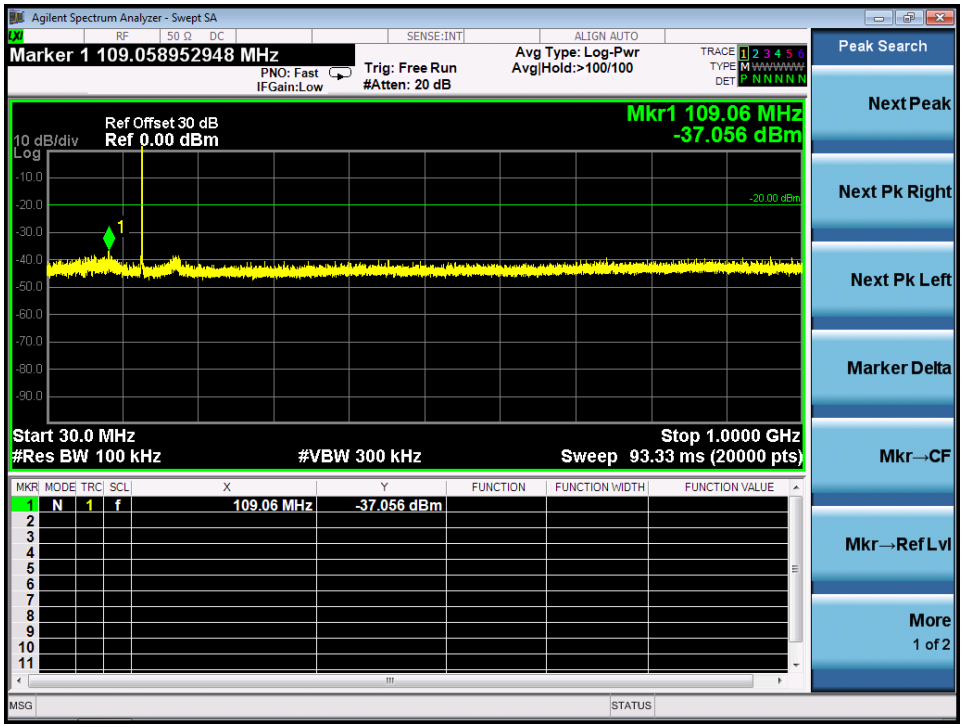
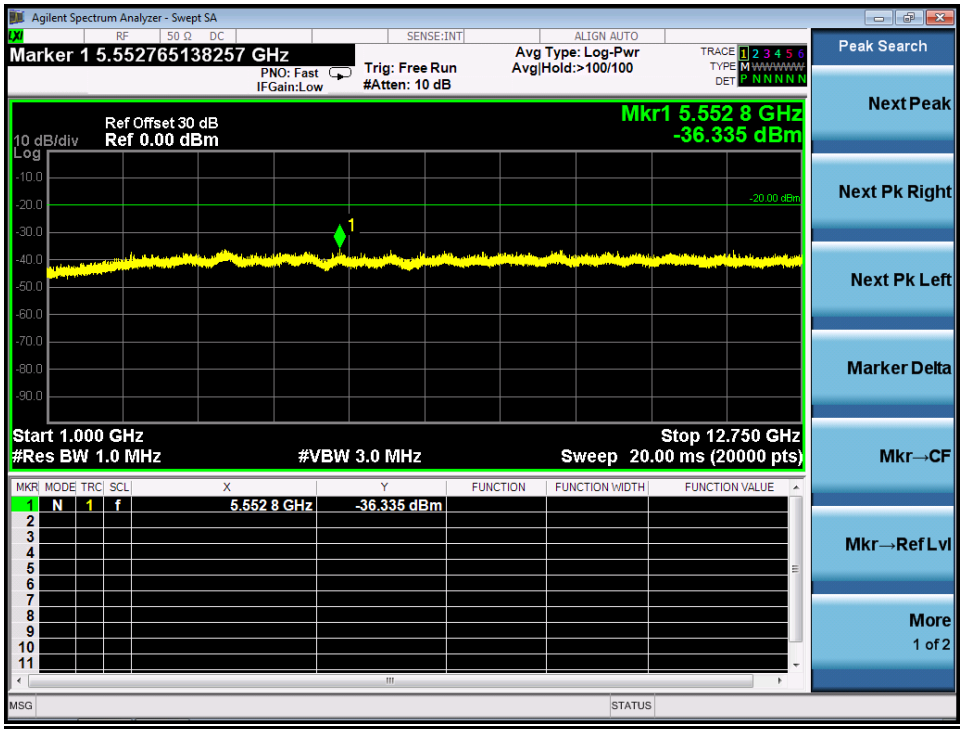
**Conducted Spurious Emission (worst) @151.850 MHz With 12.5 KHz Channel Separation-2.5W**

