

# Harmonic and Intermod Study Field Report

Date: **May 20, 2016**

Station Call Sign: **WQIL & WMCG**

Location: **Chester, Georgia**

Frequencies: **101.3 & 104.9 respectively**

Antenna: **8 Bay Dielectric DCRM, full wave spacing**

Transmission Line: **3-1/8" Andrew, air dielectric, Heliax**

Work Description: **Intermod study per FCC requirements**

Prepared for Dave Melton, Dowdy and Dowdy Partnership

Prepared by Peter Eckmann

Peter Eckmann Broadcast Consultants, Inc.

**EXHIBIT B**  
**APPLICATION FOR STATION LICENSE**  
**TEL-DODGE BROADCASTING, INC.**  
**WMCG (FM) RADIO STATION**  
**CH 285C2 - 104.9 MHZ - 49.0 KW**  
**MILAN, GEORGIA**  
**June 2016**

## Measurement Description:

Test equipment used: **Signal Hound, Model USB-SA124B**

Location of measurement: **Connected to transmission line tap on 3-1/8" elbow on the output of the combiner.**

## RF System Description:

RF System: **Two channel branch combiner, Dielectric, (3 cavities each per module)**

Transmitter Power Output (TPO): **WQIL 101.3 MHz 13,620 watts**  
**WMCG 104.9 MHz 13,383 watts**

Effective Radiated Power (ERP): **WQIL 101.3 MHz 50,000 watts**  
**WMCG 104.9 MHz 49,000 watts**

## Introduction:

This report is based on data collected at the WQIL & WMCG combined FM broadcast facility located near Chester, Georgia. The report includes measurements offered as proof that the combined operations of WQIL (101.3 MHz.) and WMCG (104.9 MHz) transmitters are in compliance with the FCC Rules and Regulations as required by the Code of Federal Regulations (CFR) Title 47 section 73.317 paragraph (b) through (d).

TITLE 47--TELECOMMUNICATION

CHAPTER I--FEDERAL COMMUNICATIONS

COMMISSION (CONTINUED)

PART 73\_RADIO BROADCAST SERVICES--Table of Contents

Subpart B\_FM Broadcast Stations

Sec. 73.317 FM transmission system requirements.

(b) Any emission appearing on a frequency removed from the carrier by between 120 kHz and 240 kHz inclusive must be attenuated at least 25 dB below the level of the unmodulated carrier. Compliance with this requirement will be deemed to show the occupied bandwidth to be 240 kHz or less.

(c) Any emission appearing on a frequency removed from the carrier by more than 240 kHz and up to and including 600 kHz must be attenuated at least 35 dB below the level of the unmodulated carrier.

(d) Any emission appearing on a frequency removed from the carrier by more than 600 kHz must be attenuated at least  $43 + 10 \log_{10}(\text{Power, in watts})$  dB below the level of the unmodulated carrier, or 80 dB, whichever is the lesser attenuation.

In brief, the collection of measurements presented in this report demonstrate that all possible third order intermodulation (IM) products generated by this multiplex system are less than the maximum allowable level as required by section 73.317 (b) through (d).

### **Measurement Technique**

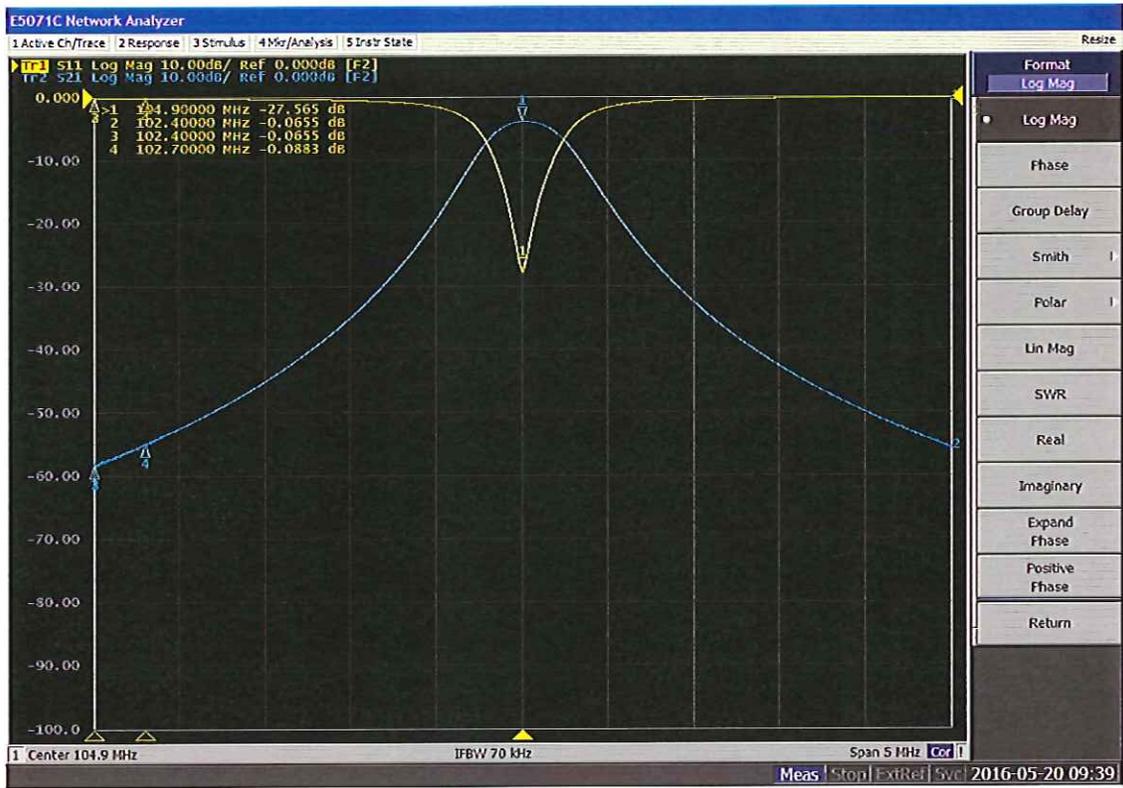
1. A tunable band pass filter was used for all measurements within or near the FM band. The tunable filter was adjusted to each frequency of interest as needed. An FM band stop filter was used for all frequencies that are 6 MHz or more outside the FM band.

### **Conclusions:**

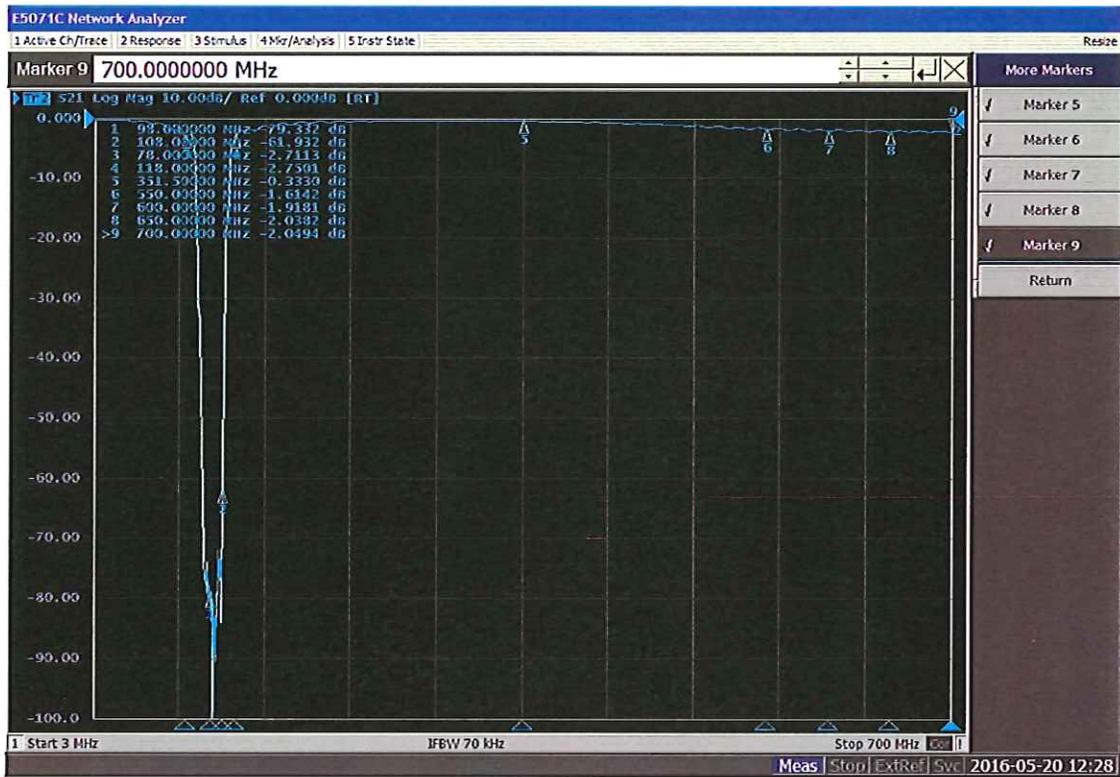
Based upon my observations and measurement data collected on May 20, 2016, I Peter Eckmann, find the subject combined system operating with stations WQIL & WMCG to be compliant with the requirements of Section 73.317 paragraph (b) through (d) of the FCC Rules and Regulations. All measurement data was collected under the observation of Dowdy and Dowdy Partnership, Chief Engineer Dave Melton.

Peter Eckmann  
President  
Peter Eckmann Broadcast Consultants, Inc.

