

# **Field Service Report FM Combiner and Antenna System**

**Terre Haute, IN.  
Broadcast Facility**

**ERI Aux Antenna: SHPX-4AC  
ERI 783-4 "T" Combiner  
99.9 MHz. ~ 100.7 MHz.  
Feedline: Comscope 3" Flex  
HJ8-50B 335 Feet and**

**WTHI-FM 99.9 MHz. ~ WMGI 100.7 MHz.**

**ERI Project # 39175C**

**May 10, 2023**

**Submitted By:**

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## INTRODUCTION

Listed below is a summary of the data and attached are the plots collected from the WTHI-FM ~ WMGI transmission site in Terre Haute, IN. by Jeff Taylor May 10, 2022.

- The antenna is an SHPX-4AC.
- The combiner is a 783-4 "T" Combiner.
- Equipment used for testing combiner was a Copper Mountain S5048 VNA.
- Equipment used for filter to antenna testing was a Rohde & Schwarz ZVL3 VNA with amp.
- Equipment used for feedline and antenna testing was a Rohde & Schwarz ZVL3 VNA with amp.
- All output measurements of the combiner system were taken at the 3 1/8" output directional coupler unless noted otherwise.
- All input measurements of the ERI products were taken at the 3 1/8" input directional couplers.
- All feedline and antenna measurements were taken on the 3 1/8" flex in the transmitter room.

**Site Address:** 4137 West National Drive  
West Terre Haute, IN. 47885

**Attendees:** Jeff Taylor and Troy Knotts Electronics Research, Inc.  
Keven Berlen Station Engineer

The reason for this Field Service Trip was to install the ERI filter system and conduct intermodulation measurements.

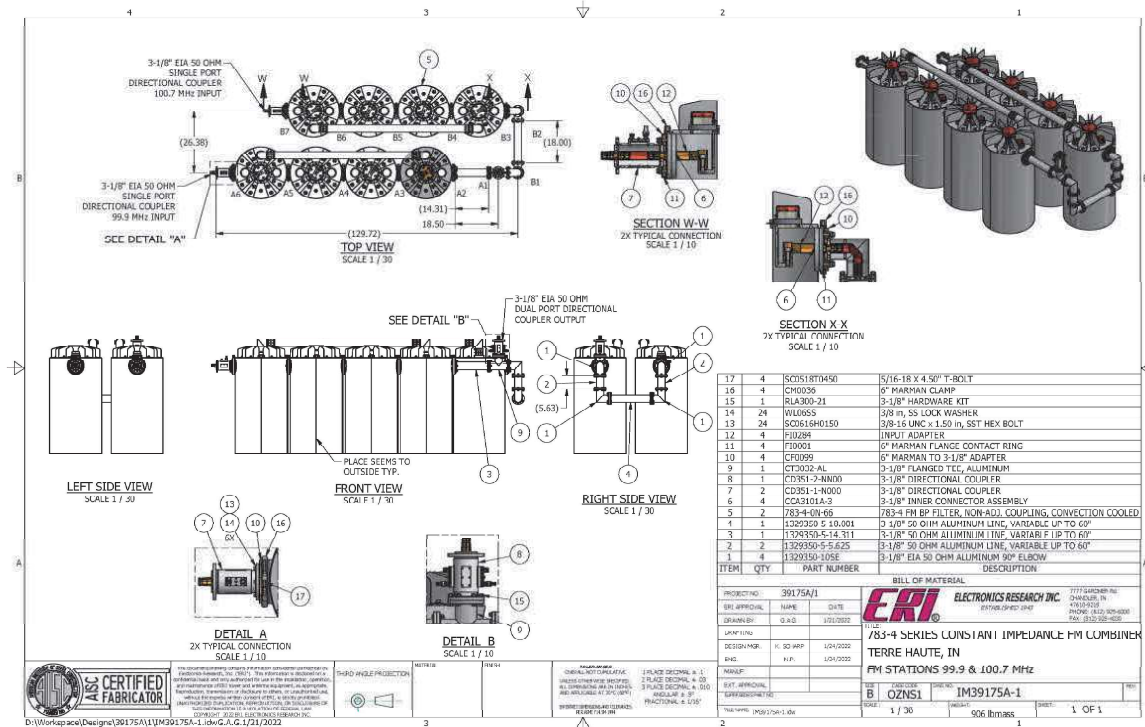
## SUMMARY and RECOMMENDATIONS

All measurements were taken by Jeff Taylor of Electronics Research Inc. May 2023.