30MHz-1GHz



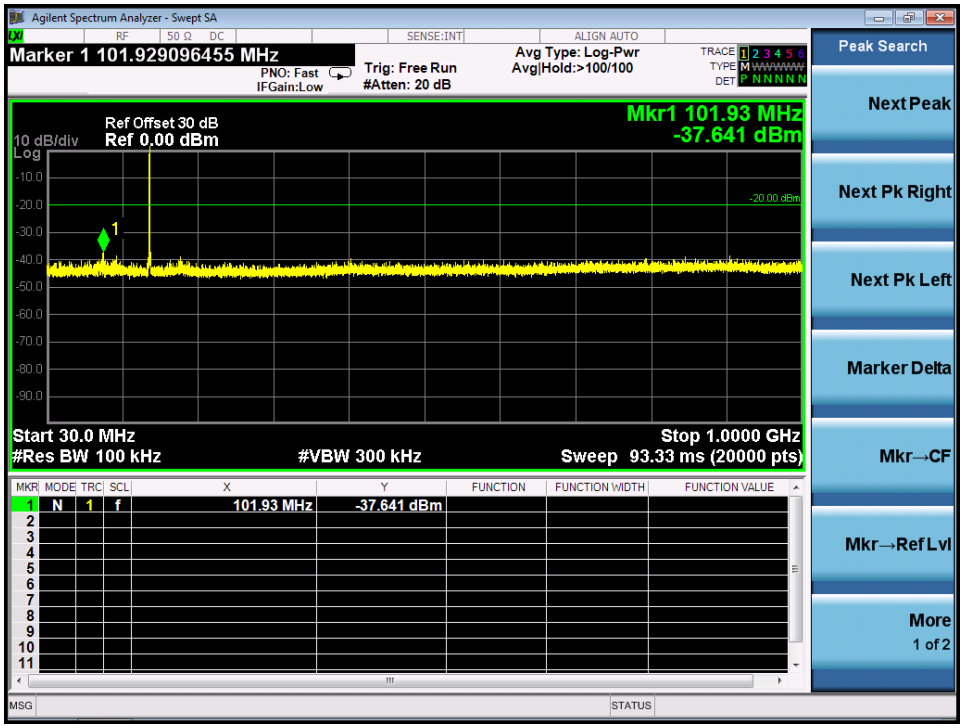

**Conduct Spurious Emission (worst) @ 151.850MHz With 12.5 KHz Channel Separation-2.5W**

1GHz-12.75GHz



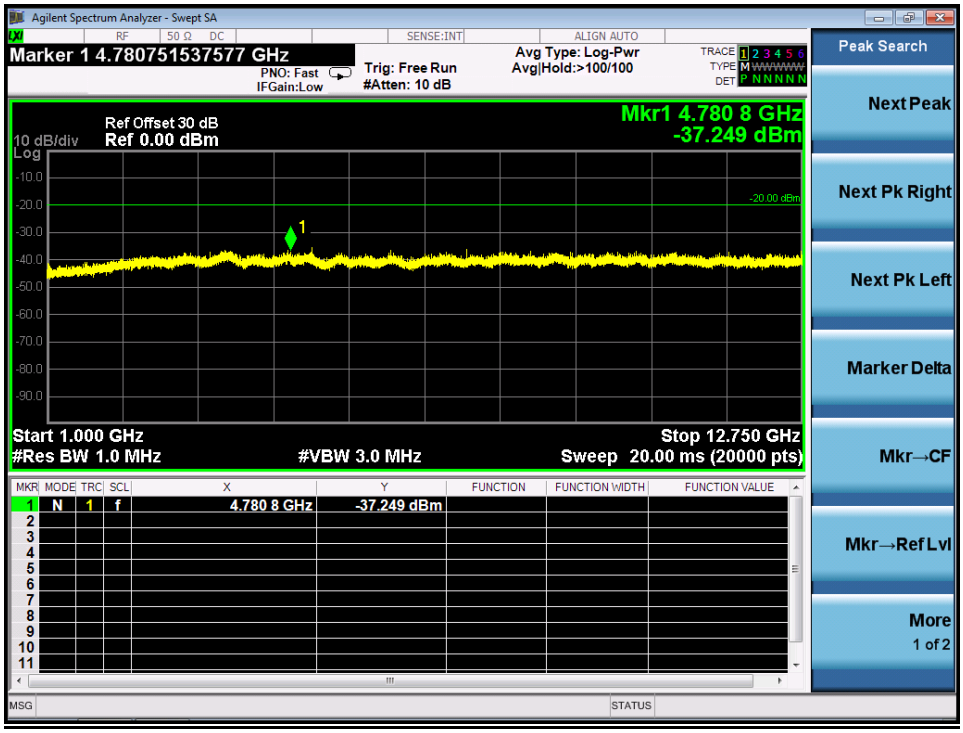
**Conducted Spurious Emission (worst) @161.61MHz With 12.5 KHz Channel Separation-2.5W**