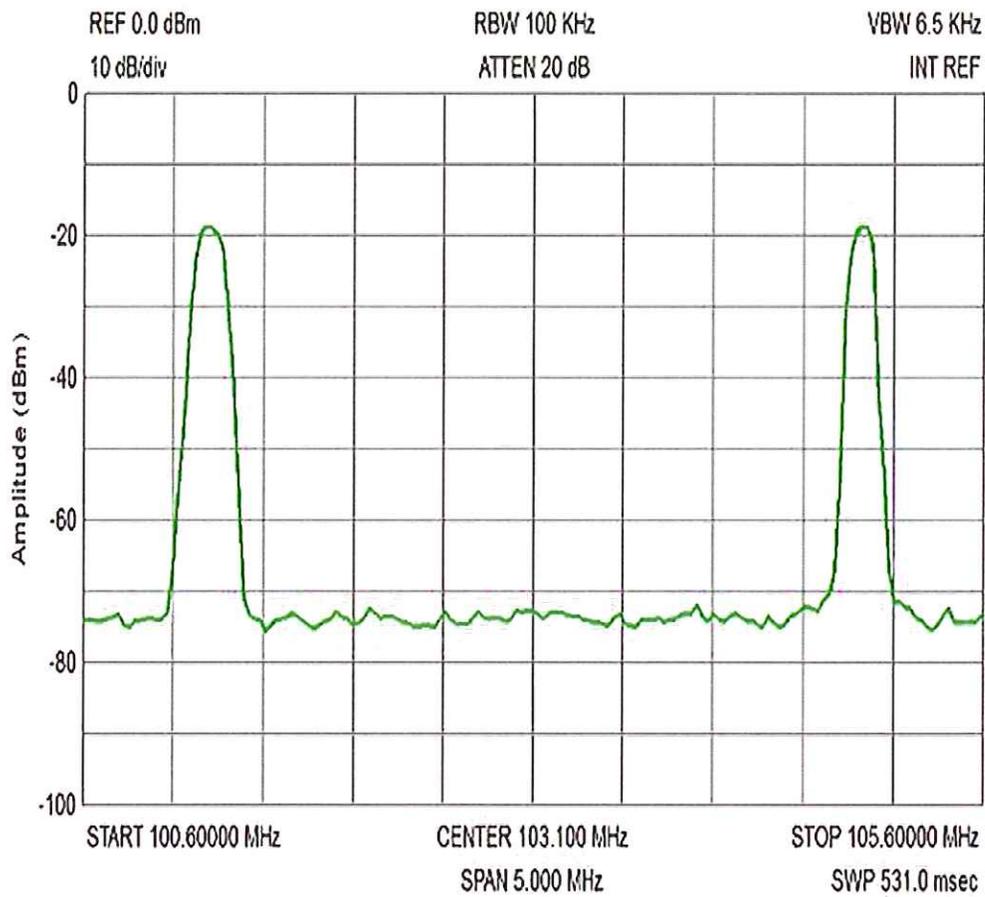
Intermod	Frequency A	Frequency B	Intermod Frequency	measured level	fm band tunable filter loss	fm band stop filter loss	attenuator (Pad)	Reference level	Calculated intermod level from peak of carrier(db)
Ref level	101.3			-19			30	11	
Ref level		104.9		-19			30	11	
A+B	101.3	104.9	206.2	-98	0	0.33	0	11	-108.67
B-A	101.3	104.9	3.6	-105	0	0.1	0	11	-115.9
2A	101.3	104.9	202.6	-90	0	0.33	0	11	-100.67
2B	101.3	104.9	209.8	-92	0	0.33	0	11	-102.67
2A-B	101.3	104.9	97.7	-104	4	0	0	11	-111
2A+B	101.3	104.9	307.5	-85	0	0.33	0	11	-95.67
2B-A	101.3	104.9	108.5	-105	4	0	0	11	-112
2B+A	101.3	104.9	311.1	-96	0	0.33	0	11	-106.67
2A+2B	101.3	104.9	412.4	-97	0	1.6	0	11	-106.4
2A-2B	101.3	104.9	7.2	-105	0	0.1	0	11	-115.9
3A	101.3	104.9	303.9	-98	0	0.33	0	11	-108.67
3B	101.3	104.9	314.7	-97	0	0.33	0	11	-107.67
3A-B	101.3	104.9	199	-98	0	0.33	0	11	-108.67
3A+B	101.3	104.9	408.8	-97	0	1.6	0	11	-106.4
3B-A	101.3	104.9	213.4	-98	0	0.33	0	11	-108.67
3B+A	101.3	104.9	416	-96	0	1.6	0	11	-105.4
3A-2B	101.3	104.9	94.1	-105	4	0	0	11	-112
3A+2B	101.3	104.9	513.7	-97	0	1.6	0	11	-106.4
3B-2A	101.3	104.9	112.1	-105	4	0	0	11	-112
3B+2A	101.3	104.9	517.3	-96	0	1.6	0	11	-105.4
3A+3B	101.3	104.9	618.6	-98	0	1.9	0	11	-107.1
3A-3B	101.3	104.9	10.8	-105	0	0.1	0	11	-115.9



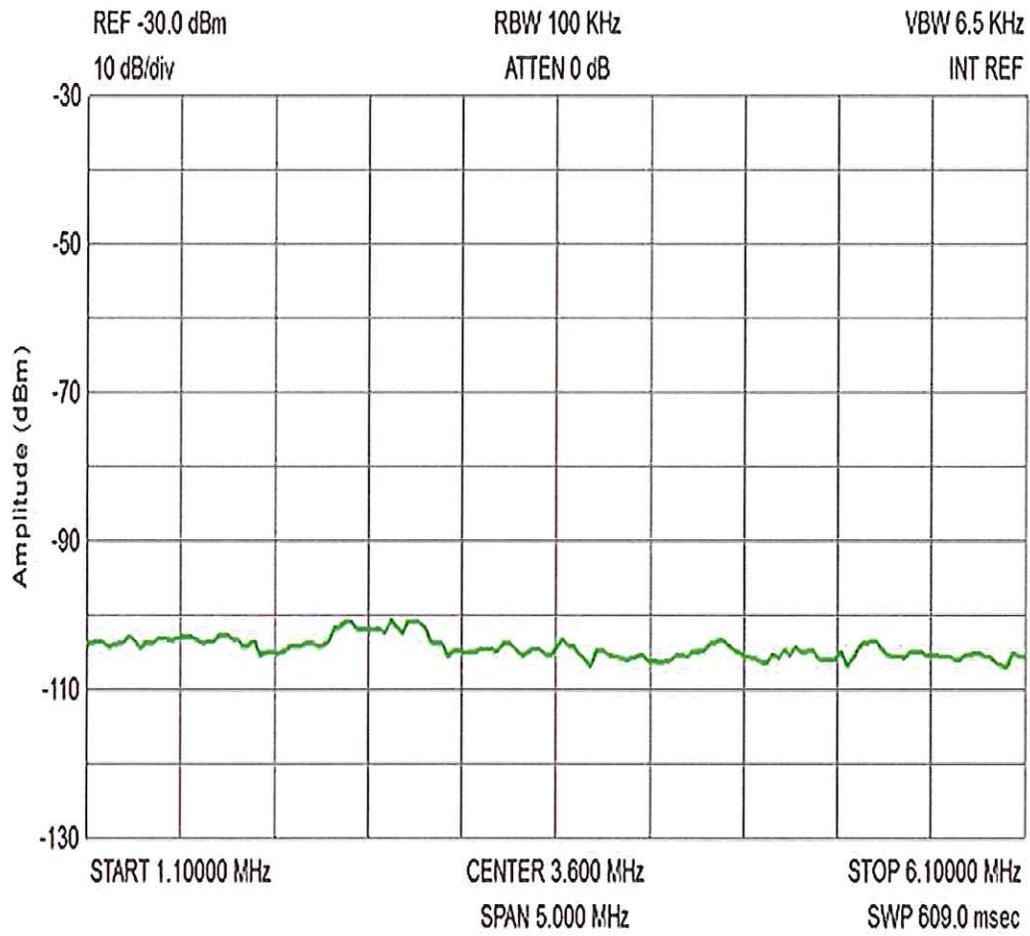
Tunable band pass filter characteristics, typical insertion loss and return loss



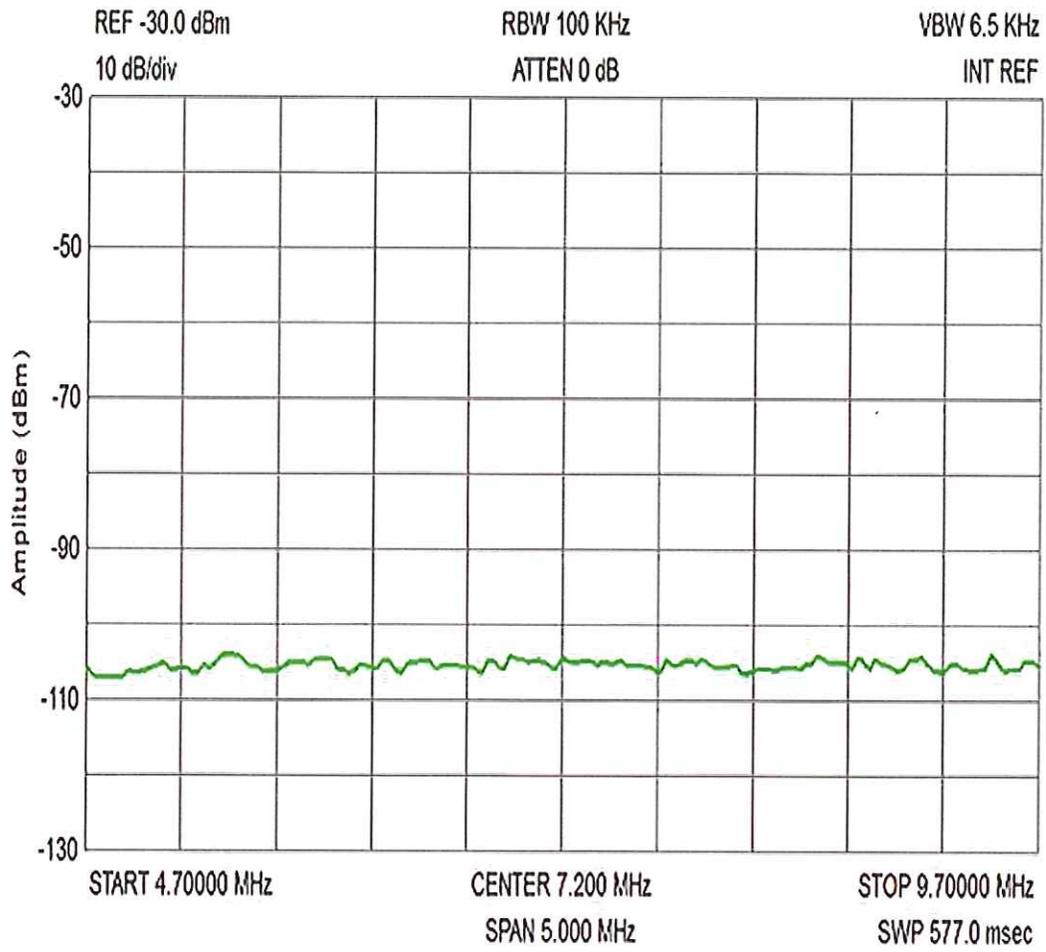
FM band stop filters, two in series, insertion loss from 3 mhz to 700 mhz.