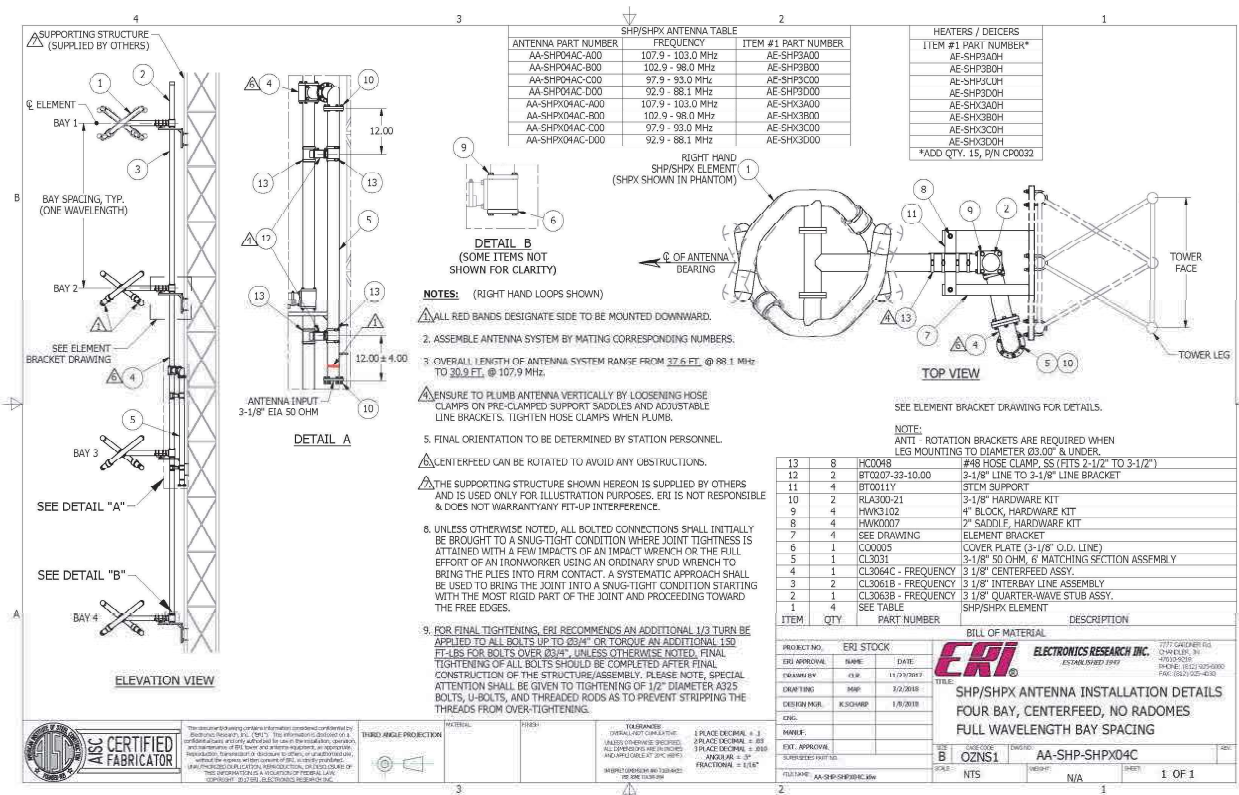
Sincerely Jeff Taylor

# DRAWINGS

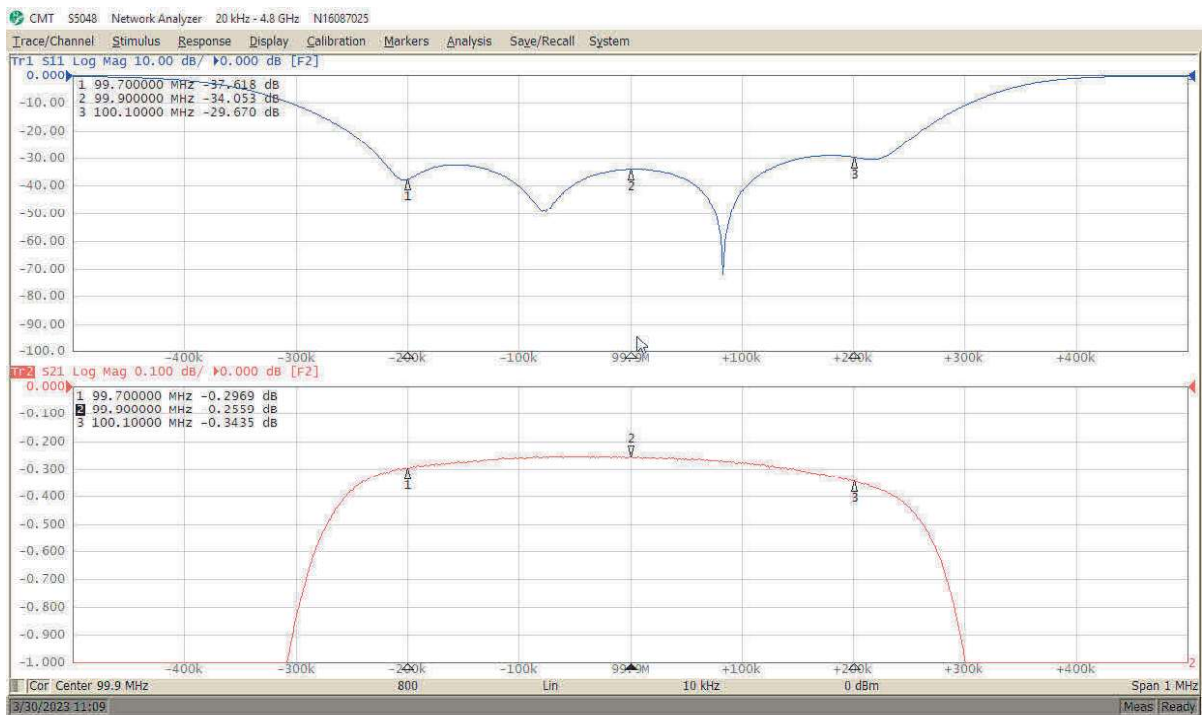
Drawing 1: Combiner Drawing.



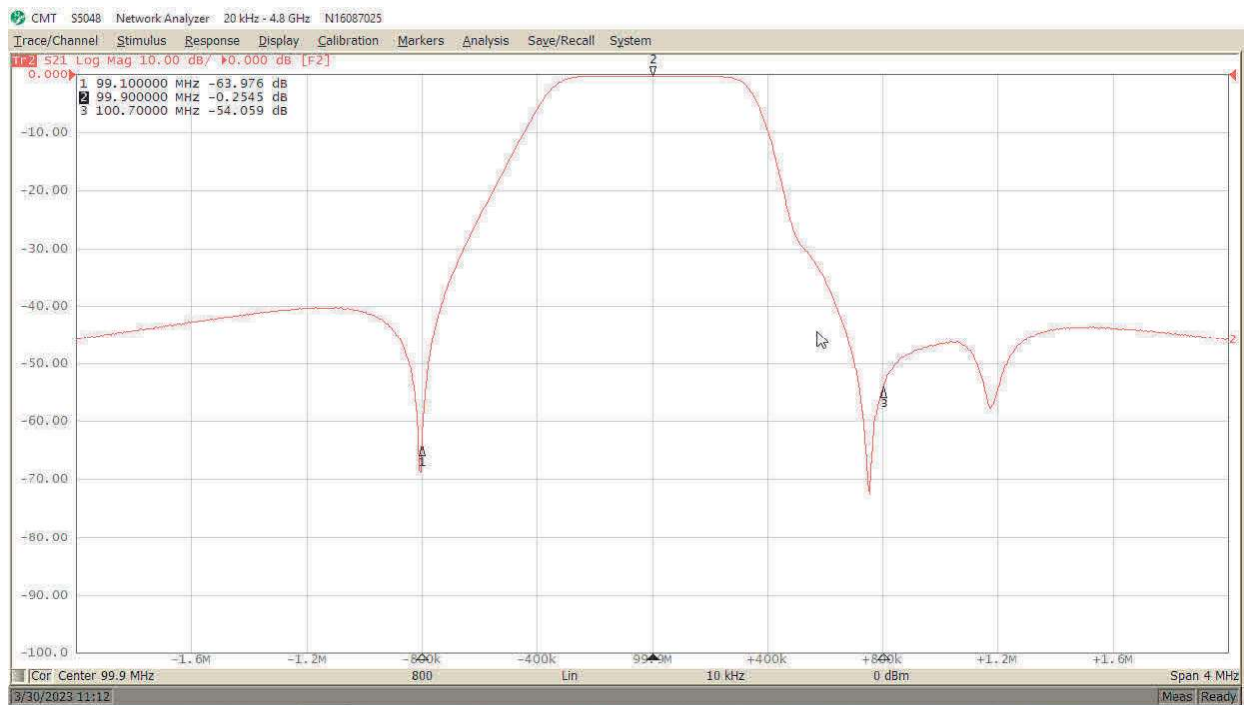
### Drawing 2: Antenna Drawing.



