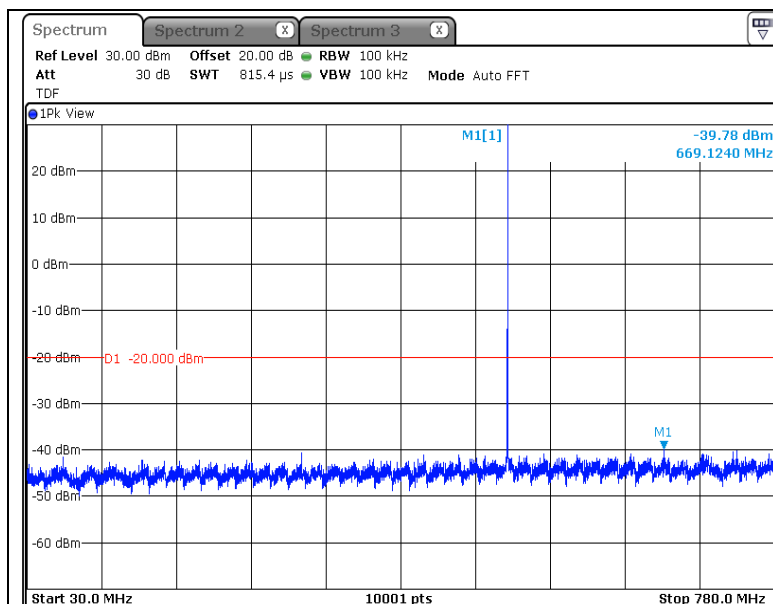
-1 GHz ~ 6 GHz



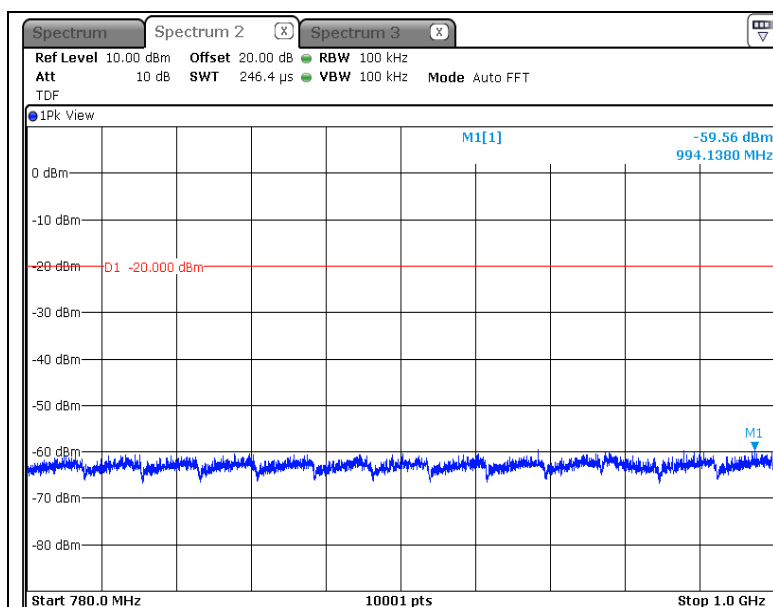


-Target Power\_1W\_512.00 MHz

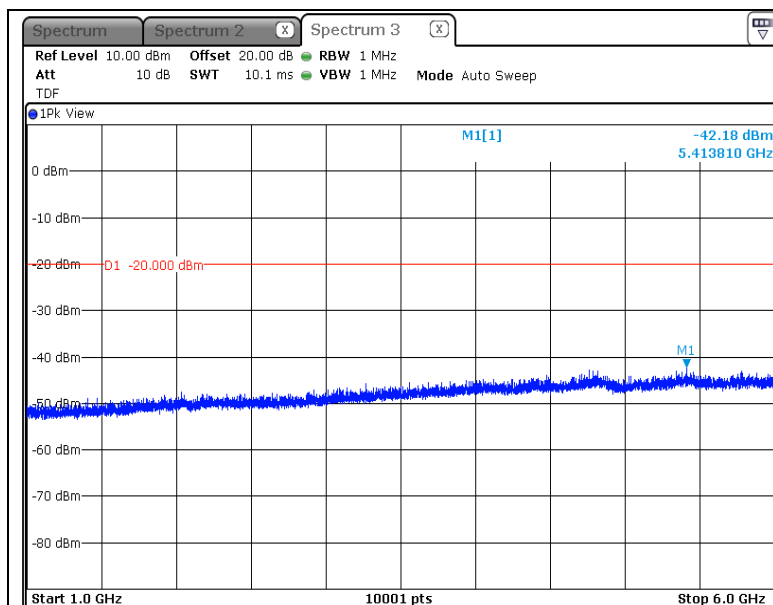
-30 MHz ~ 780 MHz



-780 MHz ~ 1 GHz

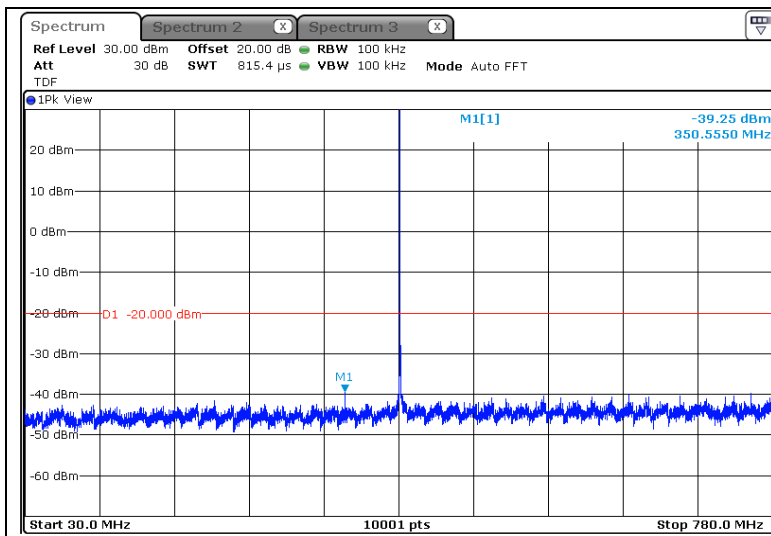


-1 GHz ~ 6 GHz

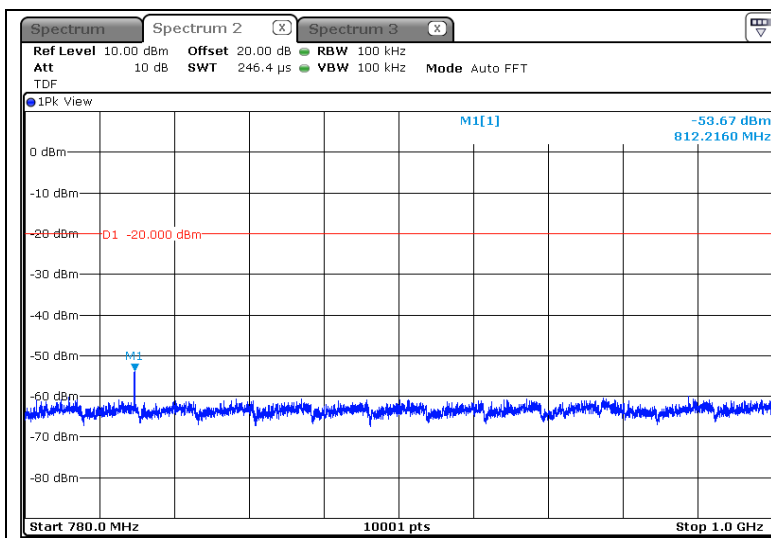


-Target Power\_4W\_406.10 MHz

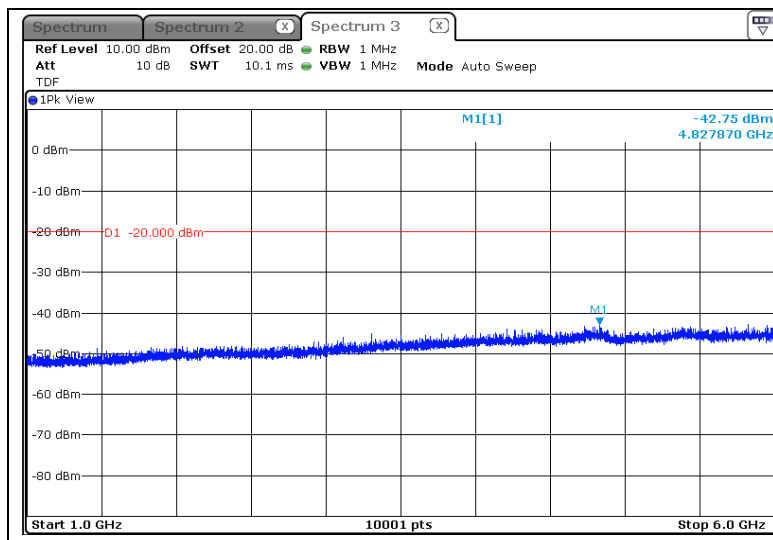
-30 MHz ~ 780 MHz



-780 MHz ~ 1 GHz

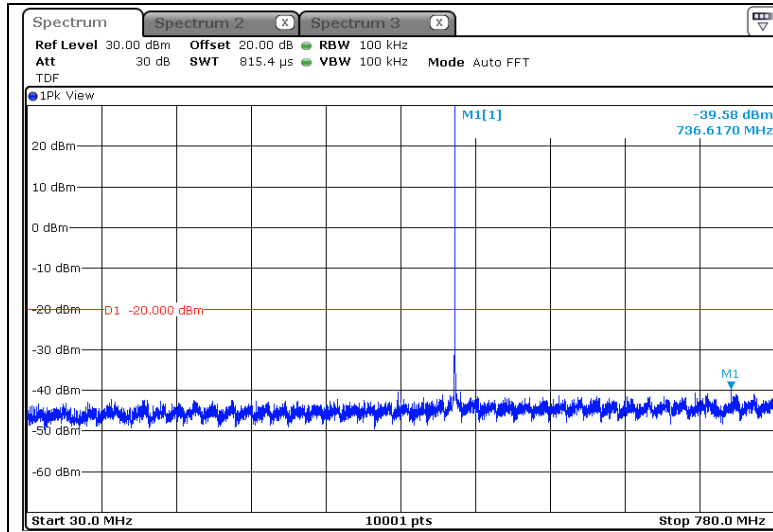


-1 GHz ~ 6 GHz

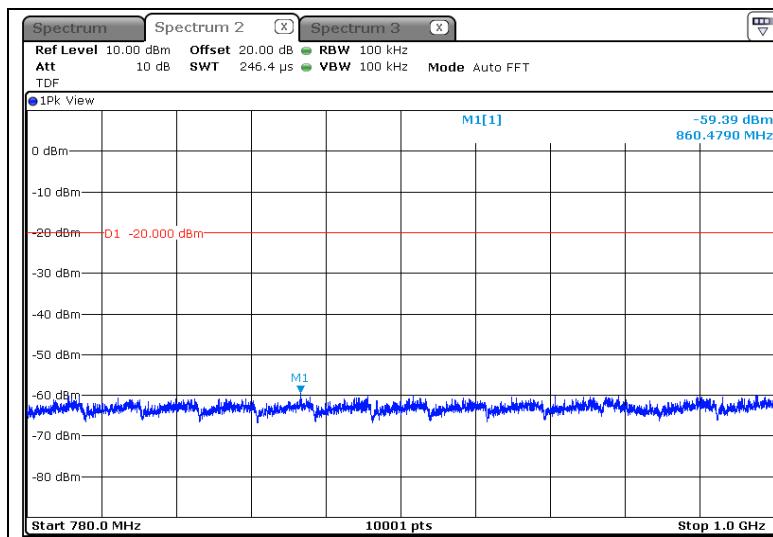