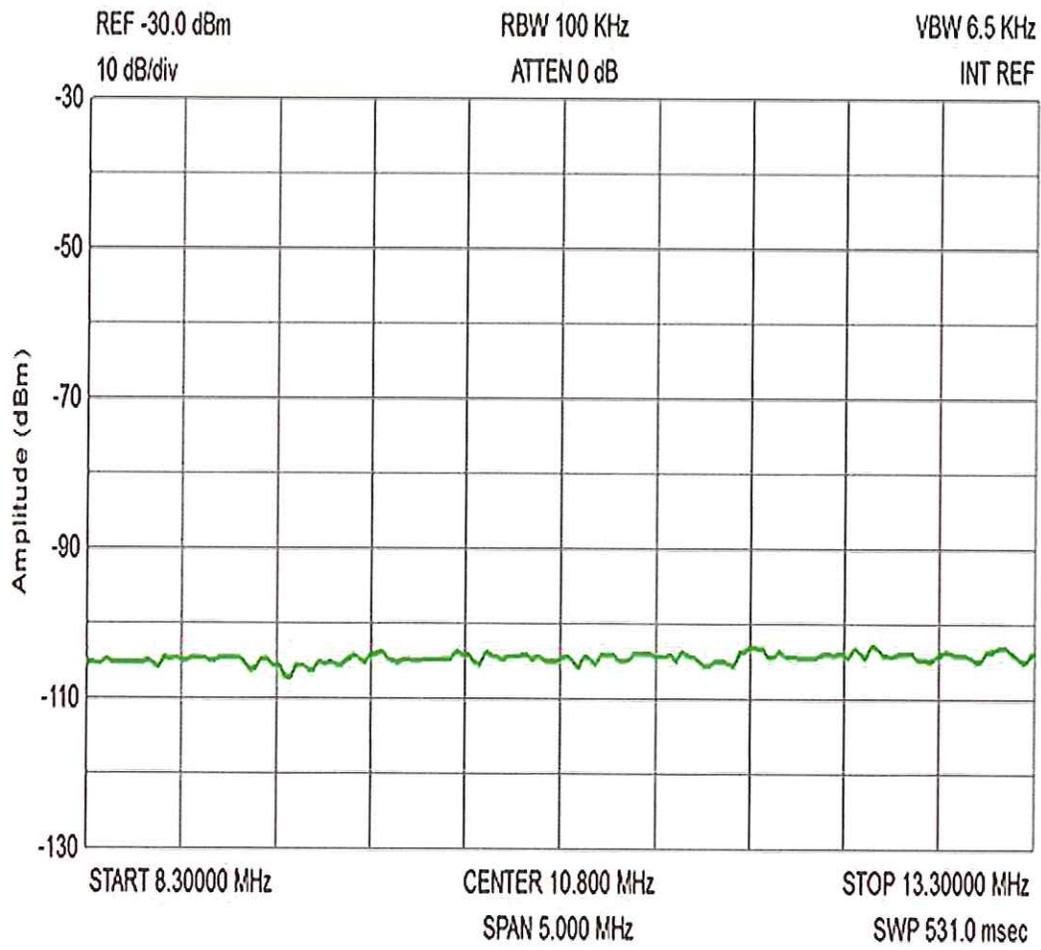
101.3 MHz & 104.9 MHz Spectra, with 30 db pad



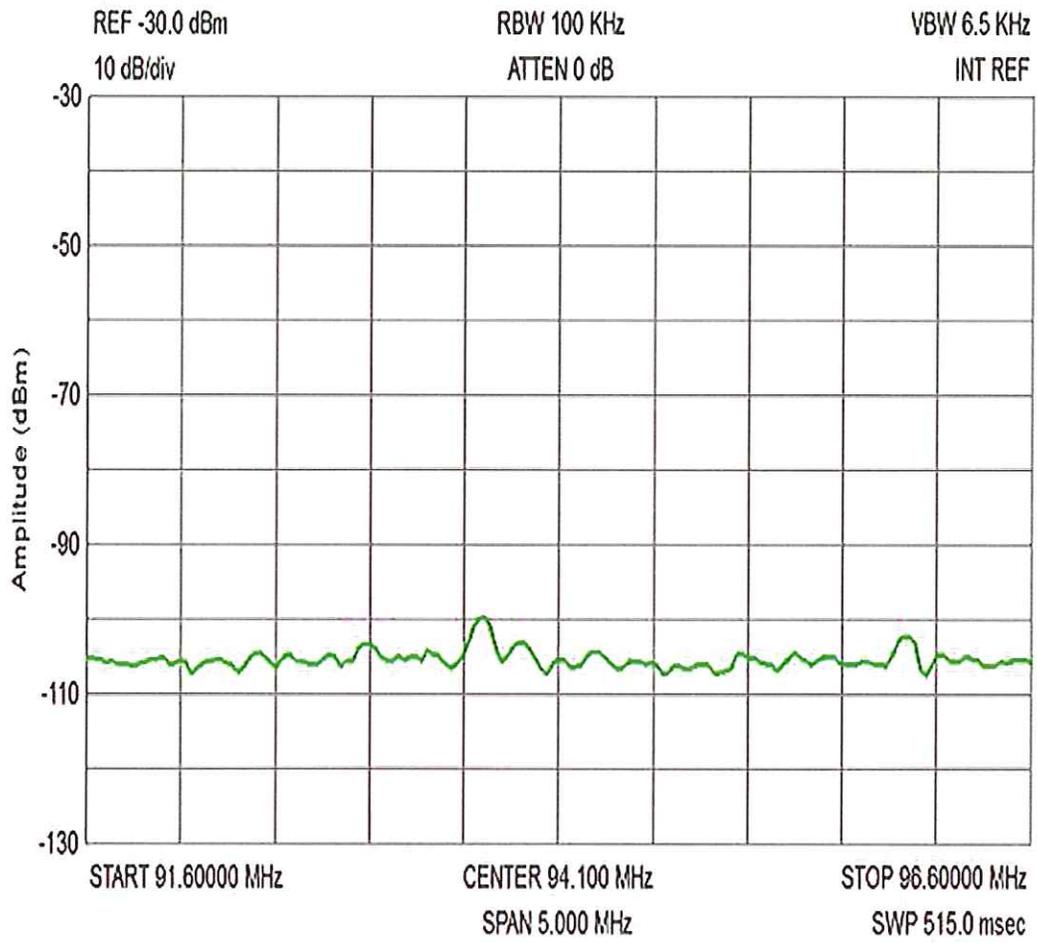
3.6 MHz Spectra, with FM band stop filter



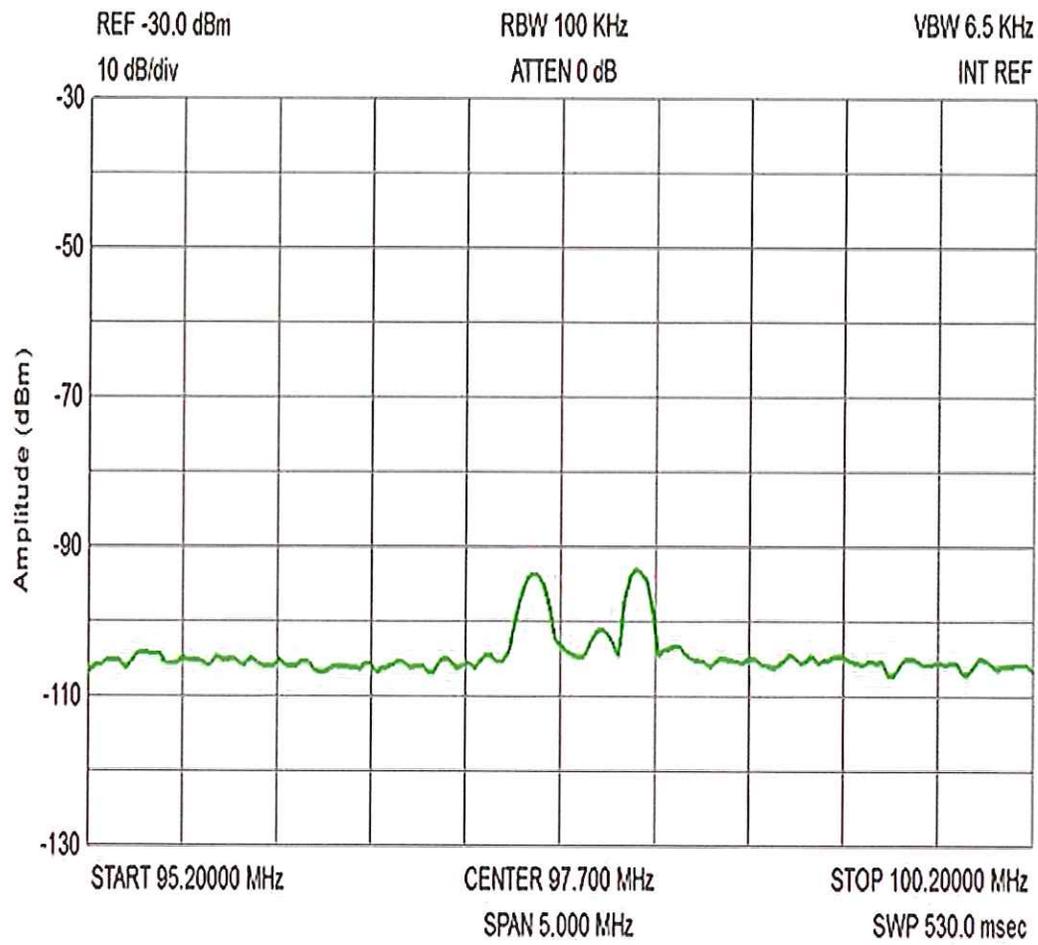
7.2 MHz Spectra, with FM band stop filter