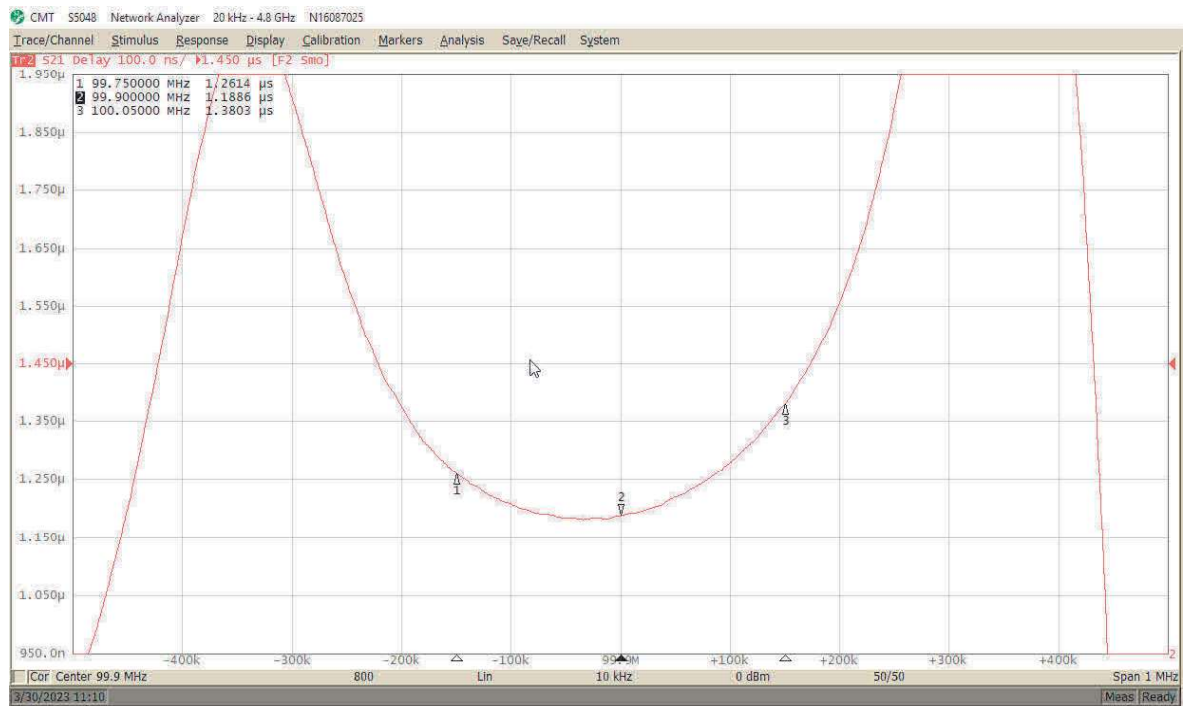
### Measurement 1: Match and Insertion Loss of 99.9 MHz.