-Target Power\_4W\_459.00 MHz

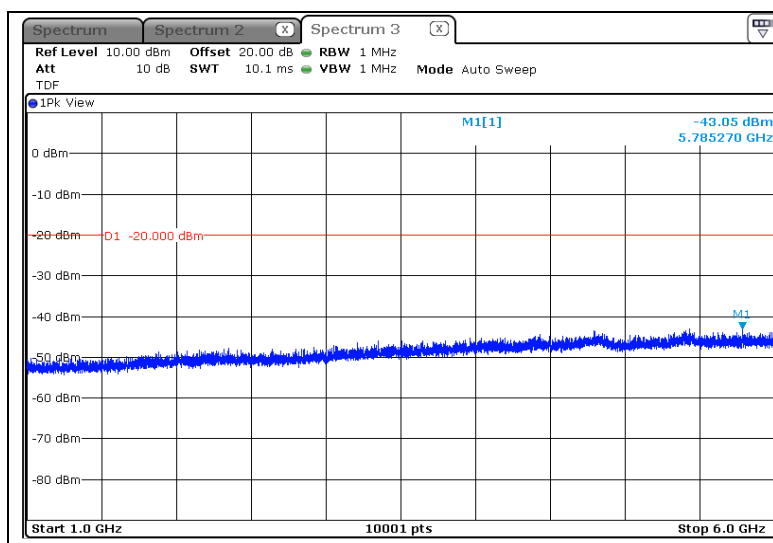
-30 MHz ~ 780 MHz



-780 MHz ~ 1 GHz

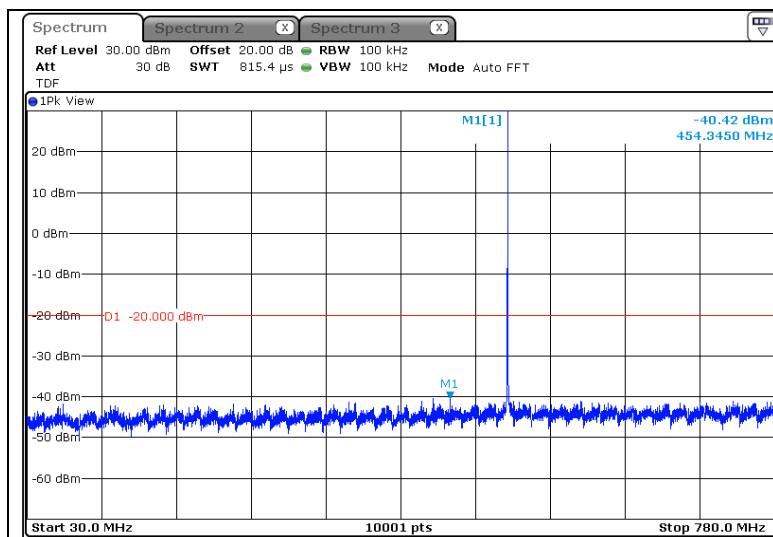


-1 GHz ~ 6 GHz

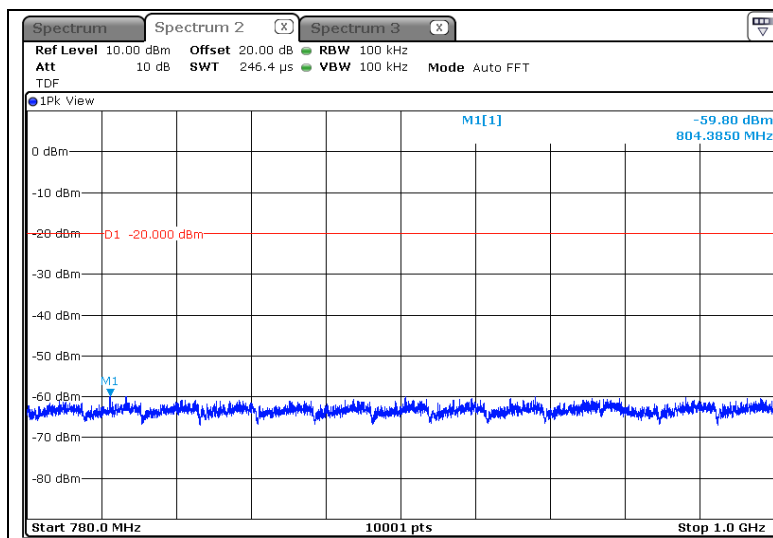


-Target Power\_4W\_512.00 MHz

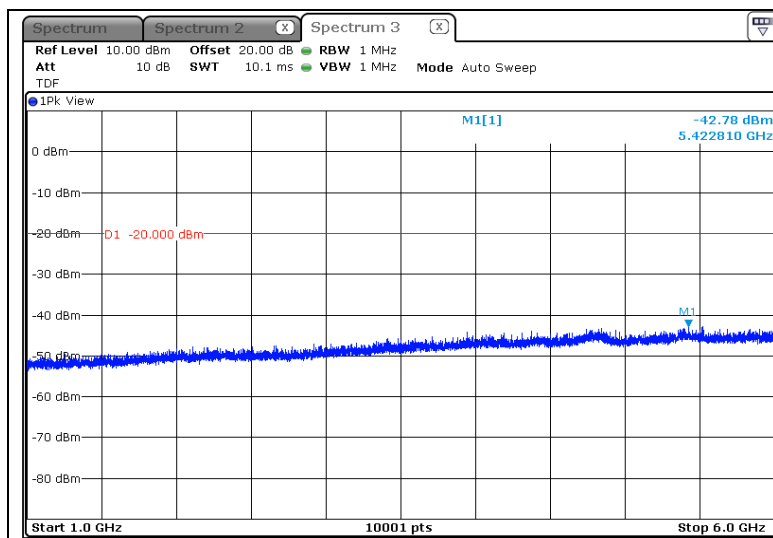
-30 MHz ~ 780 MHz



-780 MHz ~ 1 GHz



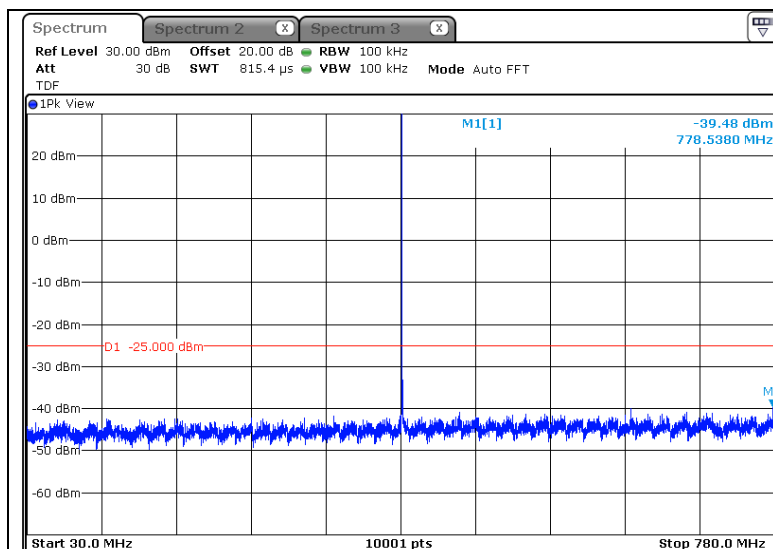
-1 GHz ~ 6 GHz



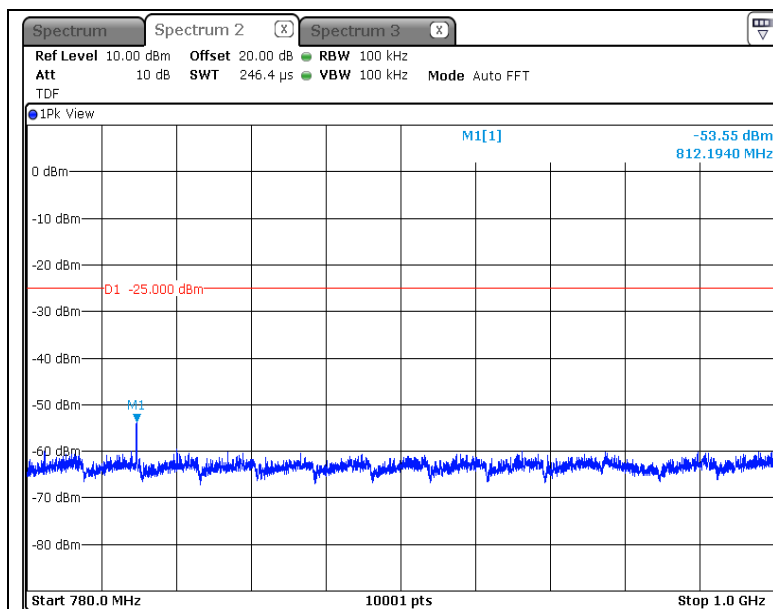
\* 6.25BW

-Target Power\_1W\_406.10 MHz

-30 MHz ~ 780 MHz

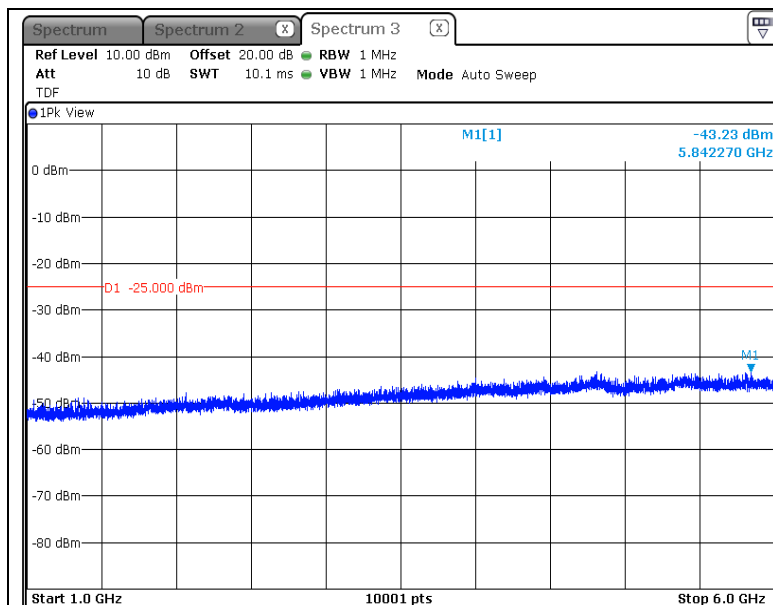


-780 MHz ~ 1 GHz



