

Field Service Report FM Combiner and Antenna System

Oakbrook Terrace, IL.
Broadcast Facility
ERI Antenna: SHPX-2AE-HW
ERI 955-4 "TEE" Combiner
Feedline: 1 5/8" Rigid 44' &
HJ7-50A 1 5/8" Andrew Flex 53'

WVIX – 93.5 MHz.
WJKL – 94.3 MHz.

ERI Project #25324B

May 12, 2017

Submitted By:

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Photo 2: Damaged Loop Adjustment.....	Error! Bookmark not defined.

INTRODUCTION

Listed below is a summary of the data and attached are the plots collected from the WVIX ~ WJKL transmission site in Oakbrook Terrace, IL. by Troy Knotts May 12, 2017.

- The antenna is a SHPX-2AE-HW.
- The combiner is a 955-4 "TEE" Combiner.
- Equipment used for combiner testing is a Copper Mountain.
- Equipment used for filter to antenna and antenna testing is a Copper Mountain high RF setup.
- All measurements of the combiner were taken at the 1 5/8" input and at the 1 5/8" output "Tee".
- All feedline and antenna measurements were taken at the 1 5/8" flex connector in the transmitter room.

Site Address: 14 Tower Lane
Oakbrook Terrace, IL. 60181

Attendees: WVIX ~ WJKL Engineer Mike Dorris
ERI Technician – Troy Knotts

The reason for this Field Service Trip was to install and check the tune of the TEE combiner and proof the system.

Final measurements of the T-combiner were no worse than -32 dB, (1.04:1 VSWR) @ carrier and no worse than -31 dB, (1.05:1) +/- 200 KHz. of carrier for either frequency.

SUMMARY and RECOMMENDATIONS

All measurements were taken by Troy Knotts of Electronics Research Inc. May, 2017.