### Measurement 2: Isolation +/- 800 KHz. of 99.9 MHz.

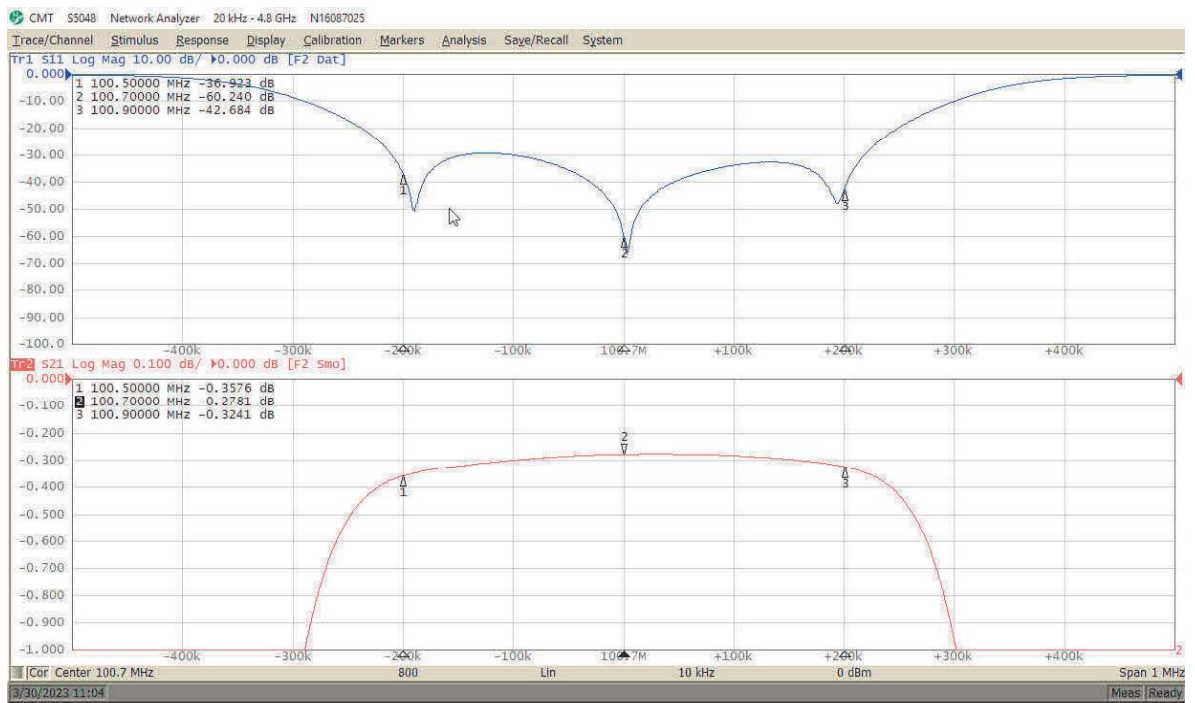


### Measurement 3: Group Delay of 99.9 MHz.





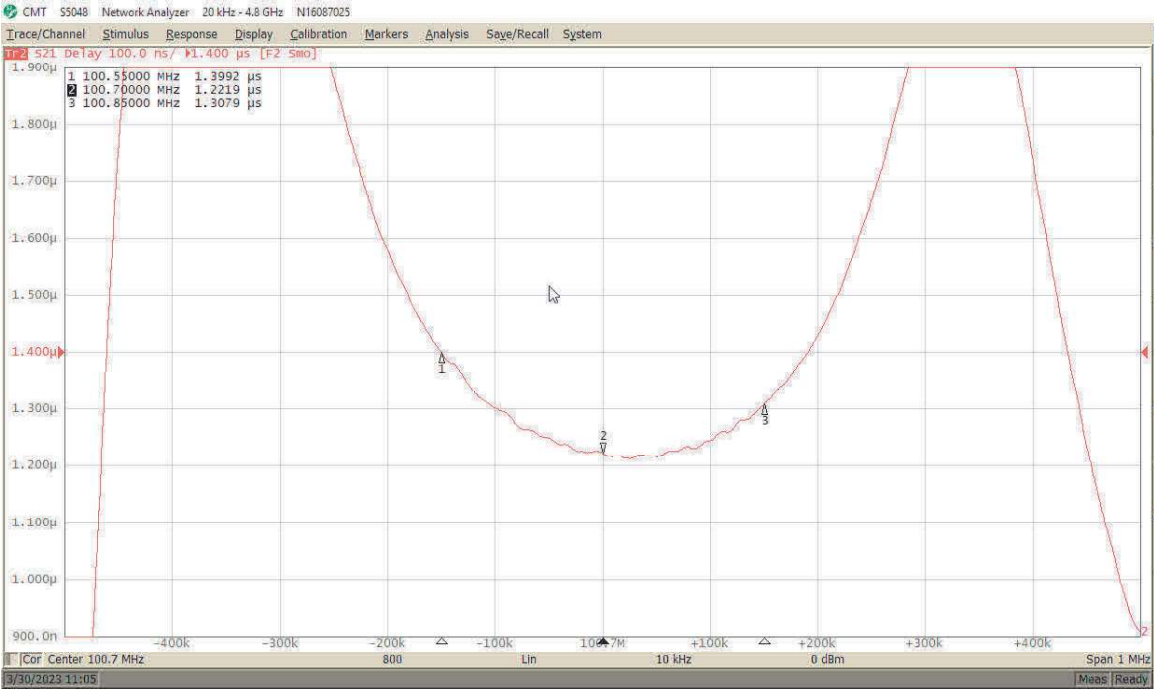
#### Measurement 4: Match and Insertion Loss of 100.7 MHz.



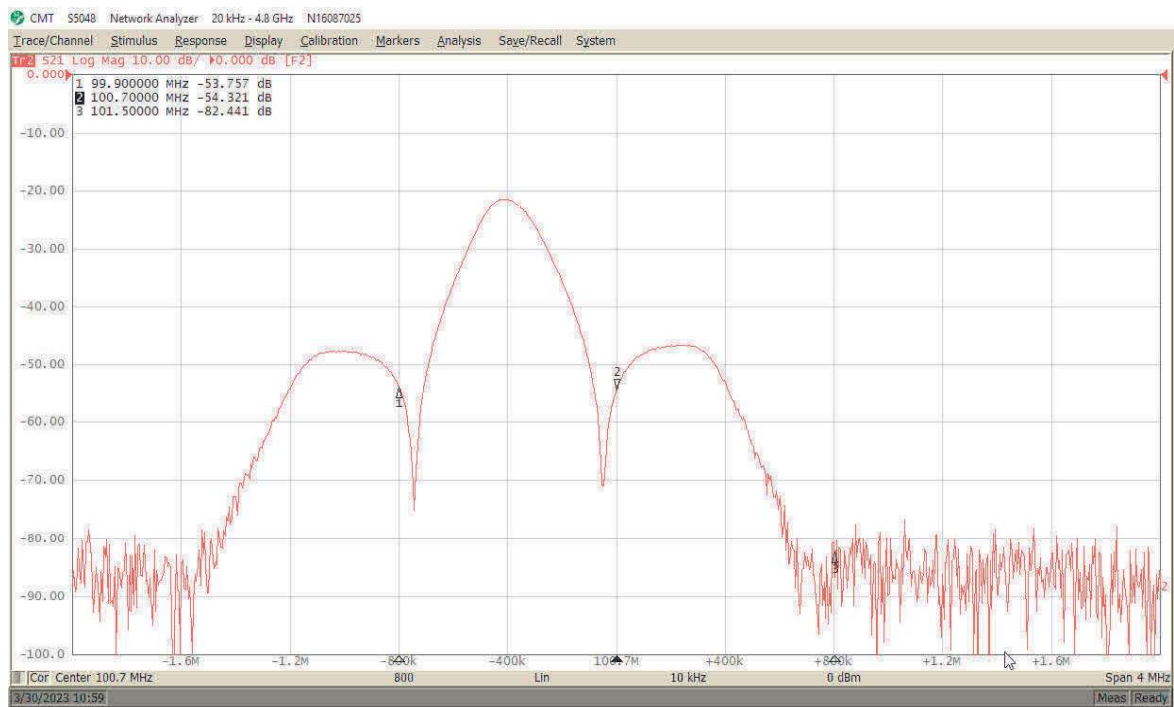
### Measurement 5: Isolation +/- 800 KHz. of 100.7 MHz.



Measurement 6: Group Delay of 100.7 MHz.



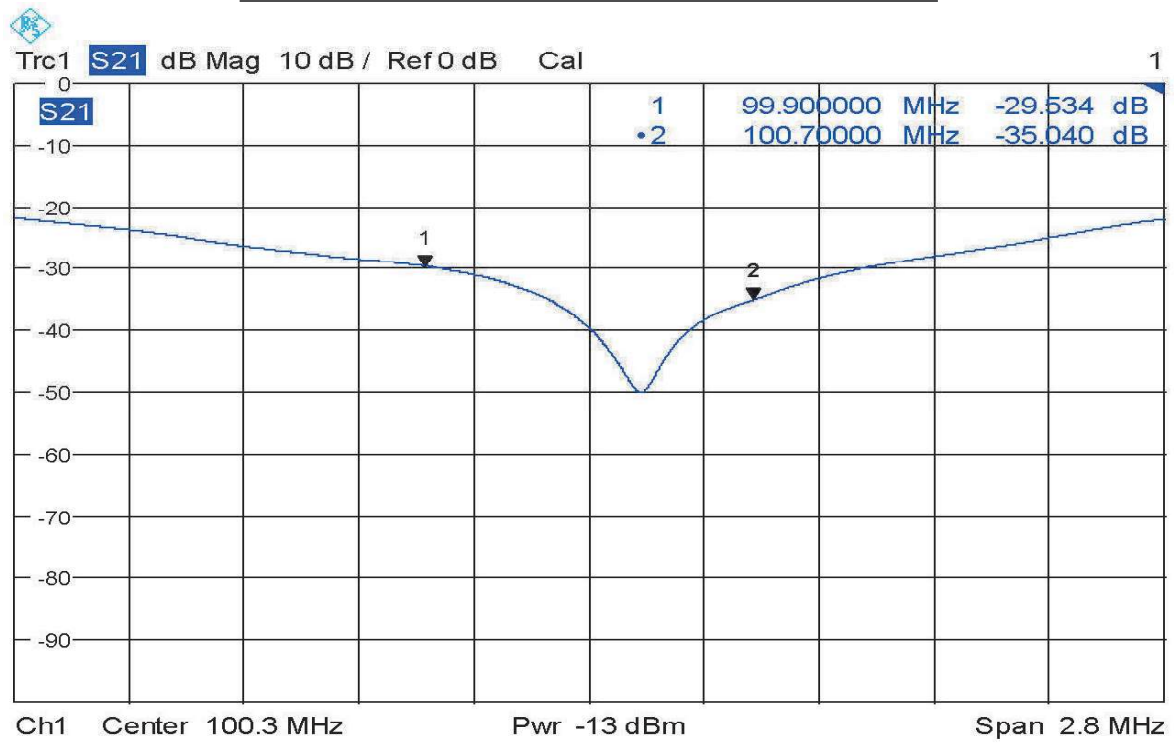
### Measurement 7: Port to Port Isolation 99.9 to 100.7 MHz.