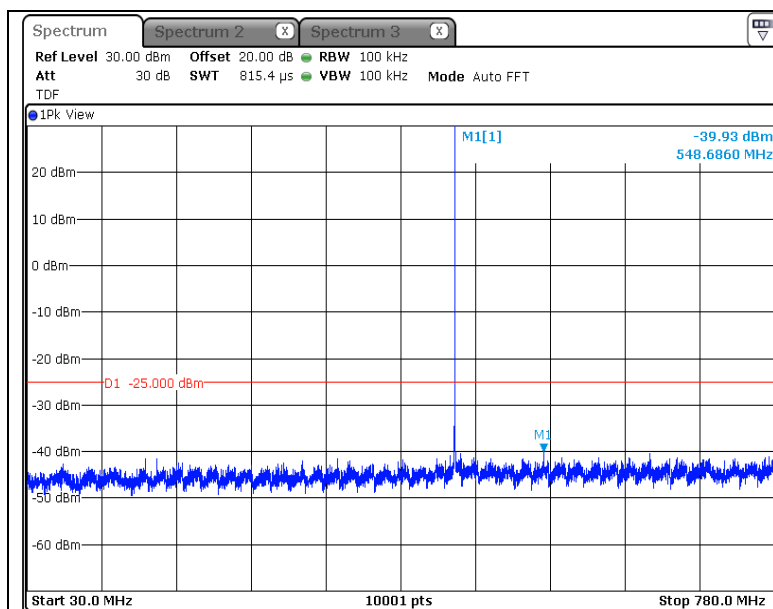


-1 GHz ~ 6 GHz

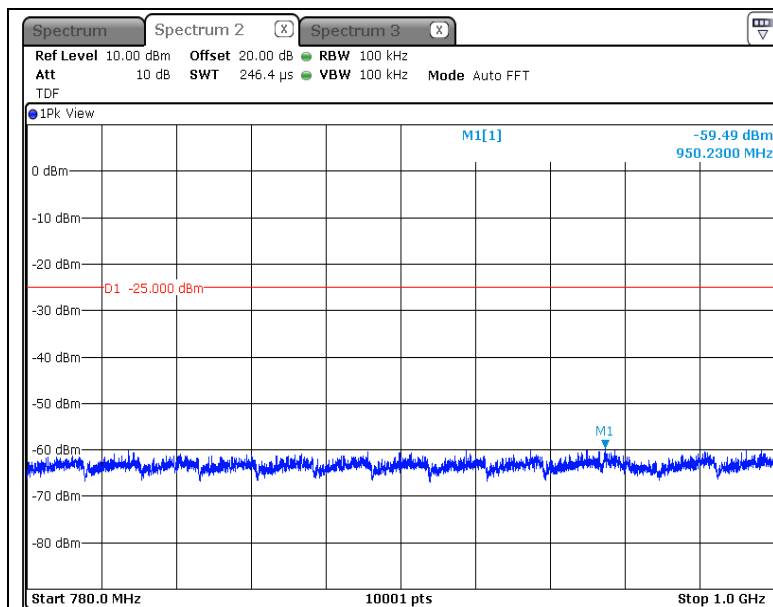


-Target Power\_1W\_459.00 MHz

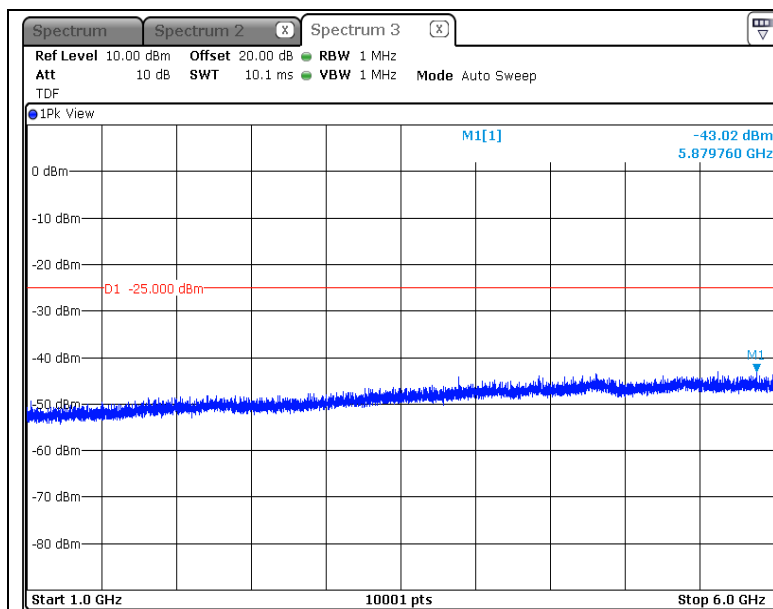
-30 MHz ~ 780 MHz



-780 MHz ~ 1 GHz

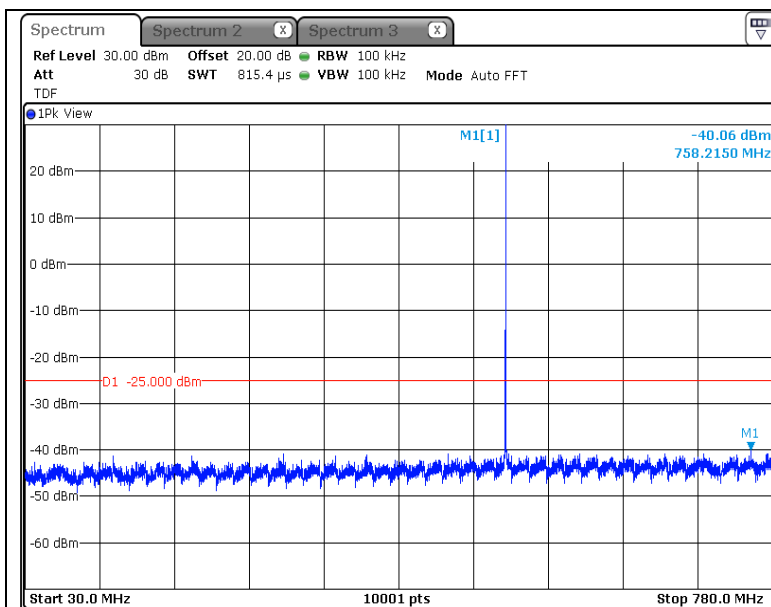


-1 GHz ~ 6 GHz

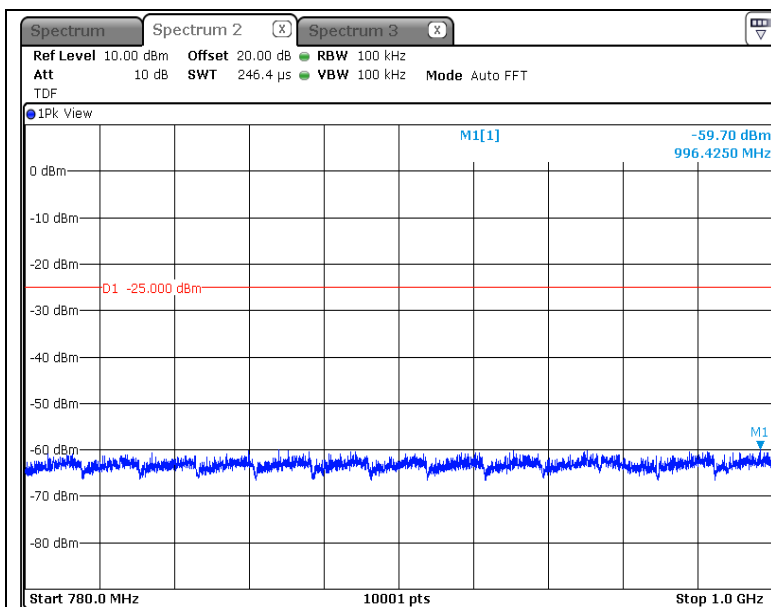


-Target Power\_1W\_512.00 MHz

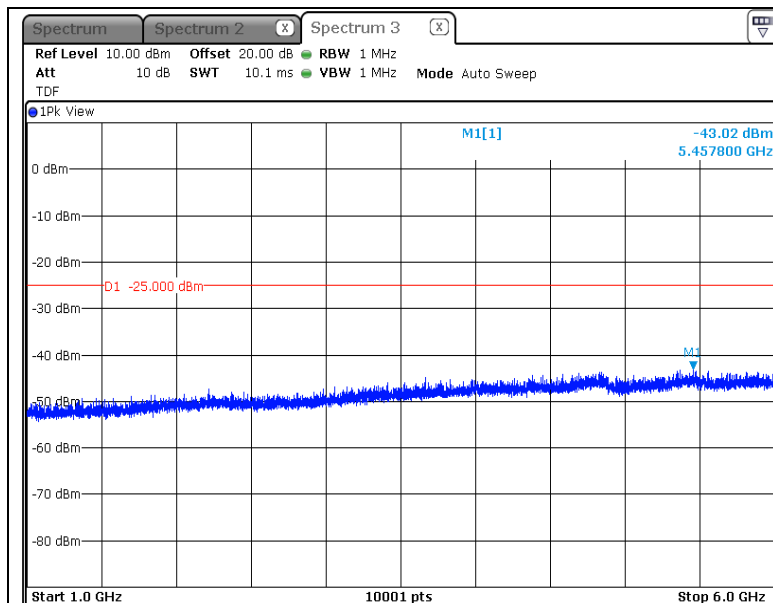
-30 MHz ~ 780 MHz



-780 MHz ~ 1 GHz

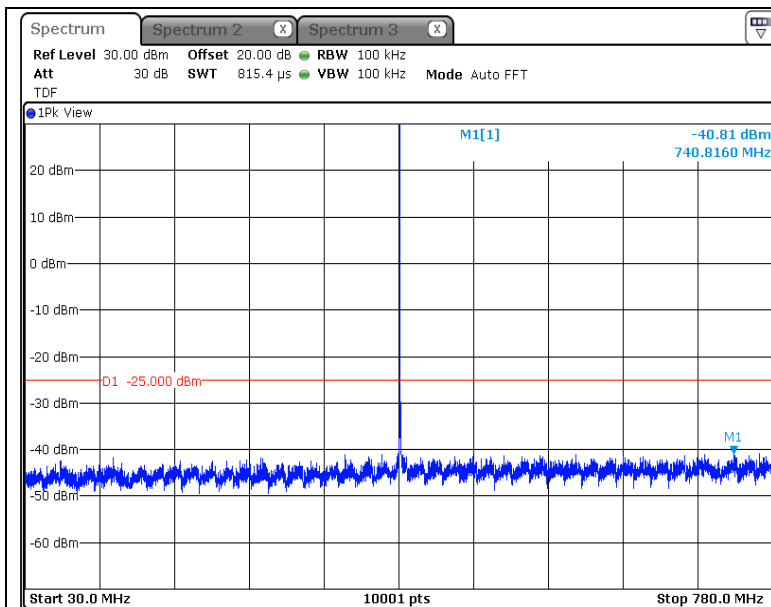


-1 GHz ~ 6 GHz

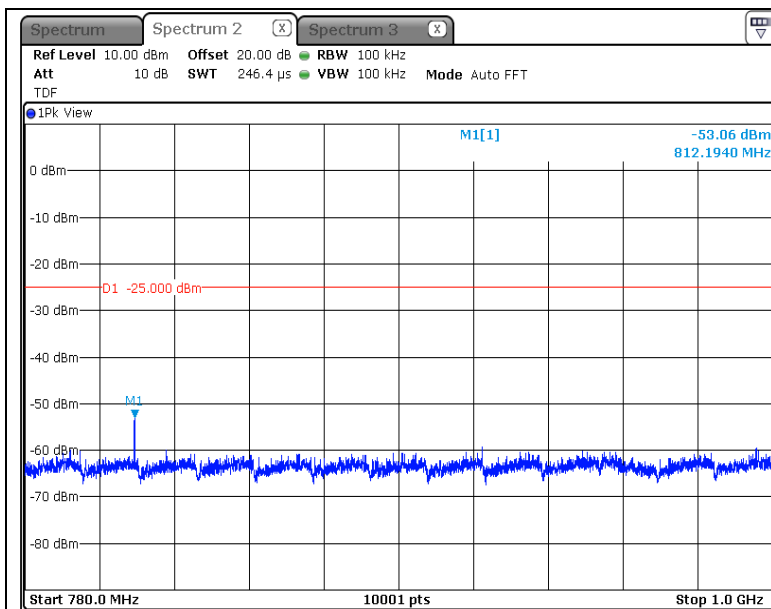