30MHz-1GHz



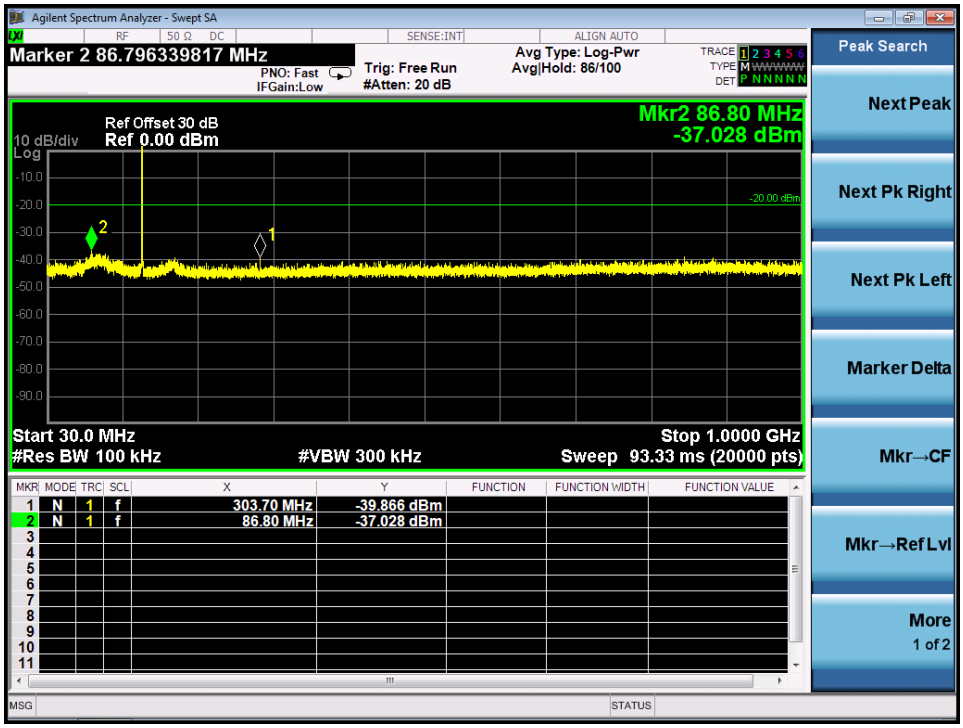

**Conduct Spurious Emission (worst) @ 161.61MHz With 12.5 KHz Channel Separation-2.5W**

1GHz-12.75GHz



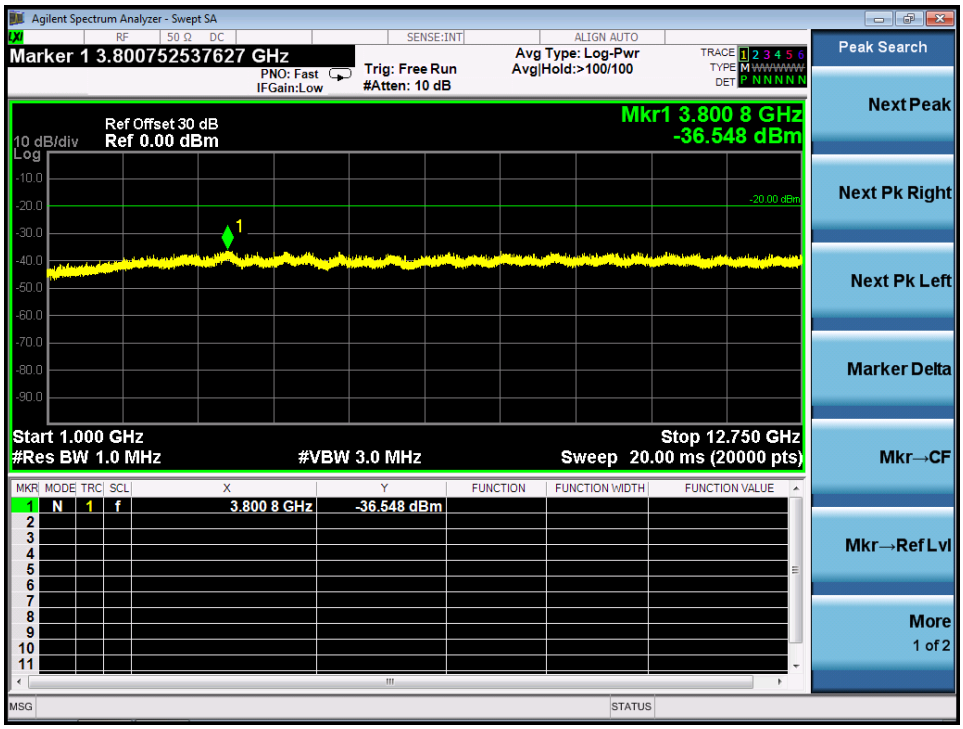
**Conducted Spurious Emission (worst) @151.85MHz With 12.5 KHz Channel Separation-1W**