Sincerely,

Troy Knotts

DRAWINGS

Figure 1: Combiner Drawing

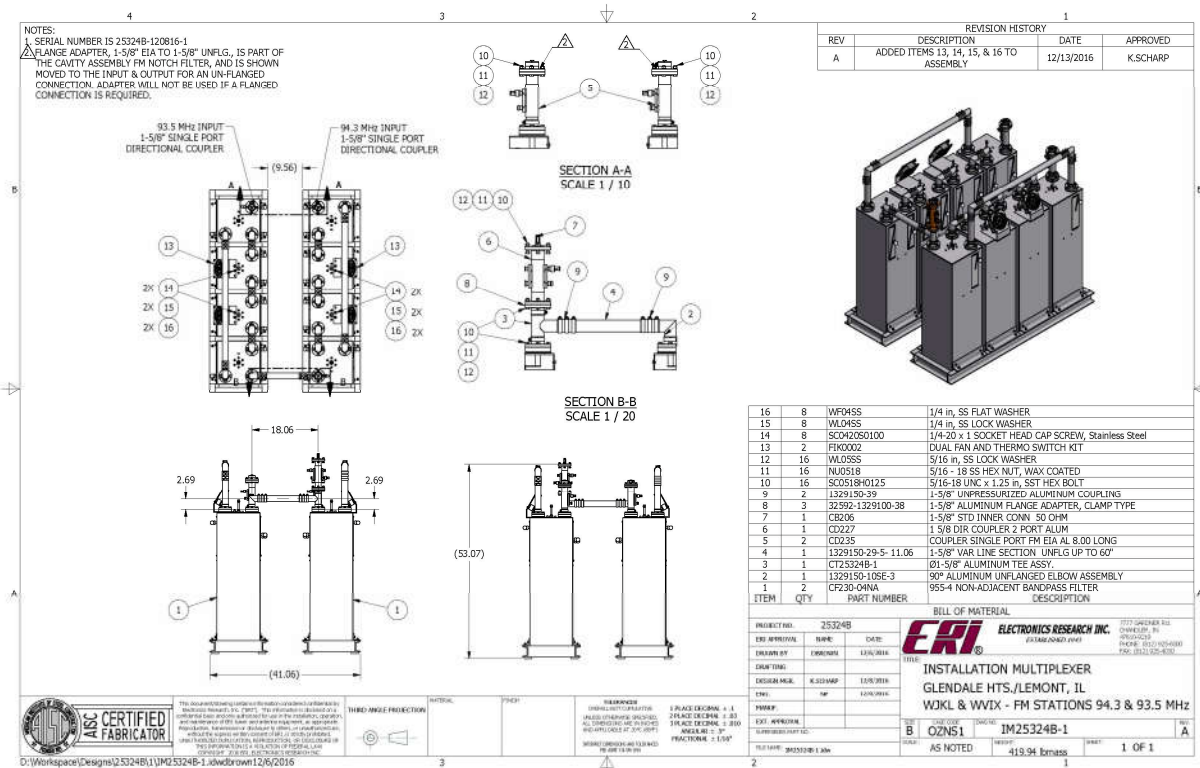