-Target Power\_4W\_406.10 MHz

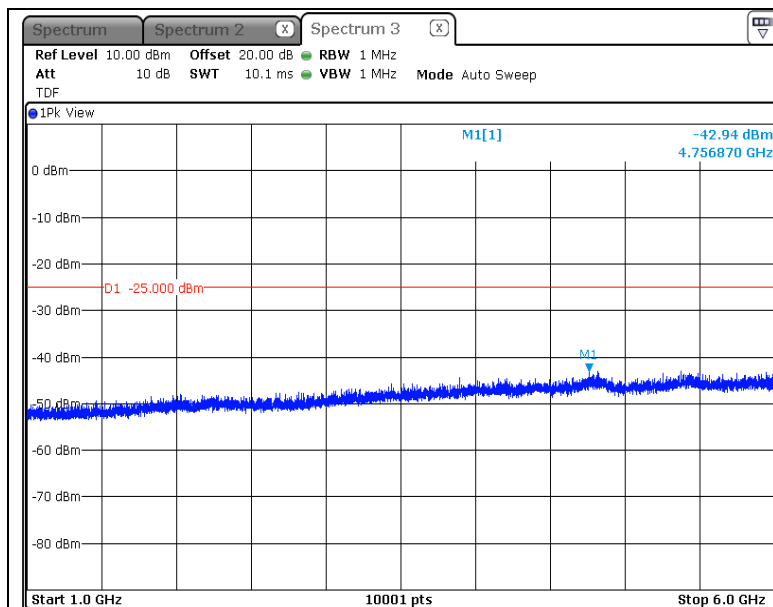
-30 MHz ~ 780 MHz



-780 MHz ~ 1 GHz

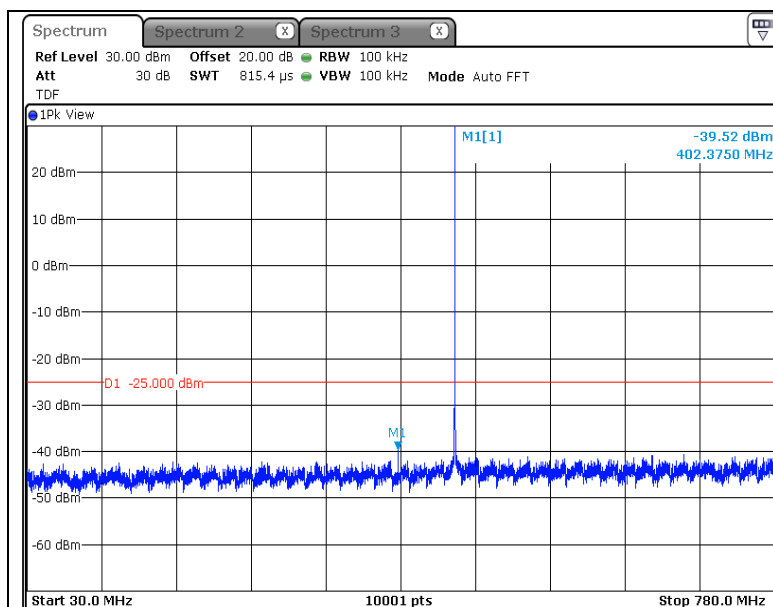


-1 GHz ~ 6 GHz

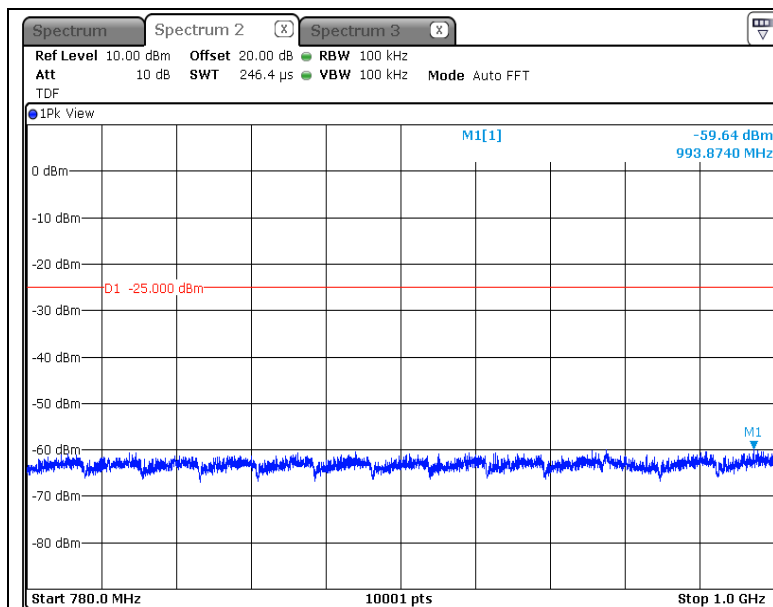


-Target Power\_4W\_459.00 MHz

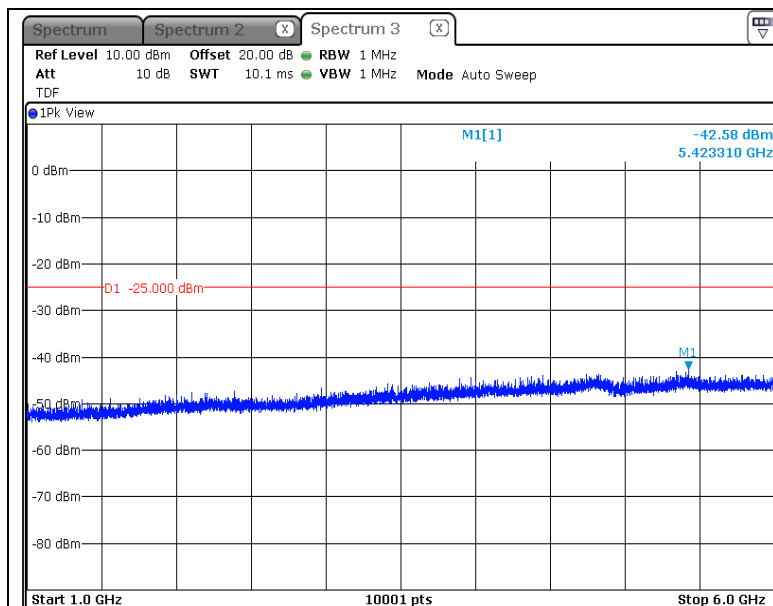
-30 MHz ~ 780 MHz



-780 MHz ~ 1 GHz

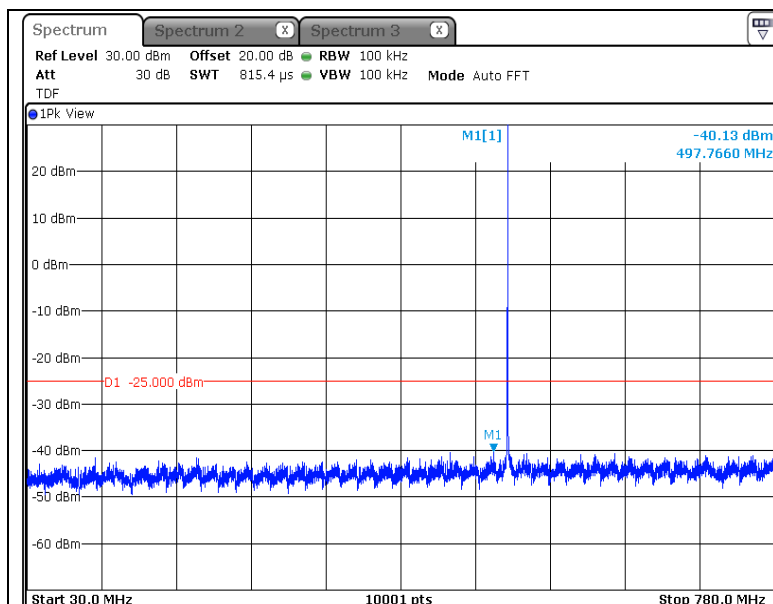


-1 GHz ~ 6 GHz

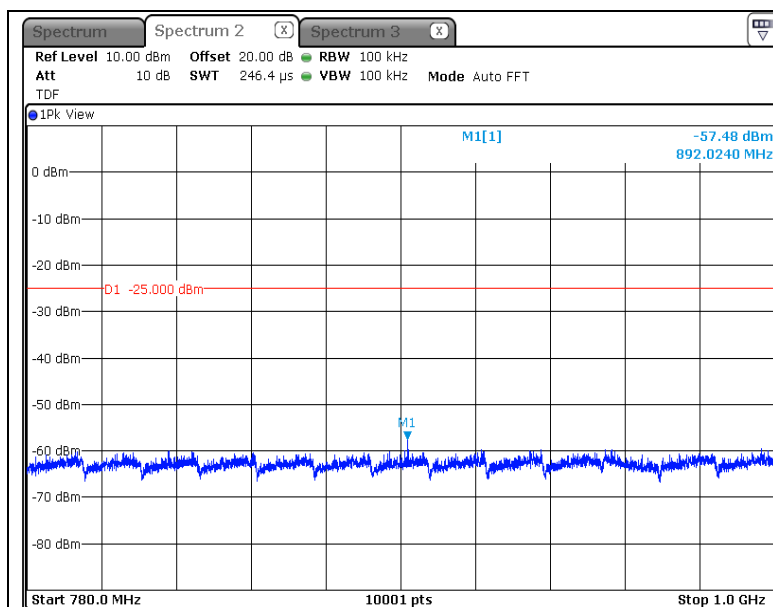


-Target Power\_4W\_512.00 MHz

-30 MHz ~ 780 MHz

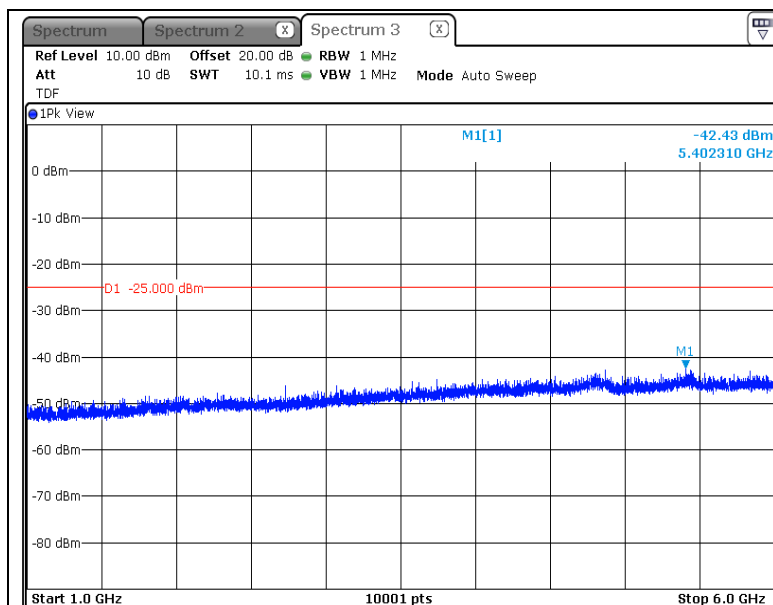


-780 MHz ~ 1 GHz





-1 GHz ~ 6 GHz



## 5.9 Radiated Spurious Emission

### 5.9.1 Regulation

According to §90.210, For 12.5 kHz channel : Spurious attenuated in dB= 50+ 10log(Power output in watts) Alternatively, an equivalent absolute level of -20 dBm is taken.

### 5.9.2 Measurement Procedure

1. Radiated spurious emissions are emissions from the EUT when transmitting in non-radiating load on frequencies outside the operating band.
2. In order to suppress inter-modulation products in the spectrum analyzer a notch filter is used, if applicable.
3. The preliminary and final radiated measurements were performed to determine the frequency producing the maximum emissions in at a 3 m anechoic chamber. The EUT was tested at a distance 3 meters.
4. The EUT was placed on the top of the 1.5-meter height. To find the maximum emission levels, the EUT was tested x,y and z – 3 axis each and the turntable was rotated 360 °.
5. The testing procedure is repeated for both horizontal and vertical polarization of the receiving antenna.
6. It mentioned only worst case data at this report.