30MHz-1GHz



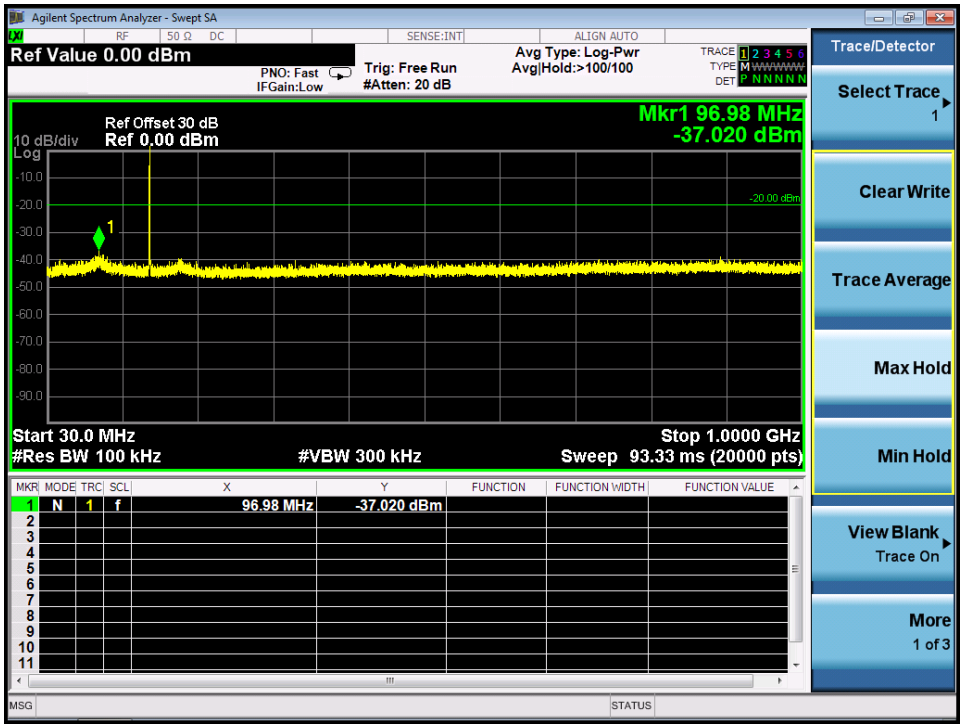

**Conduct Spurious Emission (worst) @ 51.85MHz With 12.5 KHz Channel Separation-1W**

1GHz-12.75GHz



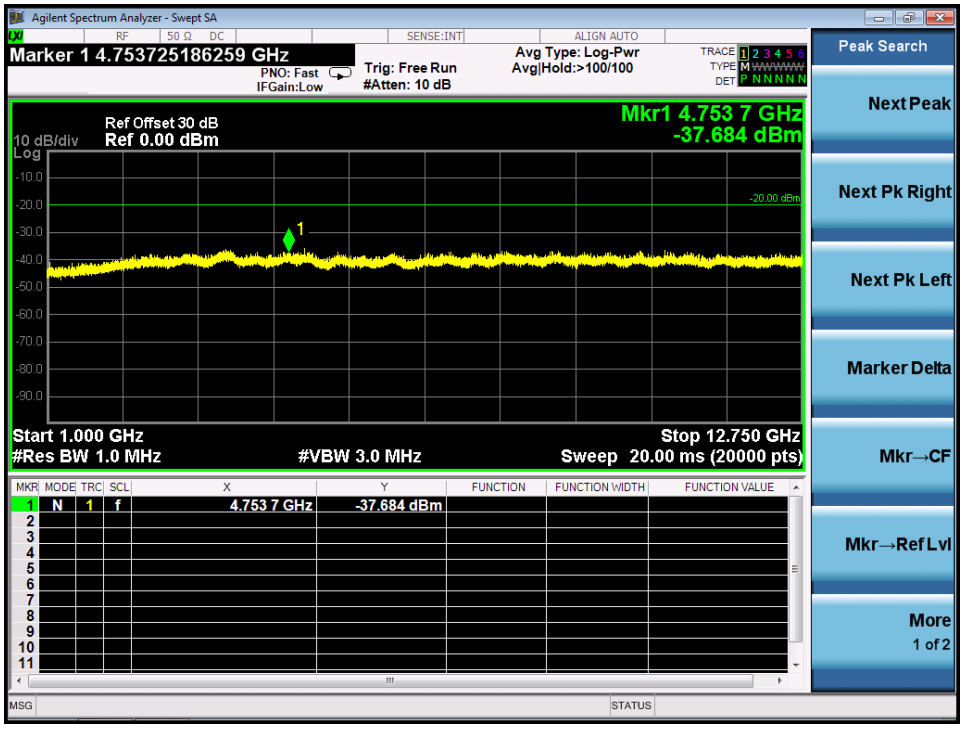
Conducted Spurious Emission (worst) @161.610 MHz With 12.5 KHz Channel Separation-1W