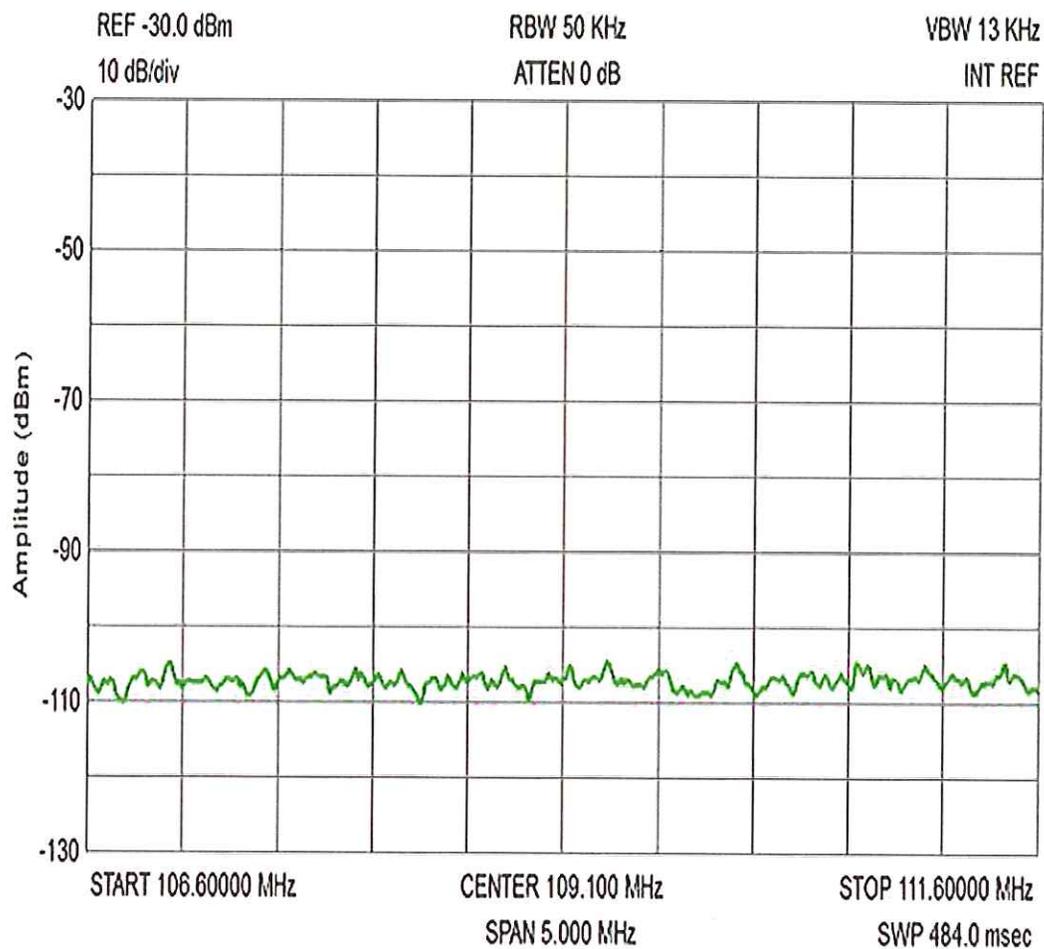
10.8 MHz Spectra, with FM band stop filter



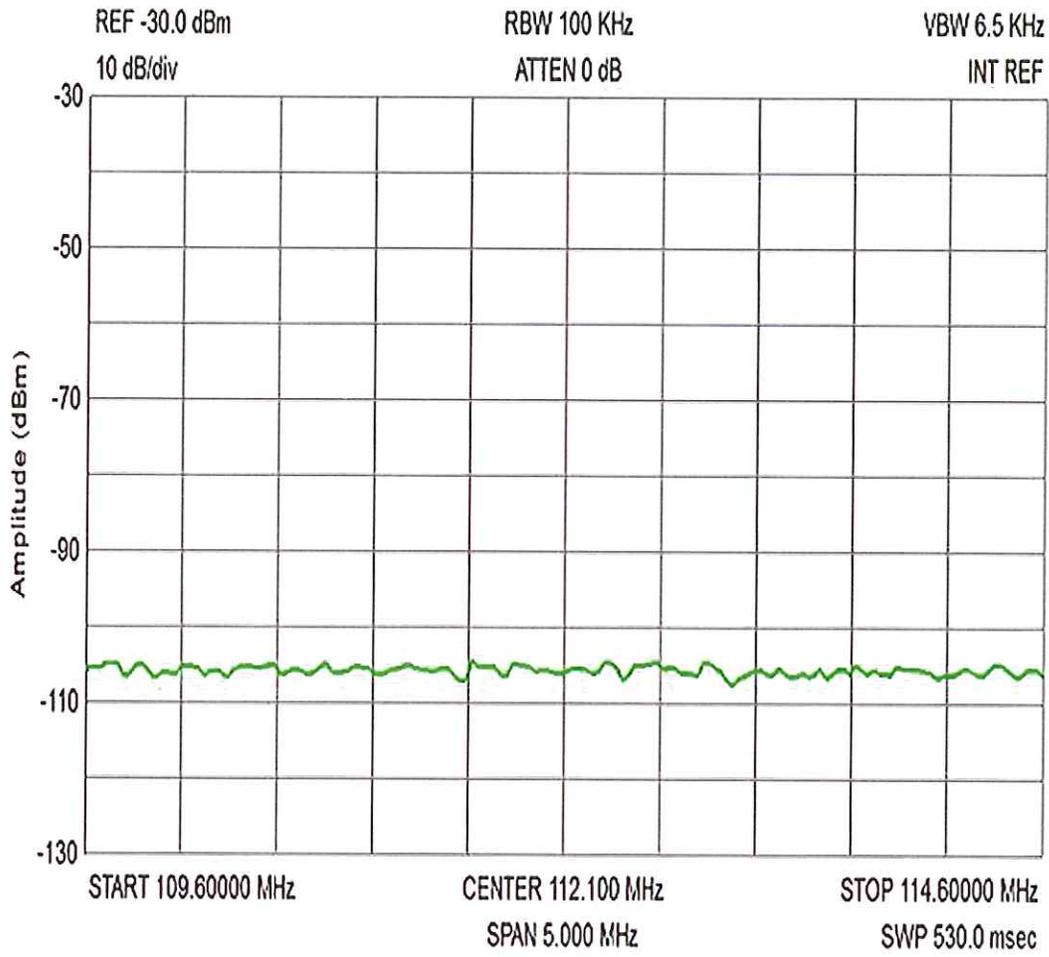
94.1 MHz Spectra, with tunable bandpass filter tuned for this frequency



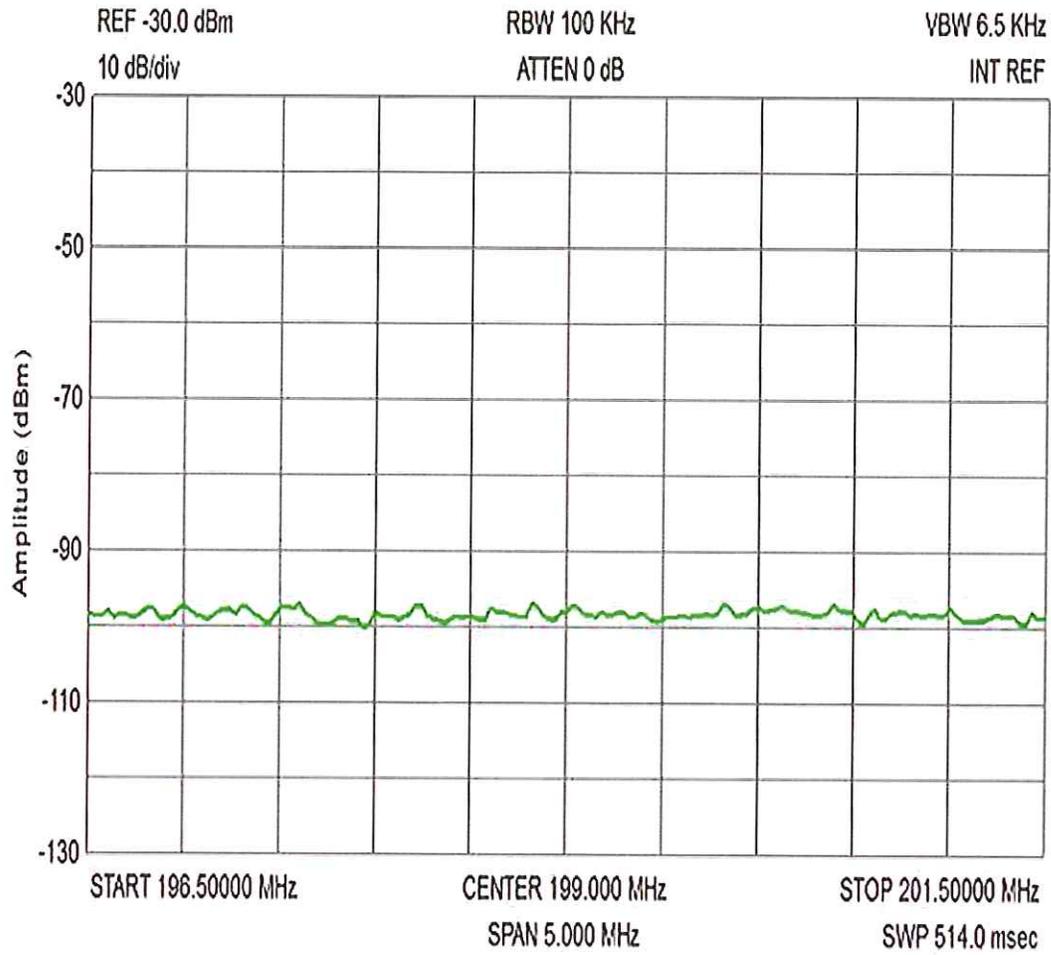
97.7 MHz Spectra, with tunable bandpass filter tuned for this frequency



109.1 MHz Spectra, with tunable bandpass filter tuned for this frequency  
 Station had concerns about this frequency so we measured it even though it was not one of the calculated intermodulation frequencies.