### 5.9.3 Test Result

- Complied

\* 12.5BW

-Target Power\_1W\_406.10 MHz

| Frequency [MHz] | Pol [H/V] | Reading [dB(mW)] | Space Loss [dB] | Level [dB(mW)] | Limit [dB(mW)] | Margin [dB] |
|-----------------|-----------|------------------|-----------------|----------------|----------------|-------------|
| 812.20          | H         | -47.80           | 8.20            | -39.60         | -20.00         | 19.60       |
| 1 218.53        | V         | -50.30           | 6.70            | -43.60         | -20.00         | 23.60       |
| 1 624.47        | V         | -44.70           | 7.10            | -37.60         | -20.00         | 17.60       |
| 2 030.40        | V         | -41.80           | 12.40           | -29.40         | -20.00         | 9.40        |
| 2 436.33        | V         | -49.10           | 12.90           | -36.20         | -20.00         | 16.20       |
| 2 842.88        | V         | -64.30           | 13.70           | -50.60         | -20.00         | 30.60       |
| 3 248.81        | V         | -67.20           | 16.20           | -51.00         | -20.00         | 31.00       |

-Target Power\_1W\_459.00 MHz

| Frequency [MHz] | Pol [H/V] | Reading [dB(mW)] | Space Loss [dB] | Level [dB(mW)] | Limit [dB(mW)] | Margin [dB] |
|-----------------|-----------|------------------|-----------------|----------------|----------------|-------------|
| 918.00          | H         | -56.30           | 10.40           | -45.90         | -20.00         | 25.90       |
| 1 377.24        | V         | -37.50           | 9.00            | -28.50         | -20.00         | 8.50        |
| 1 836.28        | V         | -45.20           | 7.90            | -37.30         | -20.00         | 17.30       |
| 2 294.71        | V         | -41.70           | 12.40           | -29.30         | -20.00         | 9.30        |
| 3 212.80        | V         | -65.60           | 16.20           | -49.40         | -20.00         | 29.40       |

-Target Power\_1W\_512.00 MHz

| Frequency [MHz] | Pol [H/V] | Reading [dB(mW)] | Space Loss [dB] | Level [dB(mW)] | Limit [dB(mW)] | Margin [dB] |
|-----------------|-----------|------------------|-----------------|----------------|----------------|-------------|
| 927.94          | H         | -70.80           | 10.70           | -60.10         | -20.00         | 40.10       |
| 1 023.81        | H         | -52.20           | 4.80            | -47.40         | -20.00         | 27.40       |
| 1 535.95        | V         | -40.10           | 7.70            | -32.40         | -20.00         | 12.40       |
| 2 048.10        | V         | -41.00           | 13.10           | -27.90         | -20.00         | 7.90        |
| 2 559.64        | V         | -56.20           | 12.60           | -43.60         | -20.00         | 23.60       |
| 3 072.40        | V         | -61.00           | 14.20           | -46.80         | -20.00         | 26.80       |
| 3 583.93        | V         | -66.60           | 16.50           | -50.10         | -20.00         | 30.10       |

-Target Power\_4W\_406.10 MHz

| Frequency [MHz] | Pol [H/V] | Reading [dB(mW)] | Space Loss [dB] | Level [dB(mW)] | Limit [dB(mW)] | Margin [dB] |
|-----------------|-----------|------------------|-----------------|----------------|----------------|-------------|
| 812.20          | H         | -46.40           | 8.20            | -38.20         | -20.00         | 18.20       |
| 1 218.53        | V         | -50.40           | 6.70            | -43.70         | -20.00         | 23.70       |
| 1 624.47        | V         | -41.40           | 7.10            | -34.30         | -20.00         | 14.30       |
| 2 030.40        | V         | -41.40           | 12.40           | -29.00         | -20.00         | 9.00        |
| 2 436.33        | V         | -45.40           | 12.90           | -32.50         | -20.00         | 12.50       |
| 2 842.88        | V         | -62.60           | 13.70           | -48.90         | -20.00         | 28.90       |
| 3 248.81        | V         | -65.40           | 16.20           | -49.20         | -20.00         | 29.20       |
| 3 654.74        | H         | -68.20           | 16.60           | -51.60         | -20.00         | 31.60       |

-Target Power\_4W\_459.00 MHz

| Frequency [MHz] | Pol [H/V] | Reading [dB(mW)] | Space Loss [dB] | Level [dB(mW)] | Limit [dB(mW)] | Margin [dB] |
|-----------------|-----------|------------------|-----------------|----------------|----------------|-------------|
| 918.00          | V         | -49.10           | 9.70            | -39.40         | -20.00         | 19.40       |
| 1 377.24        | V         | -35.20           | 9.00            | -26.20         | -20.00         | 6.20        |
| 1 835.67        | V         | -46.60           | 7.90            | -38.70         | -20.00         | 18.70       |
| 2 294.71        | V         | -46.20           | 12.40           | -33.80         | -20.00         | 13.80       |
| 2 753.75        | H         | -68.40           | 13.60           | -54.80         | -20.00         | 34.80       |
| 3 212.80        | V         | -65.70           | 16.20           | -49.50         | -20.00         | 29.50       |
| 3 671.84        | H         | -65.70           | 16.70           | -49.00         | -20.00         | 29.00       |

-Target Power\_4W\_512.00 MHz

| Frequency [MHz] | Pol [H/V] | Reading [dB(mW)] | Space Loss [dB] | Level [dB(mW)] | Limit [dB(mW)] | Margin [dB] |
|-----------------|-----------|------------------|-----------------|----------------|----------------|-------------|
| 952.68          | H         | -72.00           | 11.70           | -60.30         | -20.00         | 40.30       |
| 1 023.81        | V         | -54.30           | 4.90            | -49.40         | -20.00         | 29.40       |
| 1 535.95        | V         | -40.10           | 7.70            | -32.40         | -20.00         | 12.40       |
| 2 048.10        | V         | -36.10           | 13.10           | -23.00         | -20.00         | 3.00        |
| 2 560.25        | V         | -45.00           | 12.60           | -32.40         | -20.00         | 12.40       |
| 3 072.40        | V         | -62.20           | 14.20           | -48.00         | -20.00         | 28.00       |
| 3 583.93        | H         | -63.70           | 16.50           | -47.20         | -20.00         | 27.20       |
| 4 096.08        | H         | -65.70           | 18.50           | -47.20         | -20.00         | 27.20       |
| 4 608.23        | H         | -66.20           | 21.50           | -44.70         | -20.00         | 24.70       |
| 5 119.77        | V         | -66.10           | 20.50           | -45.60         | -20.00         | 25.60       |

\* 6.25BW

-Target Power\_1W\_406.10 MHz

| Frequency<br>[MHz] | Pol<br>[H/V] | Reading<br>[dB(mW)] | Space Loss<br>[dB] | Level<br>[dB(mW)] | Limit<br>[dB(mW)] | Margin<br>[dB] |
|--------------------|--------------|---------------------|--------------------|-------------------|-------------------|----------------|
| 812.20             | H            | -47.70              | 8.20               | -39.50            | -25.00            | 14.50          |
| 1 218.53           | V            | -50.60              | 6.70               | -43.90            | -25.00            | 18.90          |
| 1 624.47           | V            | -44.70              | 7.10               | -37.60            | -25.00            | 12.60          |
| 2 030.40           | V            | -41.10              | 12.40              | -28.70            | -25.00            | 3.70           |
| 2 436.33           | V            | -49.50              | 12.90              | -36.60            | -25.00            | 11.60          |
| 2 842.27           | V            | -65.20              | 13.70              | -51.50            | -25.00            | 26.50          |
| 3 248.81           | V            | -66.20              | 16.20              | -50.00            | -25.00            | 25.00          |