30MHz-1GHz




**Conduct Spurious Emission (worst) @ 161.610MHz With 12.5 KHz Channel Separation-1W**

1GHz-12.75GHz




***Note:*** *only result the worst case in this part.*

# 10. RANSMITTER FREQUENCY BEHAVIOR

## 10.1PROVISIONS APPLICABLE

FCC §90.214

| Time intervals [1, 2] | Maximum frequency difference [3] | All equipment | |
|---|---|---|---|
| | | 150 to 174 MHz | 421 to 512 MHz |
| Transient Frequency Behavior for Equipment Designed to Operate on 25 kHz Channels | | | |
| $t_1$ [4] | ± 25.0 kHz | 5.0 ms | 10.0 ms |
| $t_2$ | ± 12.5 kHz | 20.0 ms | 25.0 ms |
| $t_3$ [4] | ± 25.0 kHz | 5.0 ms | 10.0 ms |
| Transient Frequency Behavior for Equipment Designed to Operate on 12.5 kHz Channels | | | |
| $t_1$ [4] | ± 12.5 kHz | 5.0 ms | 10.0 ms |
| $t_2$ | ± 6.25 kHz | 20.0 ms | 25.0 ms |
| $t_3$ [4] | ± 12.5 kHz | 5.0 ms | 10.0 ms |
| Transient Frequency Behavior for Equipment Designed to Operate on 6.25 kHz Channels | | | |
| $t_1$ [4] | ± 6.25 kHz | 5.0 ms | 10.0 ms |
| $t_2$ | ± 3.125 kHz | 20.0 ms | 25.0 ms |
| $t_3$ [4] | ± 6.25 kHz | 5.0 ms | 10.0 ms |

[1] $t_{on}$ 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.
[2] 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.
[3] Difference between the actual transmitter frequency and the assigned transmitter frequency.
[4] 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.

## 10.2 TEST METHOD

TIA/EIA-603 2.2.19.3

**10.3 DESCRIBE LIMIT LINE OF RANSMITTER FREQUENCY BEHAVIOR**

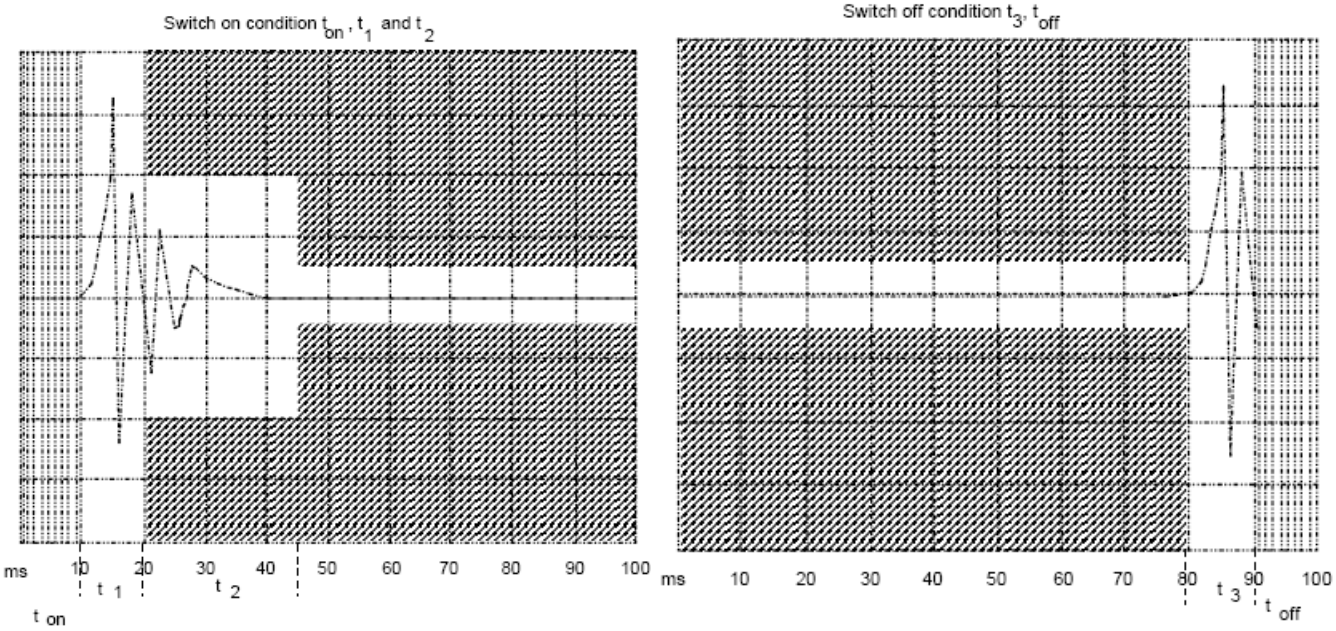
**ton:** The switch-on instant ton of a transmitter is defined by the condition when the output power, measured at the antenna terminal, exceeds 0,1 % of the full output power (-30 dBc).