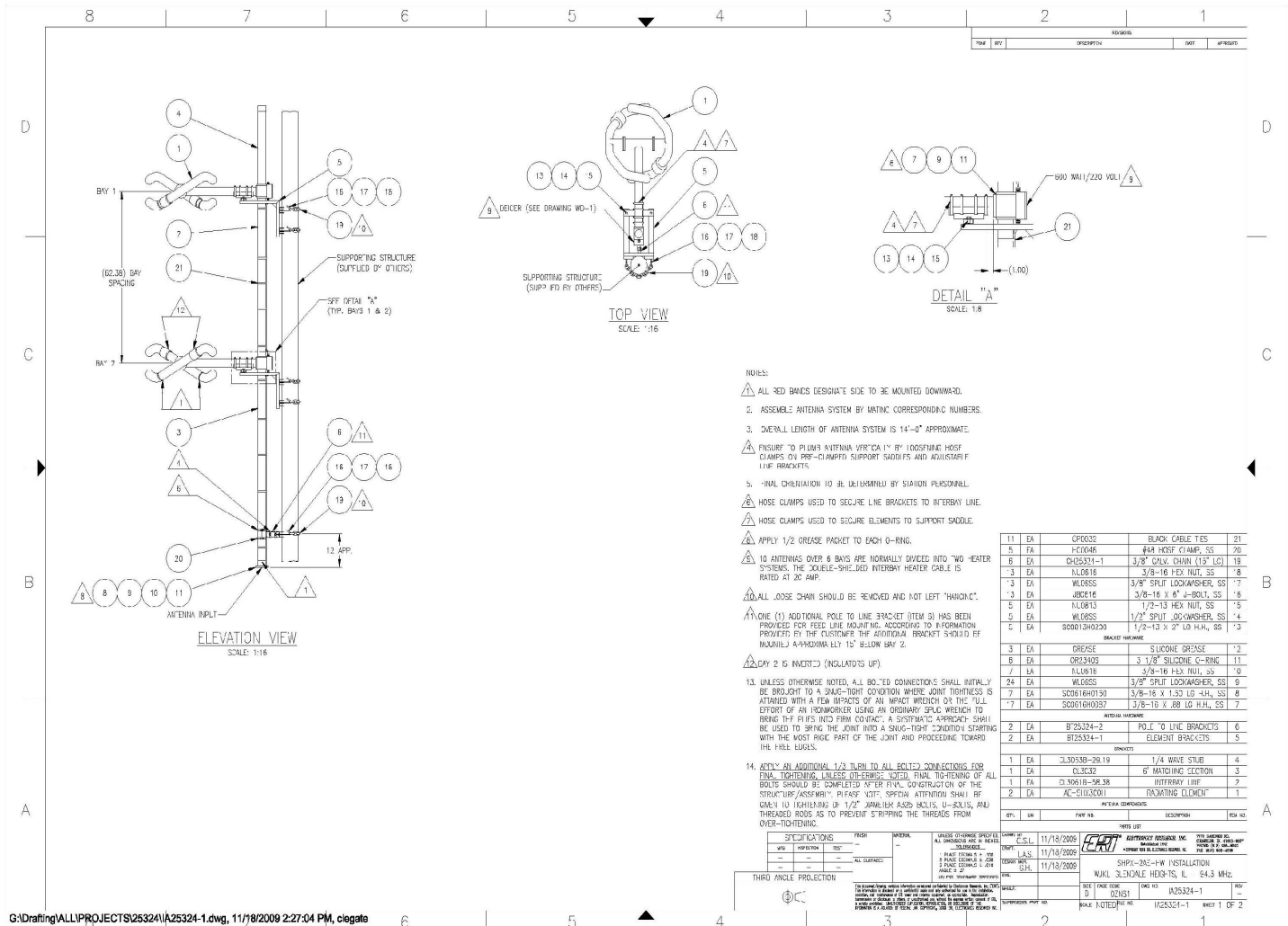
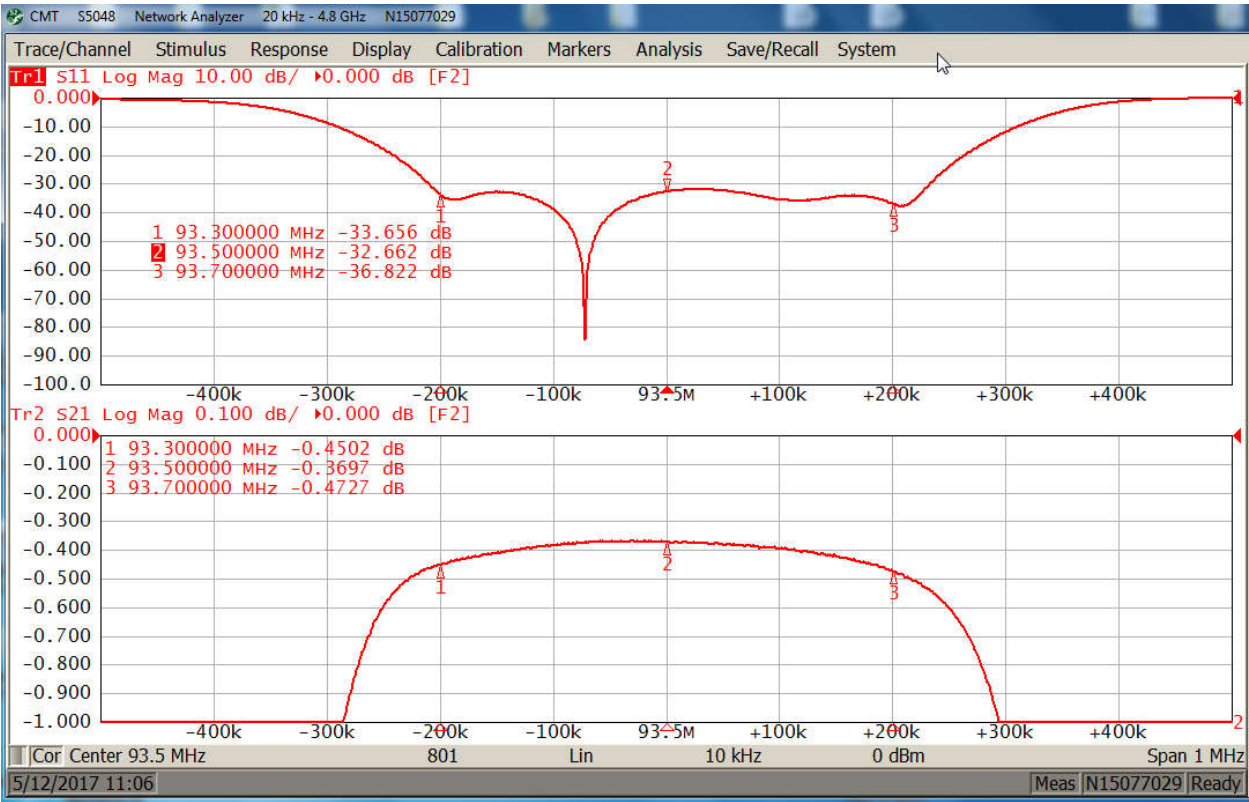