-Target Power\_1W\_459.00 MHz

| Frequency<br>[MHz] | Pol<br>[H/V] | Reading<br>[dB(mW)] | Space Loss<br>[dB] | Level<br>[dB(mW)] | Limit<br>[dB(mW)] | Margin<br>[dB] |
|--------------------|--------------|---------------------|--------------------|-------------------|-------------------|----------------|
| 918.00             | V            | -56.30              | 9.70               | -46.60            | -25.00            | 21.60          |
| 1 377.24           | V            | -37.80              | 9.00               | -28.80            | -25.00            | 3.80           |
| 1 836.28           | V            | -46.40              | 7.90               | -38.50            | -25.00            | 13.50          |
| 2 294.71           | V            | -42.80              | 12.40              | -30.40            | -25.00            | 5.40           |
| 3 213.41           | V            | -66.20              | 16.20              | -50.00            | -25.00            | 25.00          |

-Target Power\_1W\_512.00 MHz

| Frequency<br>[MHz] | Pol<br>[H/V] | Reading<br>[dB(mW)] | Space Loss<br>[dB] | Level<br>[dB(mW)] | Limit<br>[dB(mW)] | Margin<br>[dB] |
|--------------------|--------------|---------------------|--------------------|-------------------|-------------------|----------------|
| 951.71             | H            | -71.90              | 11.70              | -60.20            | -25.00            | 35.20          |
| 1 023.81           | H            | -53.20              | 4.80               | -48.40            | -25.00            | 23.40          |
| 1 535.95           | V            | -42.50              | 7.70               | -34.80            | -25.00            | 9.80           |
| 2 048.10           | H            | -49.60              | 12.30              | -37.30            | -25.00            | 12.30          |
| 2 559.64           | H            | -57.20              | 12.70              | -44.50            | -25.00            | 19.50          |
| 3 072.40           | H            | -61.80              | 14.40              | -47.40            | -25.00            | 22.40          |
| 3 583.93           | V            | -66.20              | 16.50              | -49.70            | -25.00            | 24.70          |

-Target Power\_4W\_406.10 MHz

| Frequency [MHz] | Pol [H/V] | Reading [dB(mW)] | Space Loss [dB] | Level [dB(mW)] | Limit [dB(mW)] | Margin [dB] |
|-----------------|-----------|------------------|-----------------|----------------|----------------|-------------|
| 812.20          | H         | -47.70           | 8.20            | -39.50         | -25.00         | 14.50       |
| 1 217.92        | V         | -51.80           | 6.70            | -45.10         | -25.00         | 20.10       |
| 1 624.47        | V         | -42.20           | 7.10            | -35.10         | -25.00         | 10.10       |
| 2 030.40        | V         | -41.50           | 12.40           | -29.10         | -25.00         | 4.10        |
| 2 436.33        | V         | -47.70           | 12.90           | -34.80         | -25.00         | 9.80        |
| 2 842.88        | V         | -64.60           | 13.70           | -50.90         | -25.00         | 25.90       |
| 3 248.81        | V         | -65.80           | 16.20           | -49.60         | -25.00         | 24.60       |
| 3 654.74        | V         | -69.20           | 16.70           | -52.50         | -25.00         | 27.50       |

-Target Power\_4W\_459.00 MHz

| Frequency [MHz] | Pol [H/V] | Reading [dB(mW)] | Space Loss [dB] | Level [dB(mW)] | Limit [dB(mW)] | Margin [dB] |
|-----------------|-----------|------------------|-----------------|----------------|----------------|-------------|
| 918.00          | V         | -49.70           | 9.70            | -40.00         | -25.00         | 15.00       |
| 1 377.24        | V         | -47.10           | 9.00            | -38.10         | -25.00         | 13.10       |
| 1 835.67        | V         | -60.00           | 7.90            | -52.10         | -25.00         | 27.10       |
| 2 294.71        | V         | -59.50           | 12.40           | -47.10         | -25.00         | 22.10       |
| 2 753.75        | H         | -59.60           | 13.60           | -46.00         | -25.00         | 21.00       |
| 3 212.80        | H         | -63.70           | 16.30           | -47.40         | -25.00         | 22.40       |
| 3 671.84        | V         | -64.50           | 16.80           | -47.70         | -25.00         | 22.70       |

-Target Power\_4W\_512.00 MHz

| Frequency [MHz] | Pol [H/V] | Reading [dB(mW)] | Space Loss [dB] | Level [dB(mW)] | Limit [dB(mW)] | Margin [dB] |
|-----------------|-----------|------------------|-----------------|----------------|----------------|-------------|
| 950.63          | H         | -71.70           | 11.70           | -60.00         | -20.00         | 40.00       |
| 1 023.81        | V         | -55.20           | 4.90            | -50.30         | -25.00         | 25.30       |
| 1 535.95        | H         | -37.90           | 7.70            | -30.20         | -25.00         | 5.20        |
| 2 048.10        | V         | -42.80           | 13.10           | -29.70         | -25.00         | 4.70        |
| 2 559.64        | V         | -56.30           | 12.60           | -43.70         | -25.00         | 18.70       |
| 3 071.79        | H         | -64.20           | 14.40           | -49.80         | -25.00         | 24.80       |
| 3 583.93        | V         | -58.10           | 16.50           | -41.60         | -25.00         | 16.60       |
| 4 096.08        | V         | -65.60           | 18.50           | -47.10         | -25.00         | 22.10       |
| 4 608.23        | V         | -61.70           | 21.60           | -40.10         | -25.00         | 15.10       |
| 5 119.77        | V         | -65.80           | 20.50           | -45.30         | -25.00         | 20.30       |

## 6. Test equipment used for test

|   | Description                   | Manufacturer          | Model No.   | Serial No.   | Next Cal Date. |
|---|-------------------------------|-----------------------|-------------|--------------|----------------|
| ■ | DC power supply               | AGILENT               | E3632A      | MY40004791   | 16.07.15       |
| ■ | Constant temp & Humid chamber | ESPEC CORP.           | SH-641      | 92004765     | 16.07.17       |
| ■ | Attenuator                    | BIRD                  | 50-A-MFN-20 | 403002       | 16.10.08       |
| ■ | Signal generator              | R&S                   | SMR40       | 100007       | 16.06.15       |
| ■ | Spectrum Analyzer             | R&S                   | FSV30       | 100732       | 16.07.21       |
| ■ | Highpass Filter               | Mini-Circuits         | NHP-800+    | v uu16801113 | 16.07.15       |
| ■ | Audio analyzer                | HP                    | 8903B       | 3729A18248   | 16.10.13       |
| ■ | Modulation analyzer           | HP                    | 8901B       | 3538A05527   | 16.10.13       |
| ■ | Wideband power sensor         | R&S                   | NRP-Z81     | 102398       | 17.02.11       |
| ■ | Digital Phosphor Oscilloscope | Tektronix             | TDS3012     | B027160      | 16.01.06       |
| ■ | Bilog Antenna                 | Teseq GmbH            | CBL 6143A   | 35039        | 16.07.10       |
| ■ | Horn antenna                  | ETS.lindgren          | 3115        | 62589        | 16.11.12       |
| ■ | Amplifier                     | SONOMA INSTRUMENT     | 317         | 321041       | 17.03.05       |
| ■ | Broadband Preamplifier        | SCHWARZBECK           | BBV9718     | 216          | 16.11.11       |
| ■ | Attenuator                    | Weinschel ENGINEERING | 10          | AJ1239       | 16.07.15       |
| ■ | RF Selector                   | TOYO Corporation      | NS5800      | 1003-010     | -              |
| ■ | Band Selector                 | TOYO Corporation      | NS5800      | 1003-135     | -              |
| ■ | Band Selector                 | TOYO Corporation      | NS5800      | 1003-320     | -              |
| ■ | Antenna Master                | MATURO                | EAS 1.5     | 042/8941211  | -              |
| ■ | Antenna Master                | MATURO                | EAS 1.5     | 043/8941211  | -              |
| ■ | Turn Table                    | MATURO                | TT 0.8 PF   | 041/8941211  | -              |
| ■ | Turn Devices                  | MATURO                | TD 1.5-2 kg | 039/8941211  | -              |