**t1:** period of time starting at ton and finishing according to above 11.1

**t2:** period of time starting at the end of t1 and finishing according to above 11.1

toff: switch-off instant defined by the condition when the output power falls below 0,1 % of the full output power (-30 dBc).

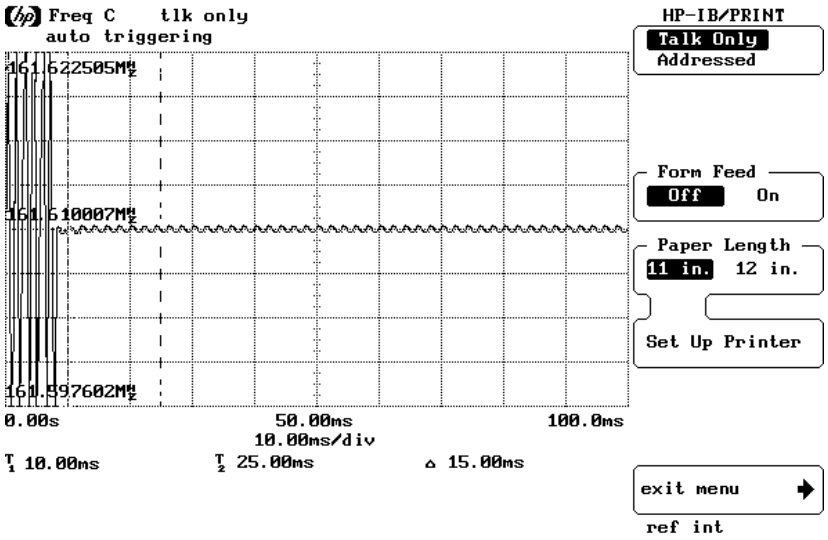
**t3**: period of time that finishing at toff and starting according to above 11.1