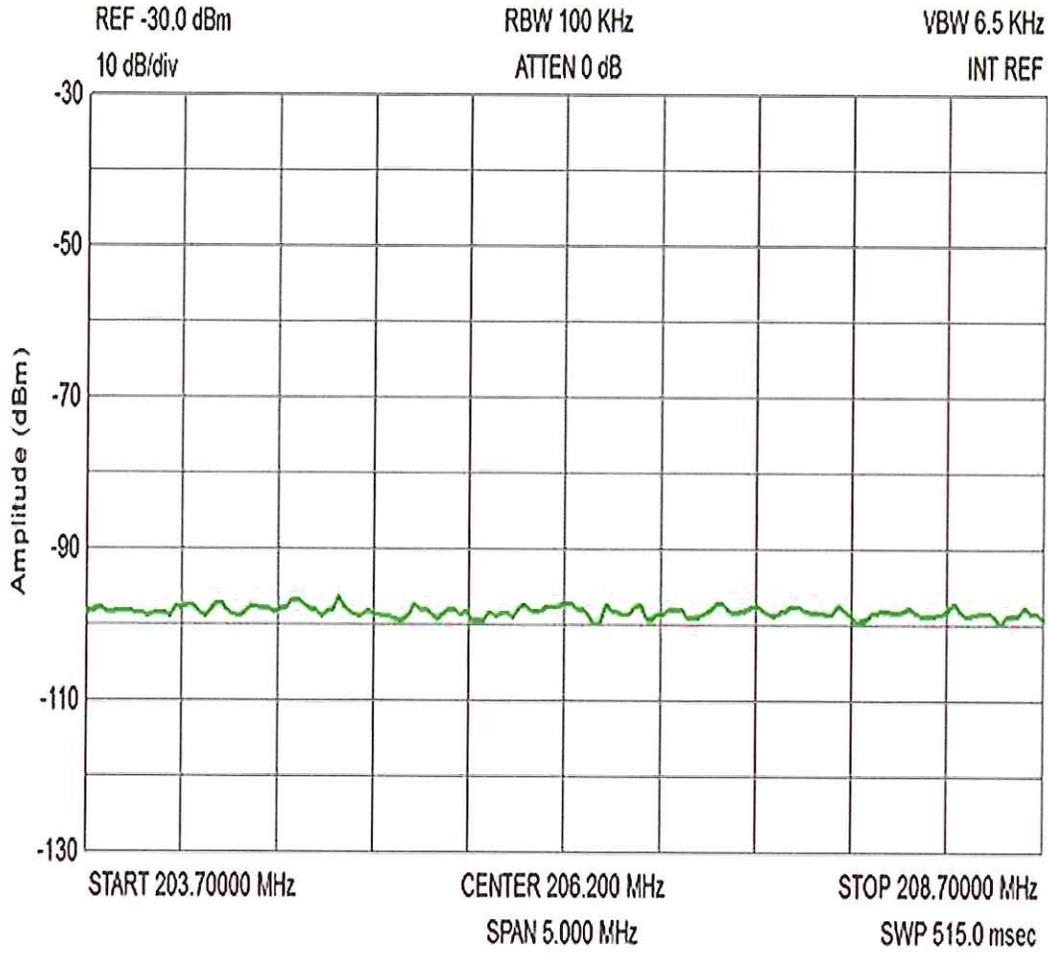


112.1 MHz Spectra, with tunable bandpass filter tuned for this frequency

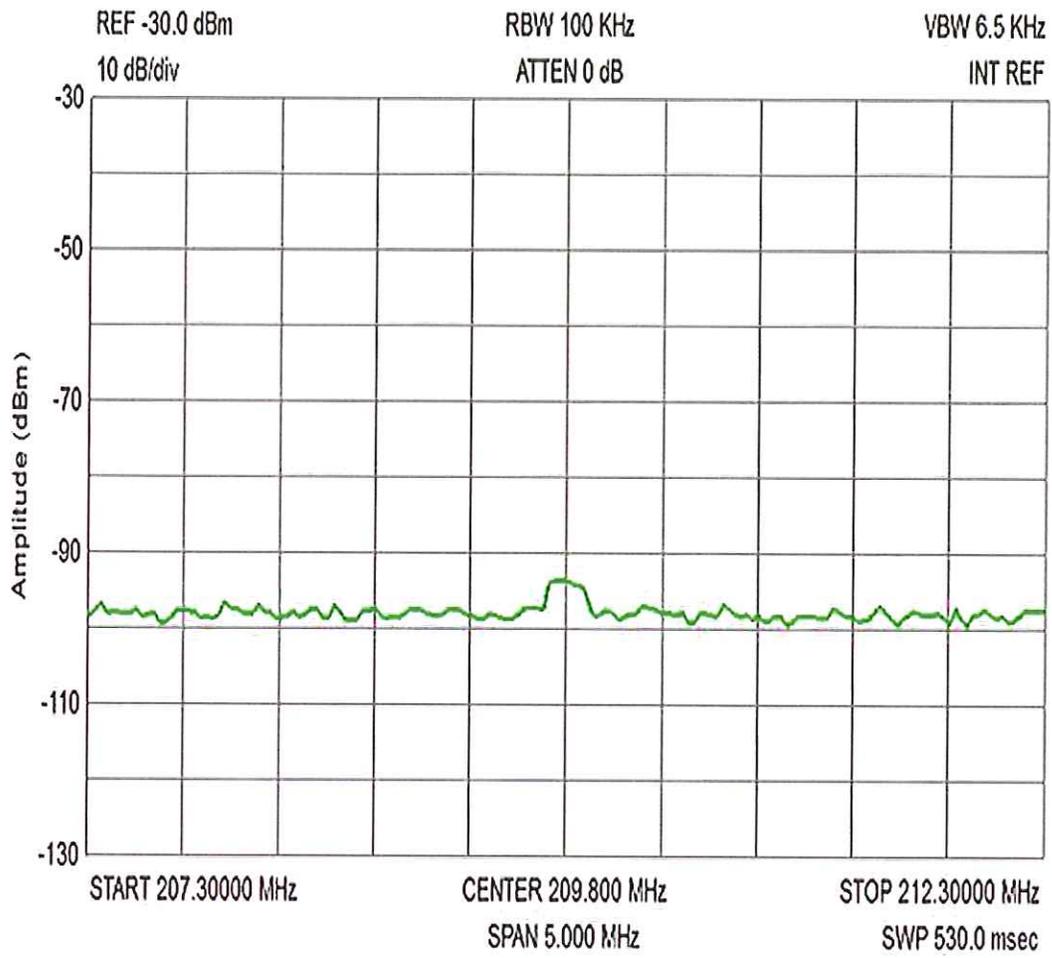


199 MHz Spectra, with FM band stop filter

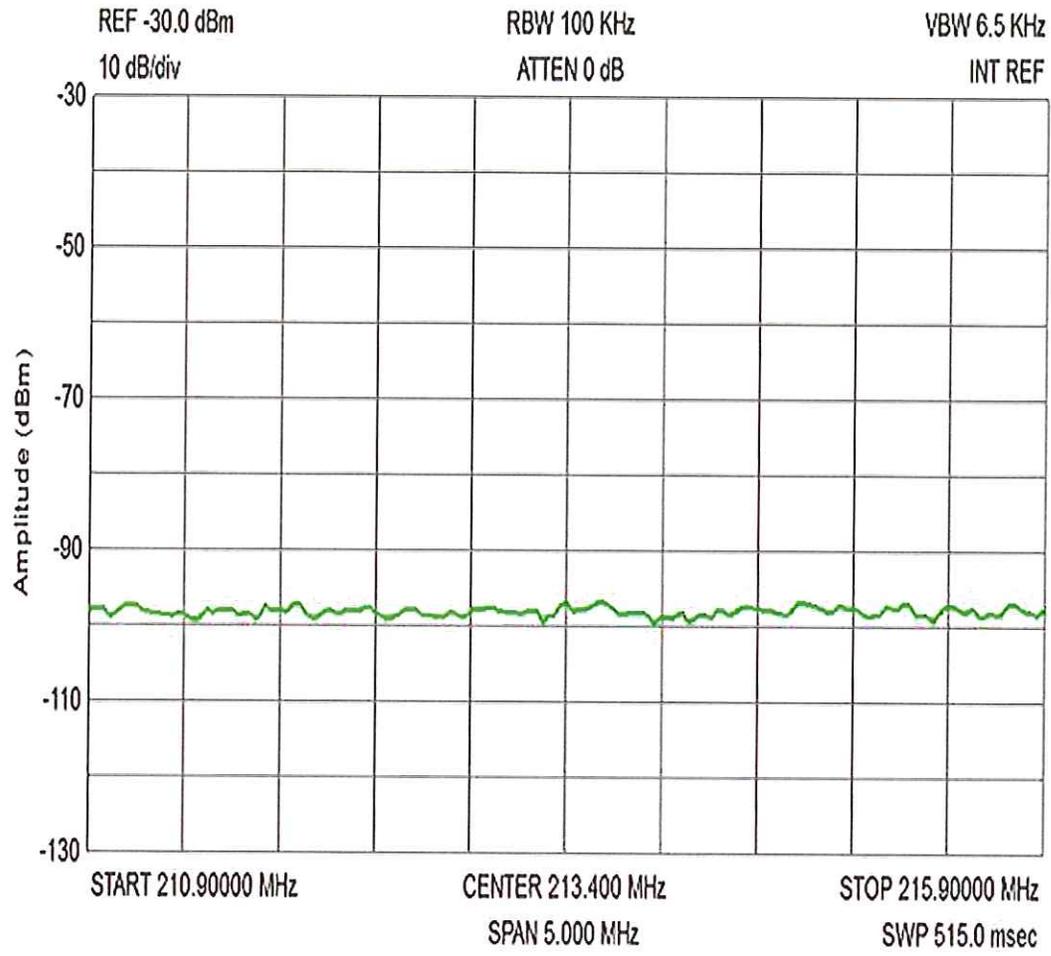




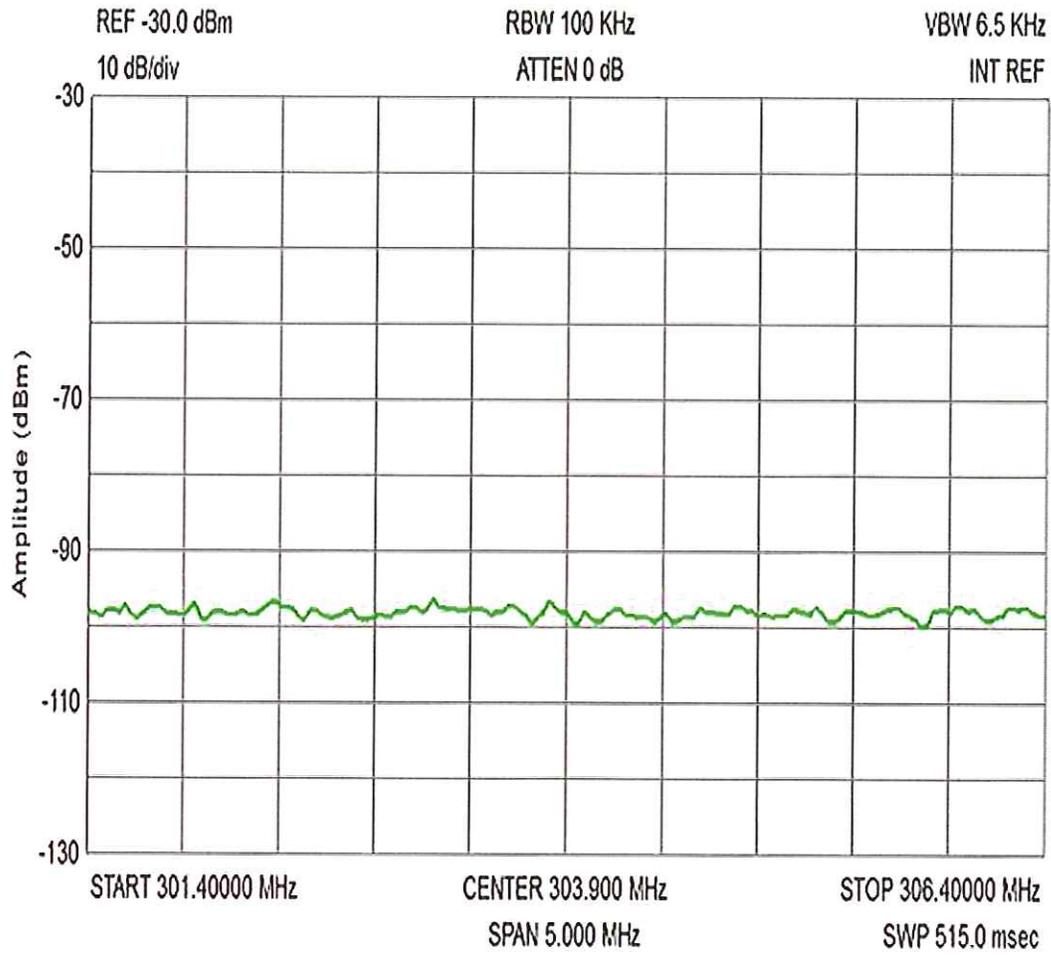
206.2 MHz Spectra, with FM band stop filter