**Measurement 8: Antenna Match 99.9 and 100.7 MHz.**

Return Loss Measurement.

Final Antenna with  $\frac{1}{4}$ " Slug @ 40  $\frac{1}{2}$ " Bottom of Inner to Bottom of Slug.

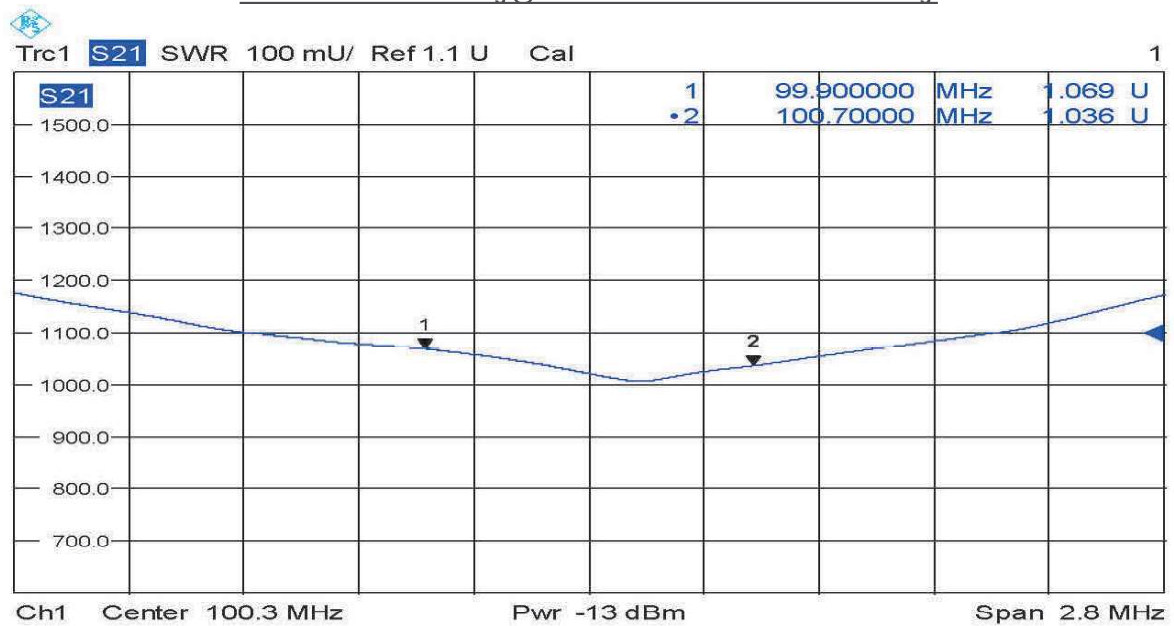


Date: 22.OCT.2022 11:07:18

### Measurement 9: Antenna Match 99.9 and 100.7 MHz.

VSWR Measurement.

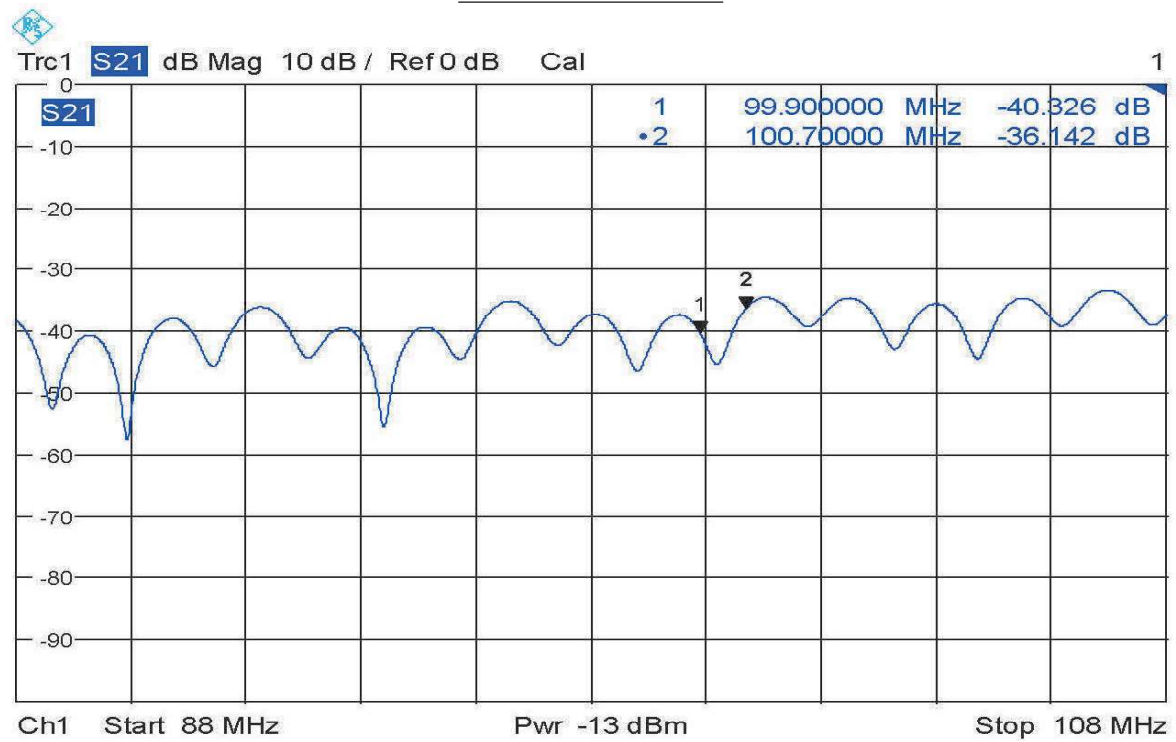
Final Antenna with  $\frac{1}{4}$ " Slug @ 40  $\frac{1}{2}$ " Bottom of Inner to Bottom of Slug.