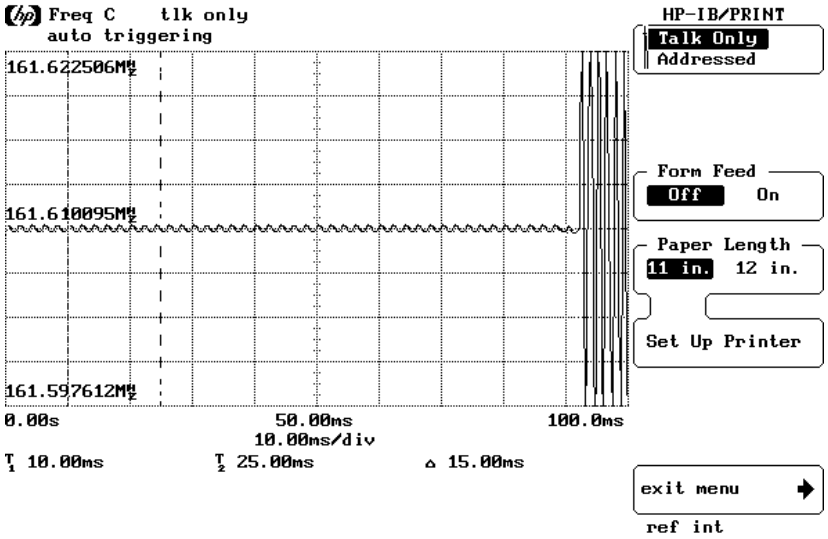
**10.4 MEASURE RESULT**

**FM:**

Transmitter Frequency Behavior @ 12.5 KHz Channel Separation--Off to On-10W

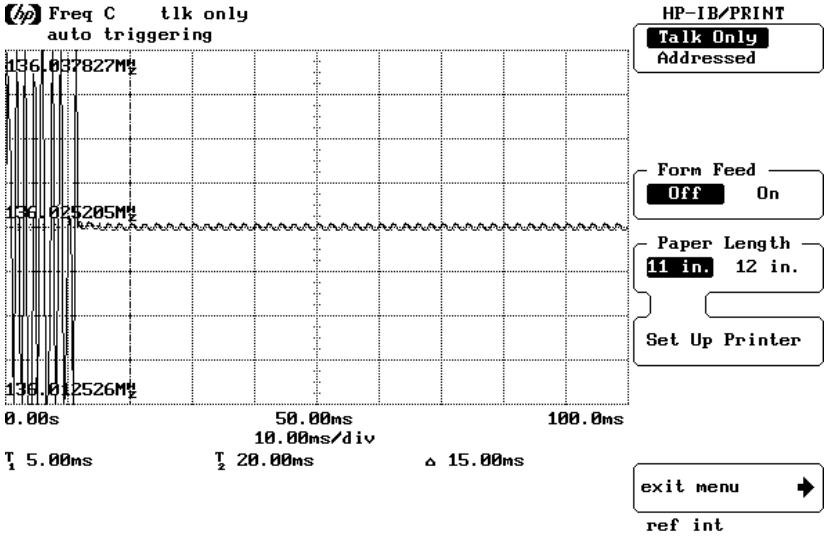



Transmitter Frequency Behavior @ 12.5 KHz Channel Separation--On to Off-10W

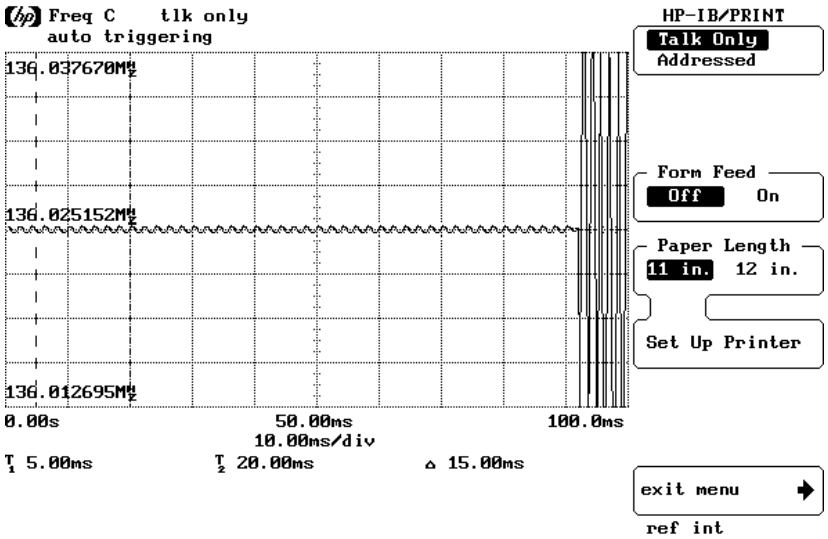


**4FSK:**

Transmitter Frequency Behavior @ 12.5 KHz Channel Separation--Off to On




Transmitter Frequency Behavior @ 12.5 KHz Channel Separation--On to Off



# 11. AUDIO LOW PASS FILTER RESPONSE

## 11.1 LIMITS

**2.1047(a):** Voice modulated communication equipment. A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be submitted. For equipment required to have an audio low-pass filter, a curve showing the frequency response of the filter or of all circuitry installed between the modulation limiter and the modulated stage shall be submitted.
**90.242(b)(8)**: Recommended audio filter attenuation characteristics are given below:

| Audio band | Minimum Attenuation Rel. to 1 KHz Attenuation |
|---|---|
| 3 –20 KHz | 60 $\log_{10}$(f/3) dB where f is in KHz |
| 20 – 30 KHz | 50dB |

## 11.2. METHOD OF MEASUREMENTS

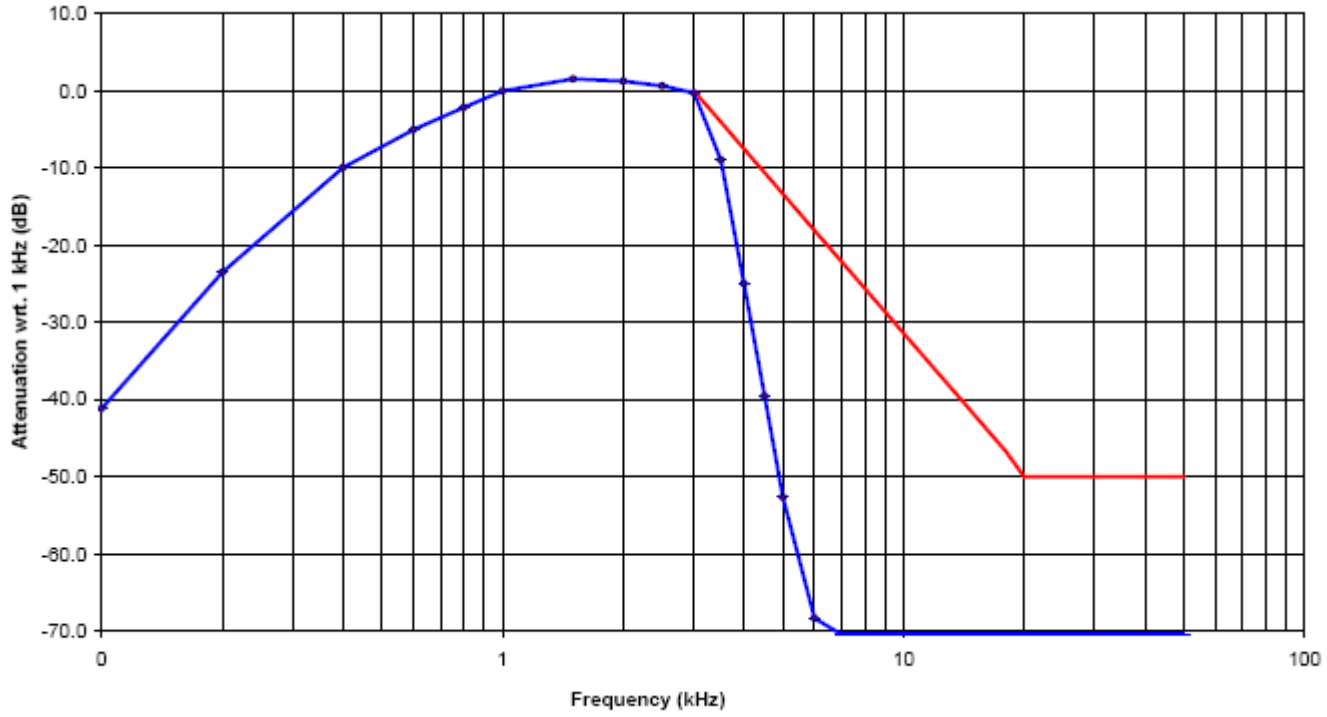
The rated audio input signal was applied to the input of the audio low-pass filter (or of all modulation stages) using an audio oscillator, this input signal level and its corresponding output signal were then measured and recorded using the FFT Digital Spectrum Analyzer. Tests were repeated at different audio signal frequencies from 0 to 50 KHz.