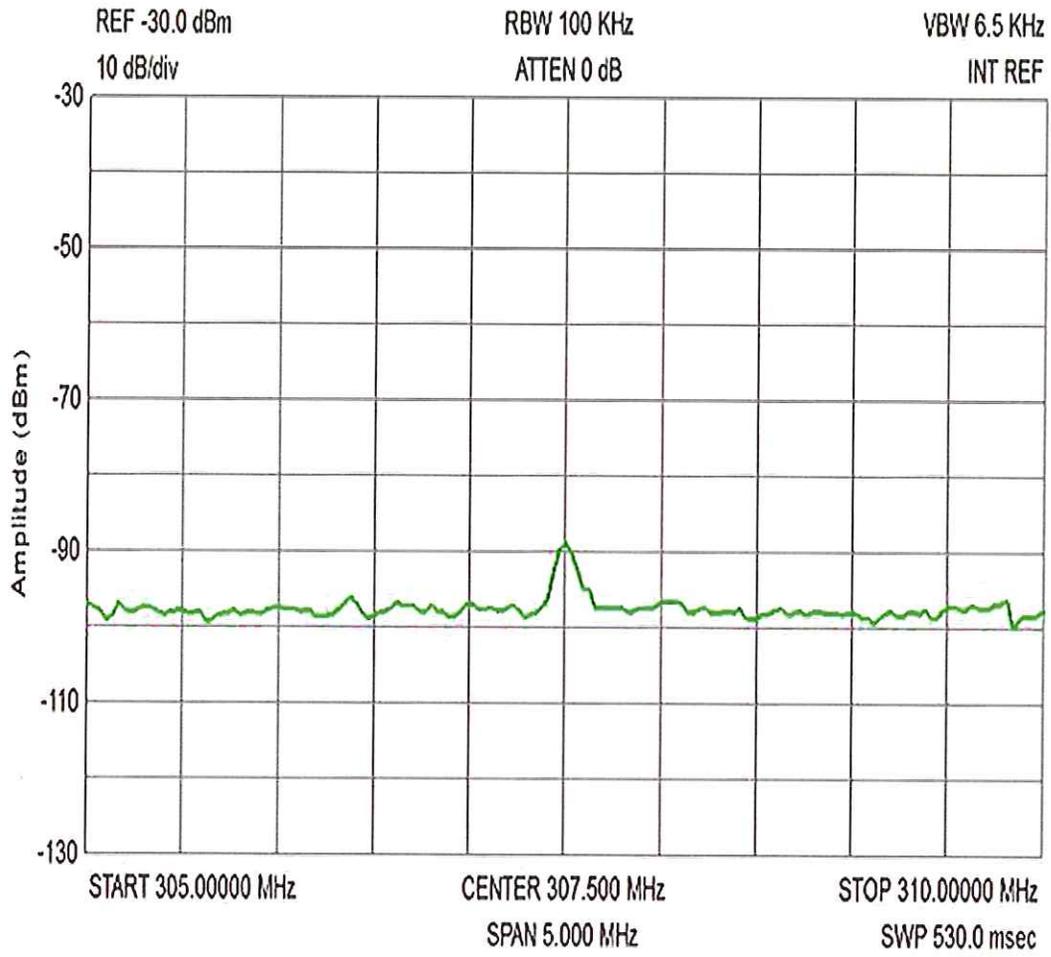
209.8 MHz Spectra, with FM band stop filter



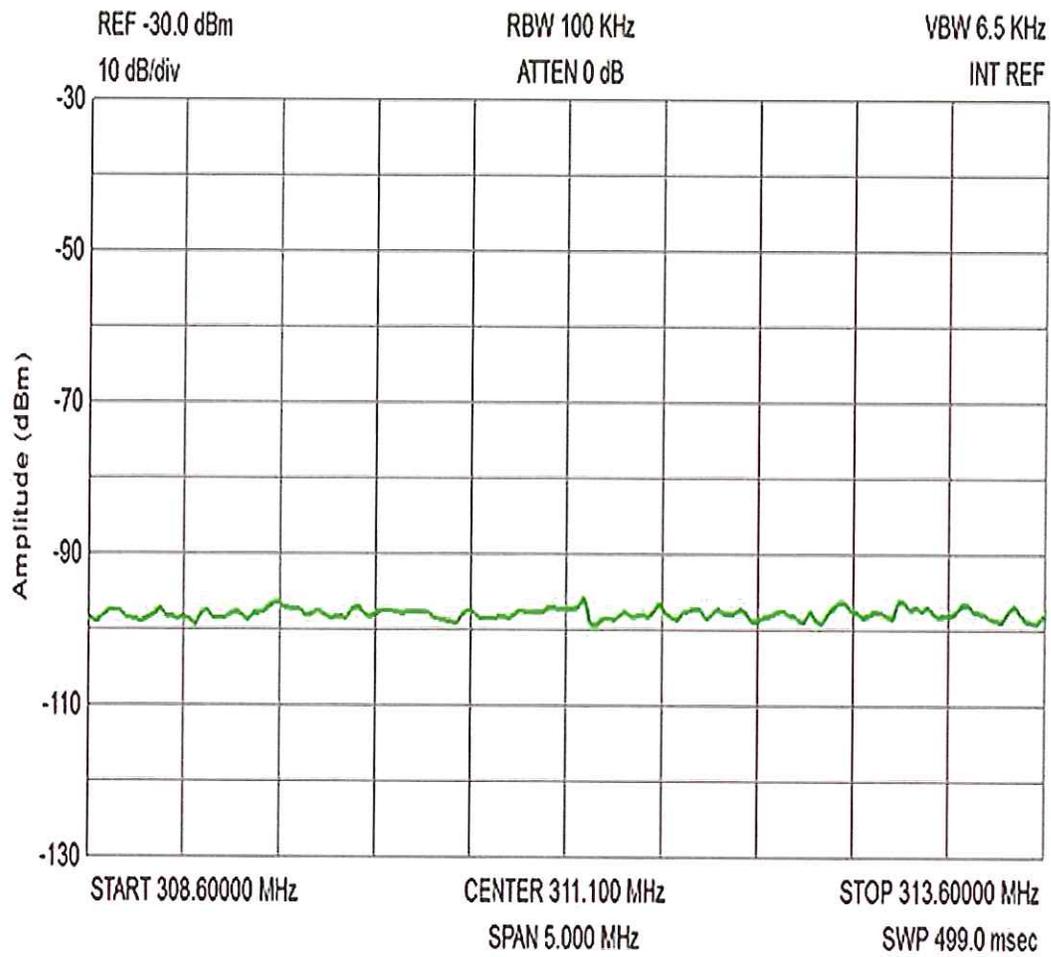
213.4 MHz Spectra, with FM band stop filter



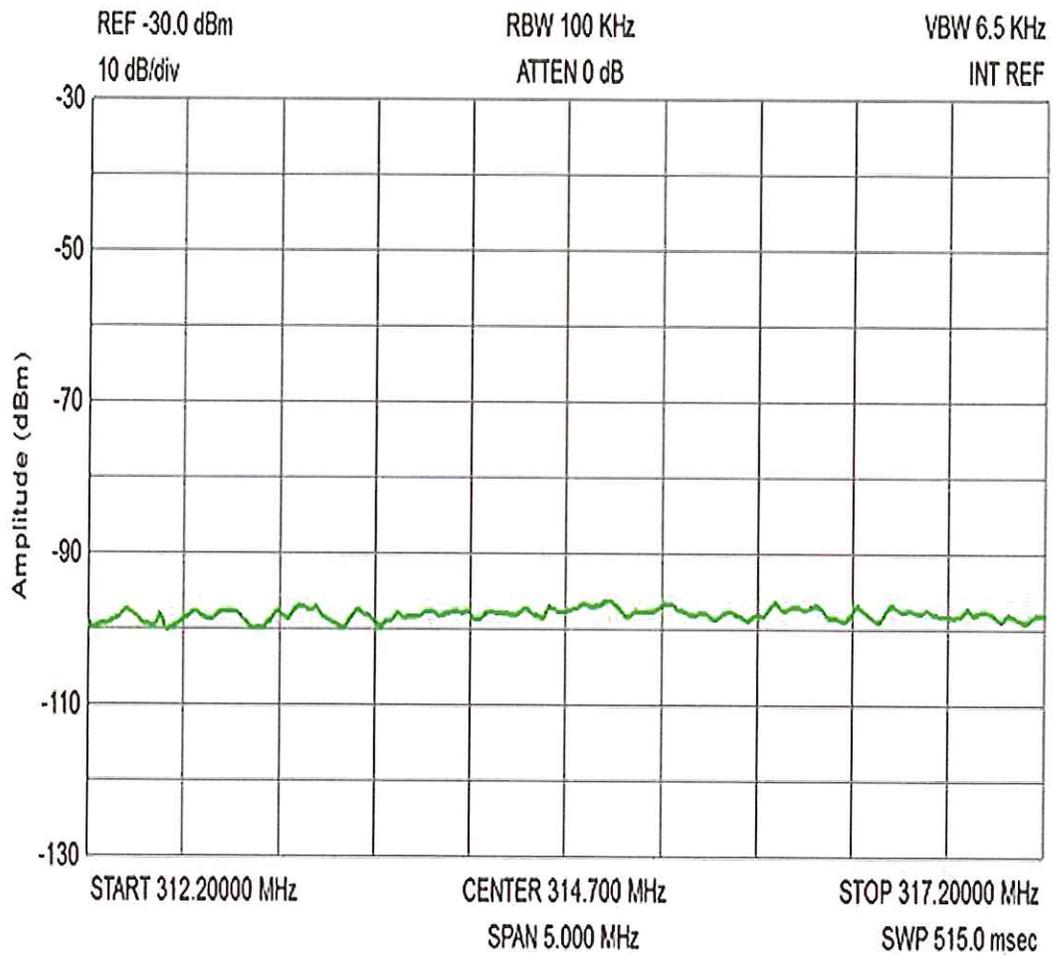
303.9 MHz Spectra, with FM band stop filter