Date: 22.OCT.2022 11:07:40

**Measurement 10: 88 to 108 MHz. Sweep of Feedline with 50-ohm Load.**

**Return Loss Measurement.**



Date: 22.OCT.2022 10:27:10

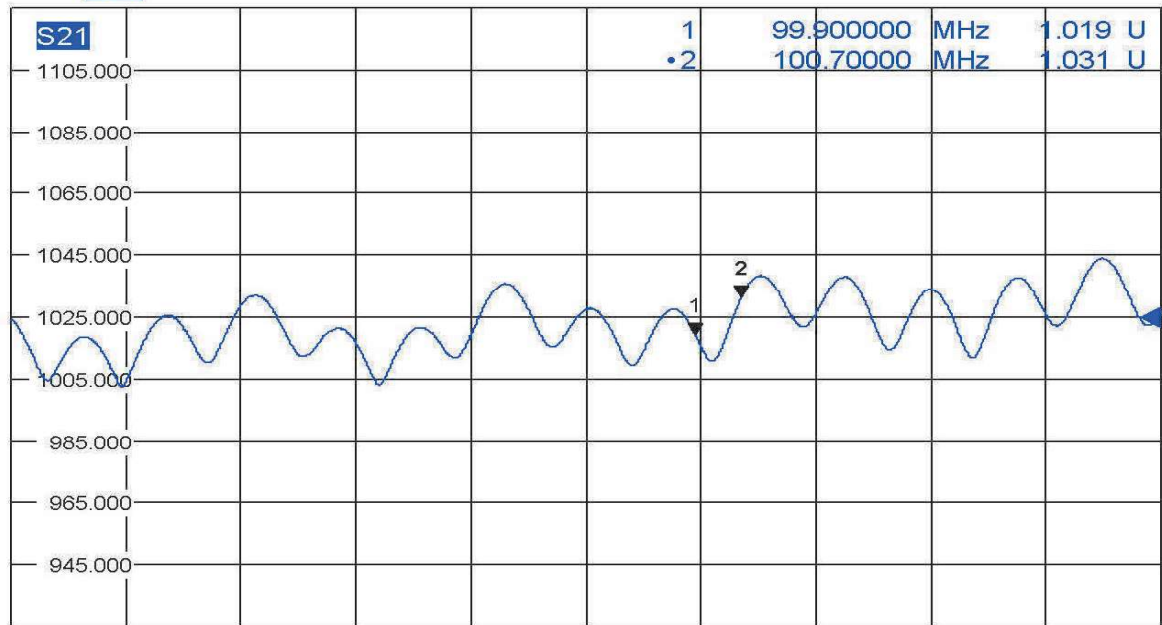
**Measurement 11: 88 to 108 MHz. Sweep of Feedline with 50-ohm Load.**

VSWR Measurement.



Trc1 **S21** SWR 20 mU/ Ref 1.025 U Cal

1



Ch1 Start 88 MHz Pwr -13 dBm Stop 108 MHz

Date: 22.OCT.2022 10:27:28



**Measurement 12: 50 to 400 MHz Sweep of Feedline with 50-ohm Load.**

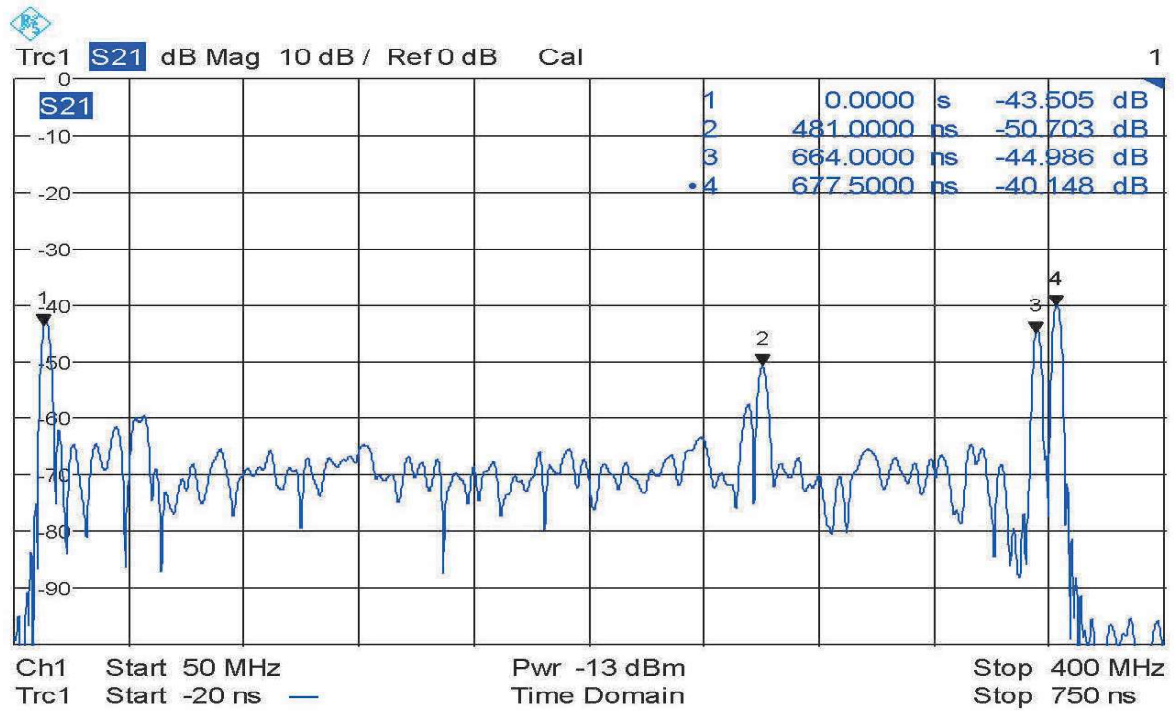
TDR Return Loss Measurement.

Mkr#1 is Test location @ Zero Feet.

Mkr#2 is the Hoisting Grip @ Approx. 220 Feet.