**11.3 TEST DATA**

**12.5KHZ CHANNEL SPACING, 4FSK FREQUENCY OF ALL MODULATION STATES (TEST RESULT FOR VHF)-10W**

| Frequency | Audio In | Audio out | Attenuation | Attenuation | Recommended Attenuation |
|---|---|---|---|---|---|
| (KHz) | (dBV) | (dBV) | (Out_In) | Rel.to 3 KHz | (dB) |
| | | | dB | （dB) | |
| 0.1 | -76.15 | -31.53 | 45.52 | -36.15 | |
| 0.2 | -76.15 | -17.49 | 58.48 | -25.85 | |
| 0.4 | -76.15 | -6.536 | 71.16 | -12.625 | |
| 0.6 | -76.15 | 0.32 | 74.85 | -6.81 | |
| 0.8 | -76.15 | 4.25 | 78.25 | -2.29 | |
| 1.0 | -76.15 | 7.41 | 83.36 | -0.18 | |
| 1.5 | -76.15 | 8.85 | 84.49 | 2.35 | |
| 2.0 | -76.15 | 8.61 | 85.13 | 1.48 | |
| 2.5 | -76.15 | 7.75 | 83.25 | 0.25 | |
| 3.0 | -76.15 | 6.49 | 82.68 | -1.69 | 0 |
| 3.5 | -76.15 | 2.25 | 78.51 | -4.48 | -4 |
| 4.0 | -76.15 | -2.81 | 74.64 | -9.65 | -7 |
| 4.5 | -76.15 | -9.36 | 68.85 | -16.45 | -12 |
| 5.0 | -76.15 | -15.15 | 60.68 | -21.77 | -16 |
| 6.0 | -76.15 | -21.24 | 54.59 | -28.29 | -15 |
| 7.0 | -76.15 | -31.35 | 46.28 | -36.31 | -20 |
| 8.0 | -76.15 | -39.49 | 37.26 | -47.49 | -23 |
| 9.0 | -76.15 | -61.75 | 14.40 | -66.48 | -26 |
| 10.0 | -76.15 | -61.75 | 14.40 | -66.48 | -32 |
| 12.0 | -76.15 | -61.75 | 14.40 | -66.48 | -35 |
| 14.0 | -76.15 | -61.75 | 14.40 | -66.48 | -41 |
| 16.0 | -76.15 | -61.75 | 14.40 | -66.48 | -42 |
| 18.0 | -76.15 | -61.75 | 14.40 | -66.48 | -45 |
| 20.0 | -76.15 | -61.75 | 14.40 | -66.48 | -45 |
| 25.0 | -76.15 | -61.75 | 14.40 | -66.48 | -45 |
| 30.0 | -76.15 | -61.75 | 14.40 | -66.48 | -45 |
| 35.0 | -76.15 | -61.75 | 14.40 | -66.48 | -45 |
| 40.0 | -76.15 | -61.75 | 14.40 | -66.48 | -45 |
| 45.0 | -76.15 | -61.75 | 14.40 | -66.48 | -45 |
| 50.0 | -76.15 | -61.75 | 14.40 | -66.48 | -45 |

***Note**: Due to the difficulty of measuring the Frequency Response of the internal low-pass filter, the Frequency Response of All Modulation States is performed to show the roll-off at 3 KHz in comparison with the recommended audio filter attenuation.*



# APPENDIX I: PHOTOGRAPHS OF SETUP

RADIATED EMISSION TEST SETUP