Figure 2: Antenna Drawing



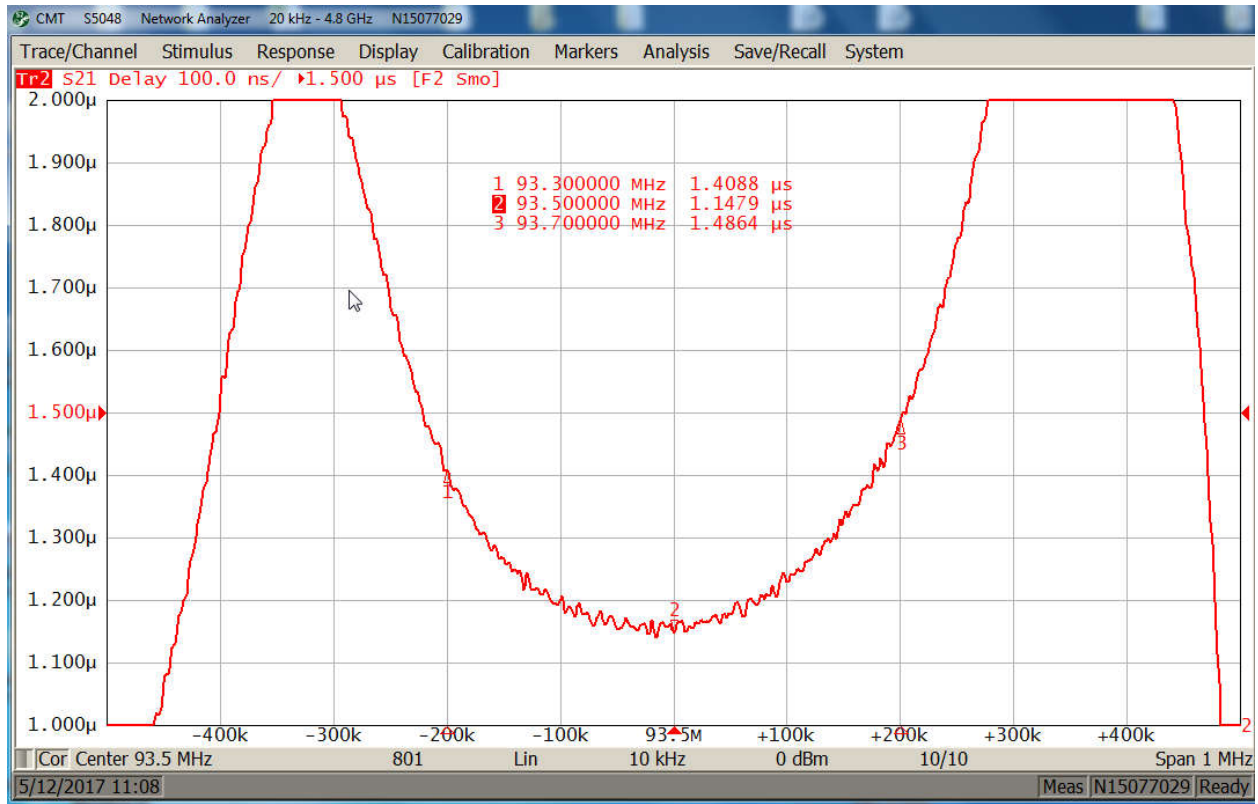
Measurement 1: Match and Insertion Loss of 93.5 MHz.



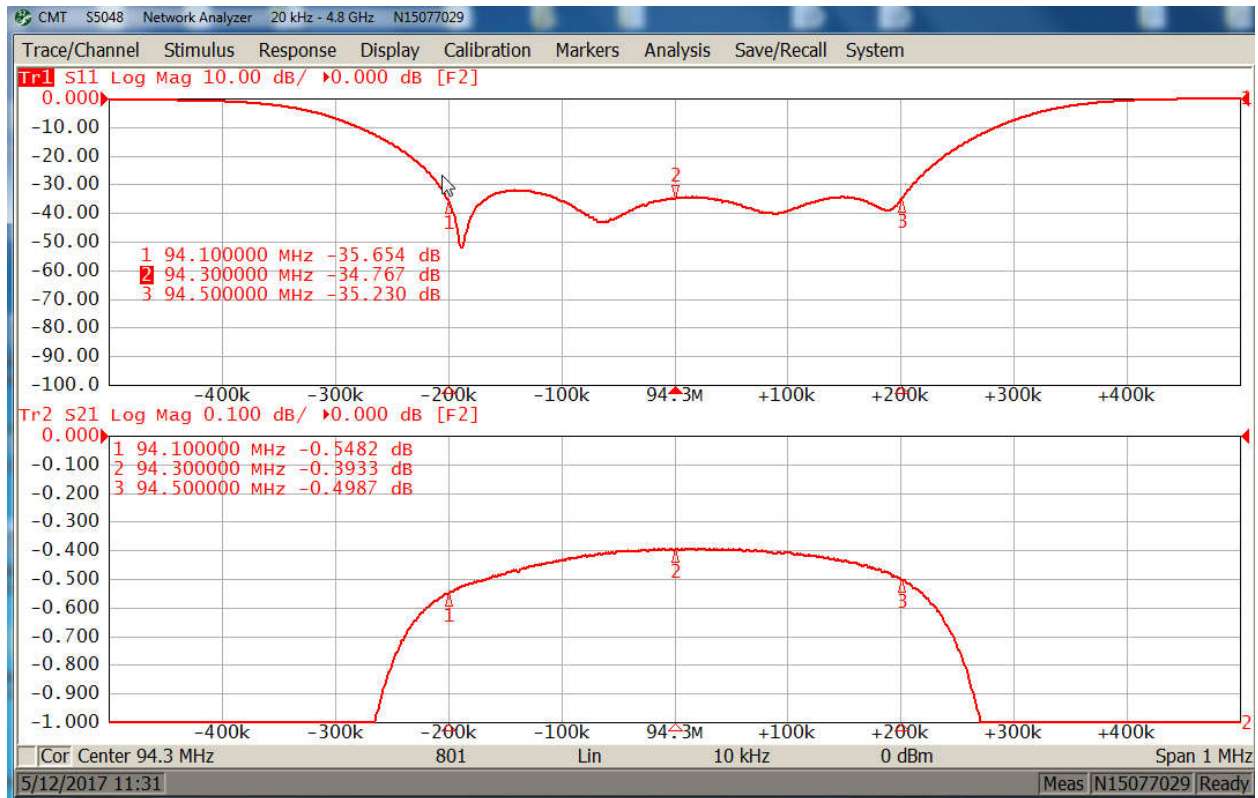
Measurement 2: Isolation + 800 KHz. of 93.5 MHz.