Mkr#3 is the Other Hoisting Grip @ Approx. 304 Feet.

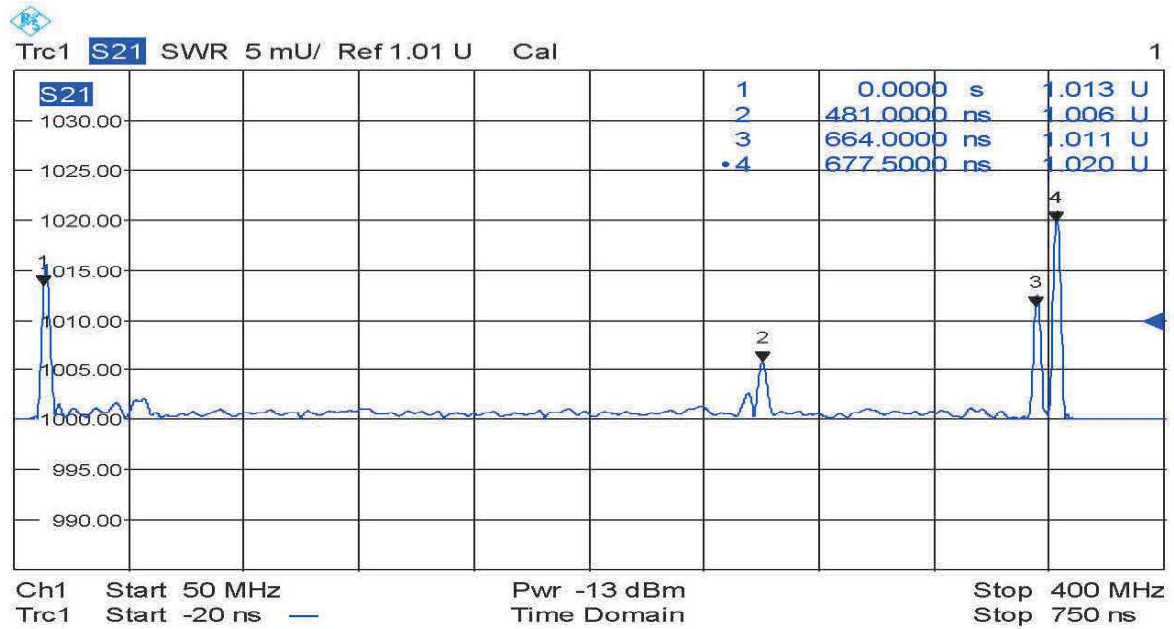
Mkr#3 is the 50-ohm Load @ Approx. 310 Feet.



Date: 22.OCT.2022 10:29:42

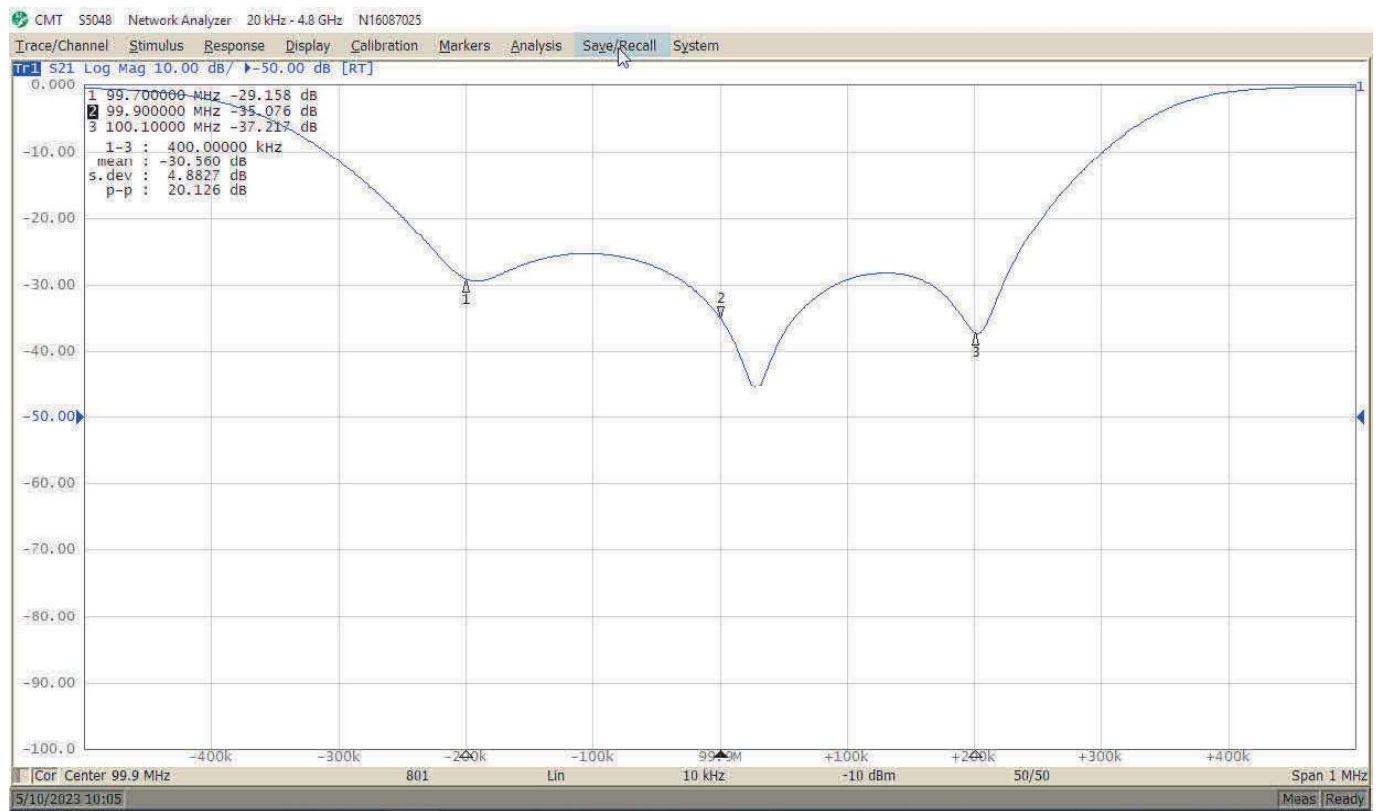
**Measurement 13: 50 to 400 MHz Sweep of Feedline with 50-ohm Load.**

TDR VSWR Measurement.  
Mkr#1 is Test location @ Zero Feet.  
Mkr#2 is the Hoisting Grip @ Approx. 220 Feet.  
Mkr#3 is the Other Hoisting Grip @ Approx. 304 Feet.  
Mkr#3 is the 50-ohm Load @ Approx. 310 Feet.