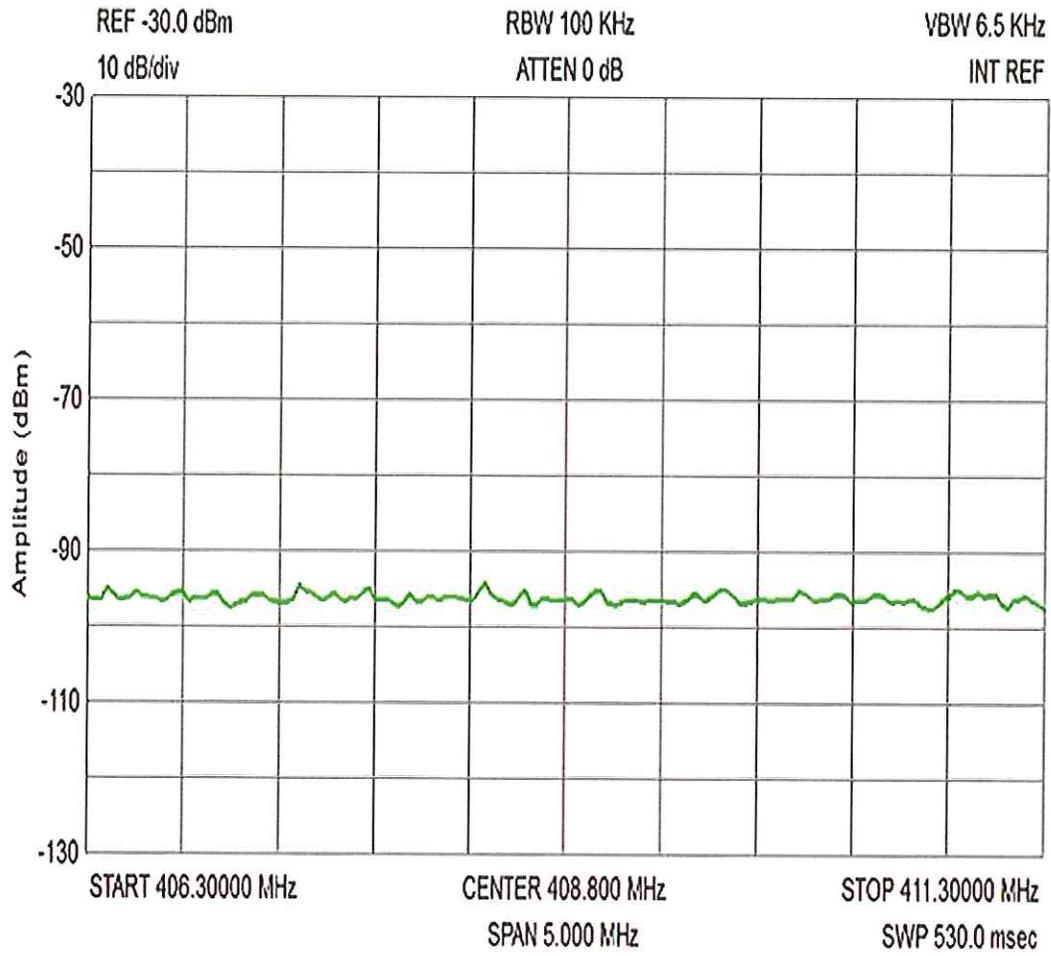
307.5 MHz Spectra, with FM band stop filter



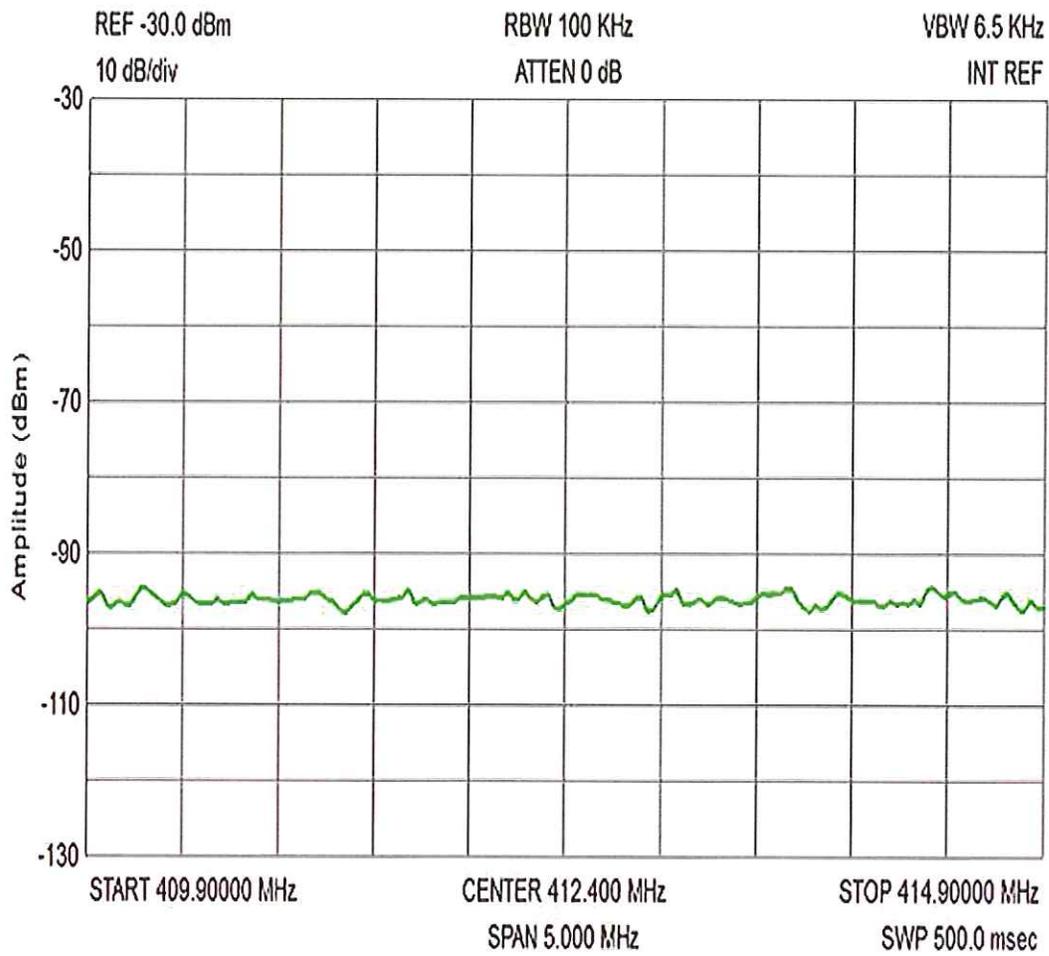
311.1 MHz Spectra, with FM band stop filter



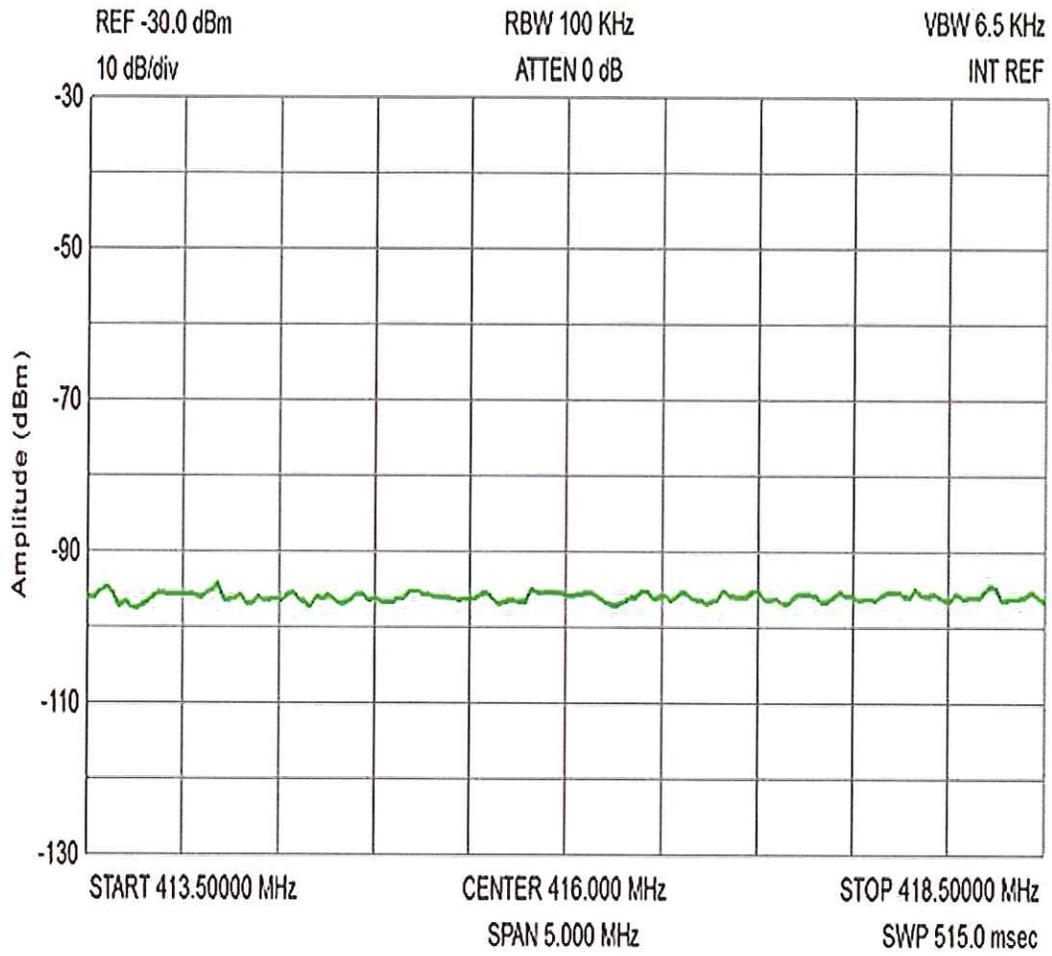
314.7 MHz Spectra, with FM band stop filter