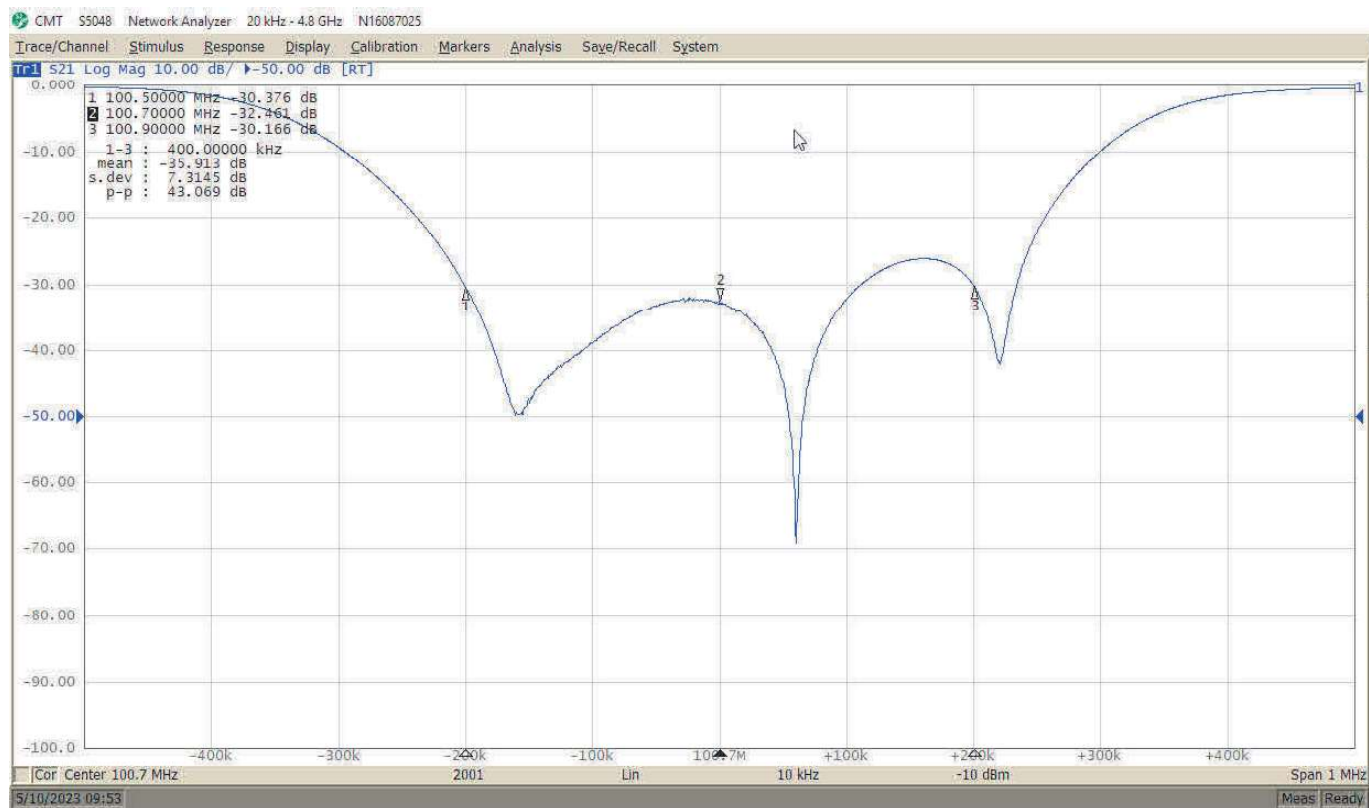


Date: 22.OCT.2022 10:30:00

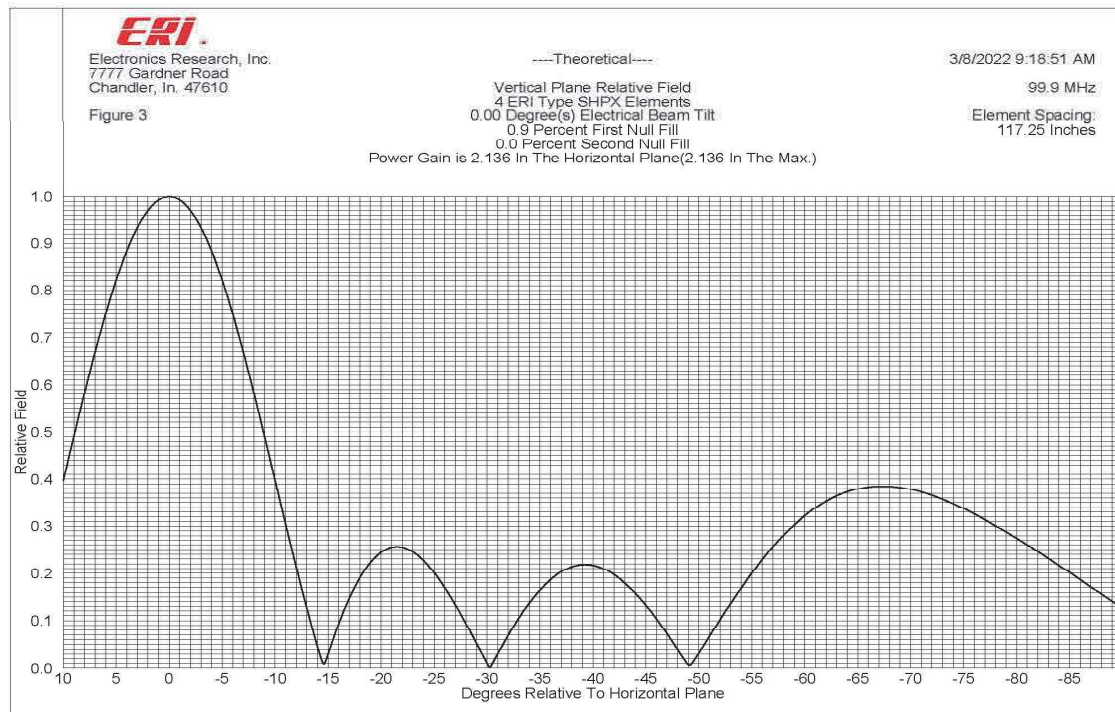
### Measurement 14: Filter to Antenna Measurement 99.9 MHz.



### Measurement 15: Filter to Antenna Measurement 100.7 MHz.



**Figure 1: Vertical Plane Relative Field Plot of 99.9 MHz.**



**Figure 2: Vertical Plane Relative Field Plot of 100.7 MHz.**