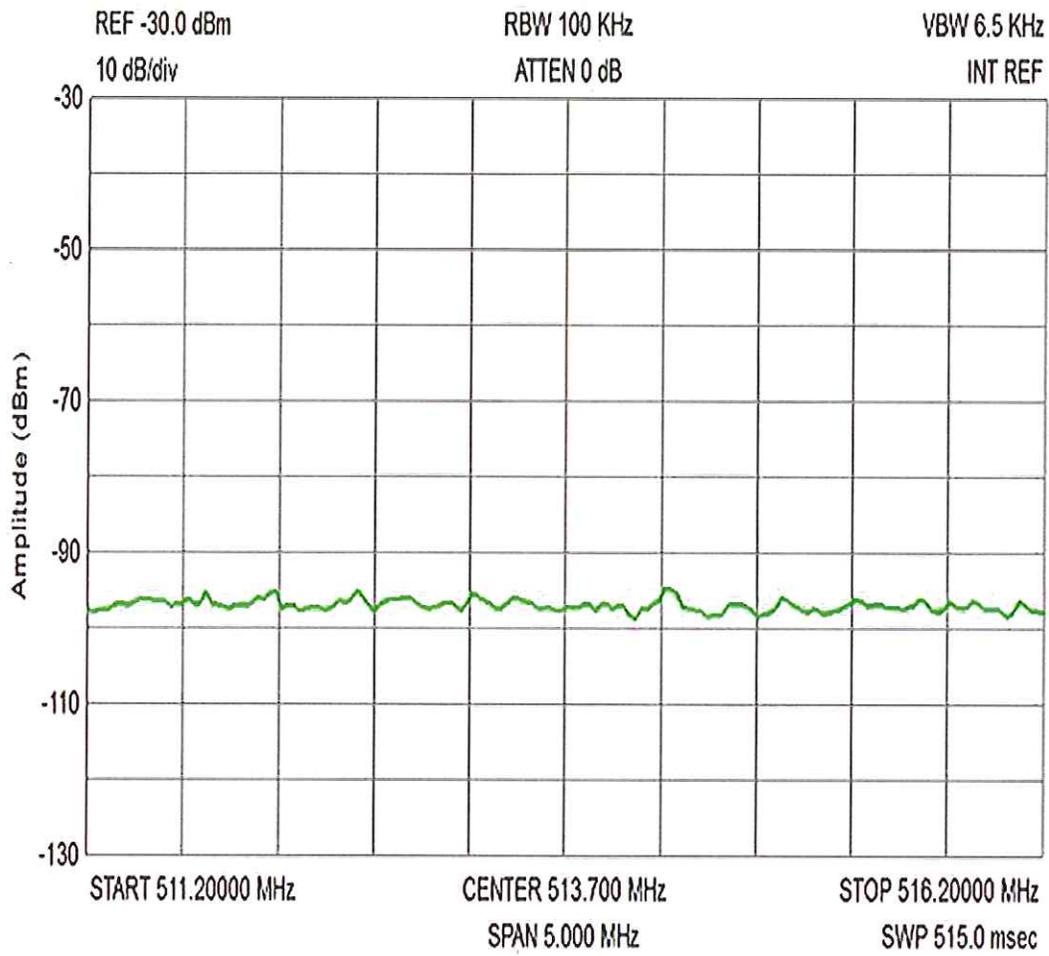
408.8 MHz Spectra, with FM band stop filter



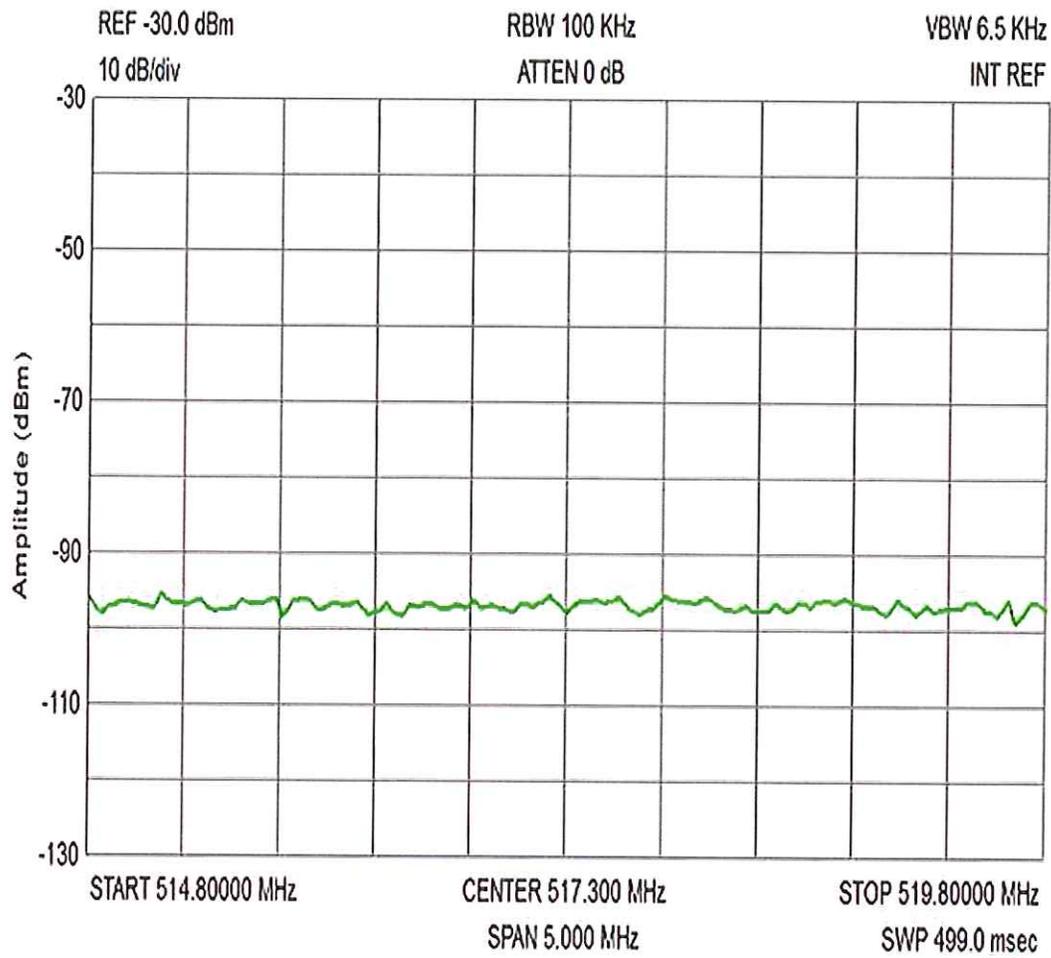
412.4 MHz Spectra, with FM band stop filter



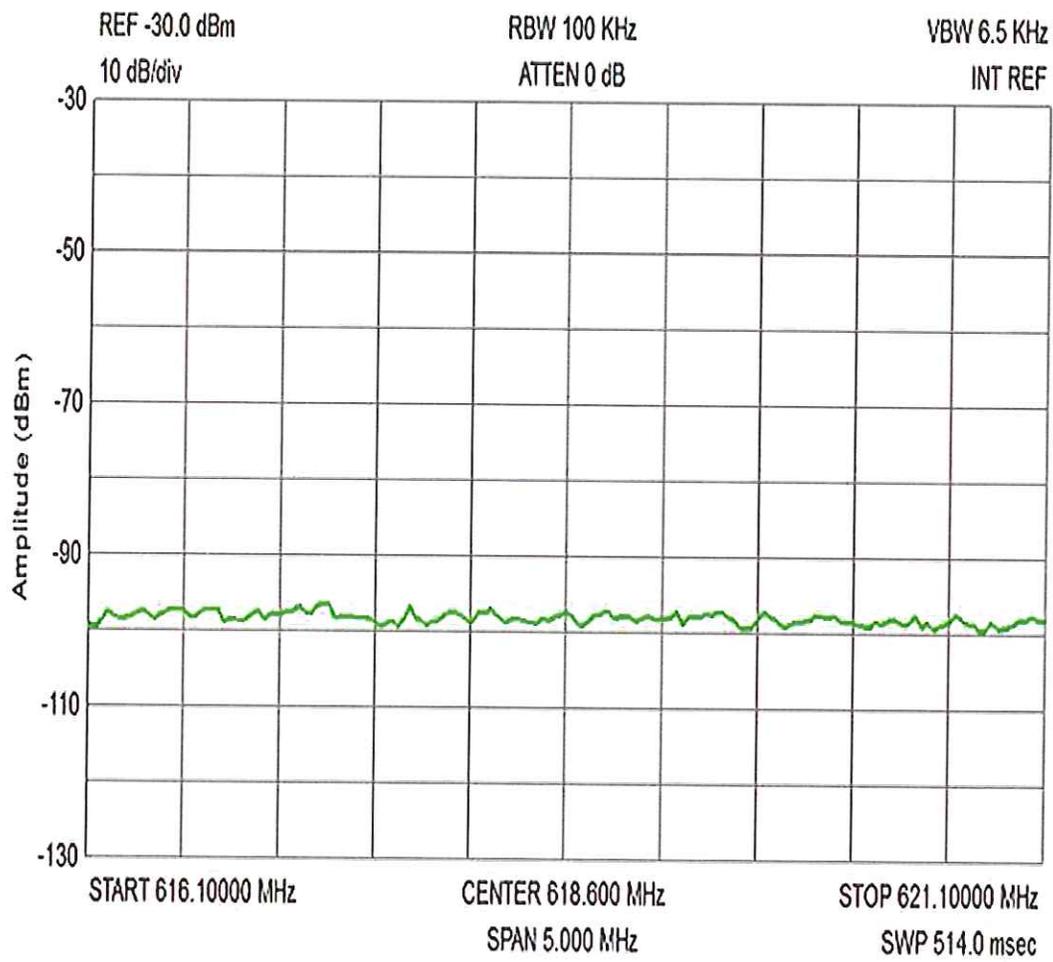
416 MHz Spectra, with FM band stop filter



513.2 MHz Spectra, with FM band stop filter



517.3 MHz Spectra, with FM band stop filter



618.6 MHz Spectra, with FM band stop filter