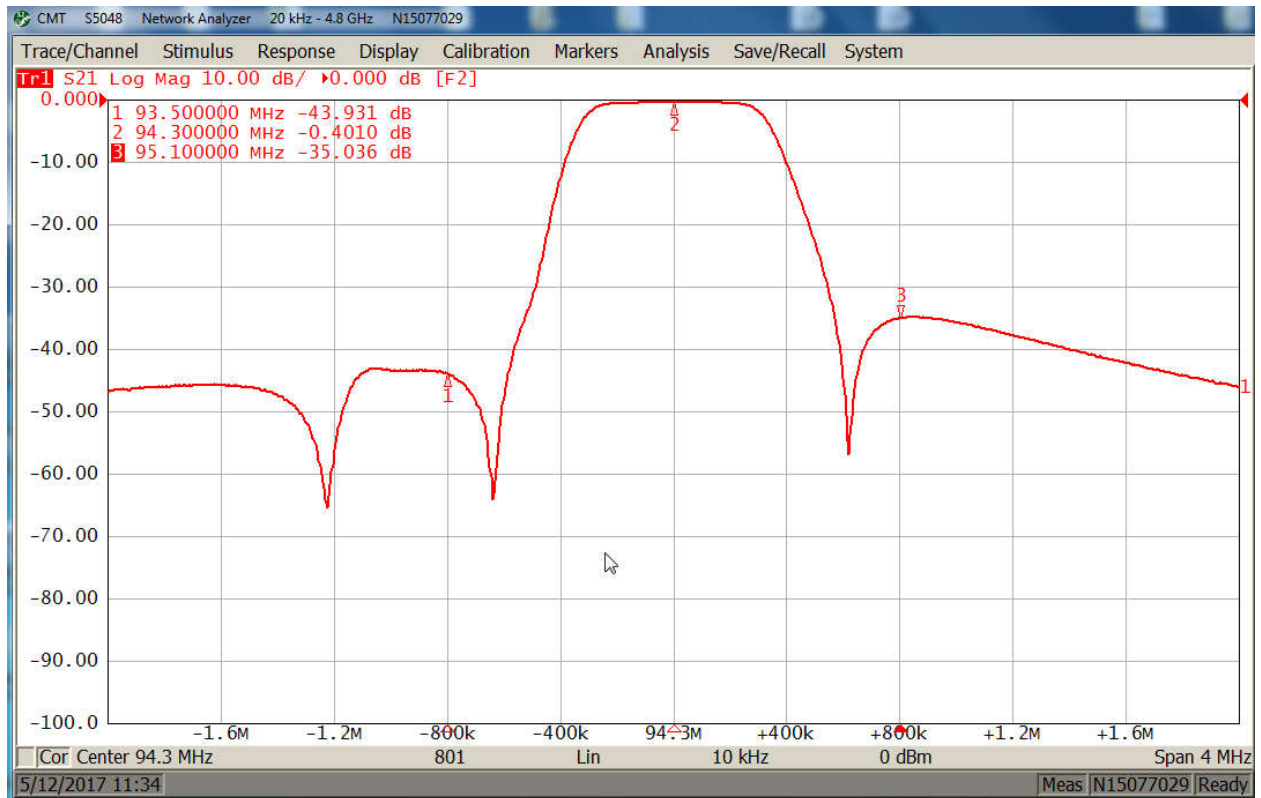
Measurement 3: Group Delay of 93.5 MHz.



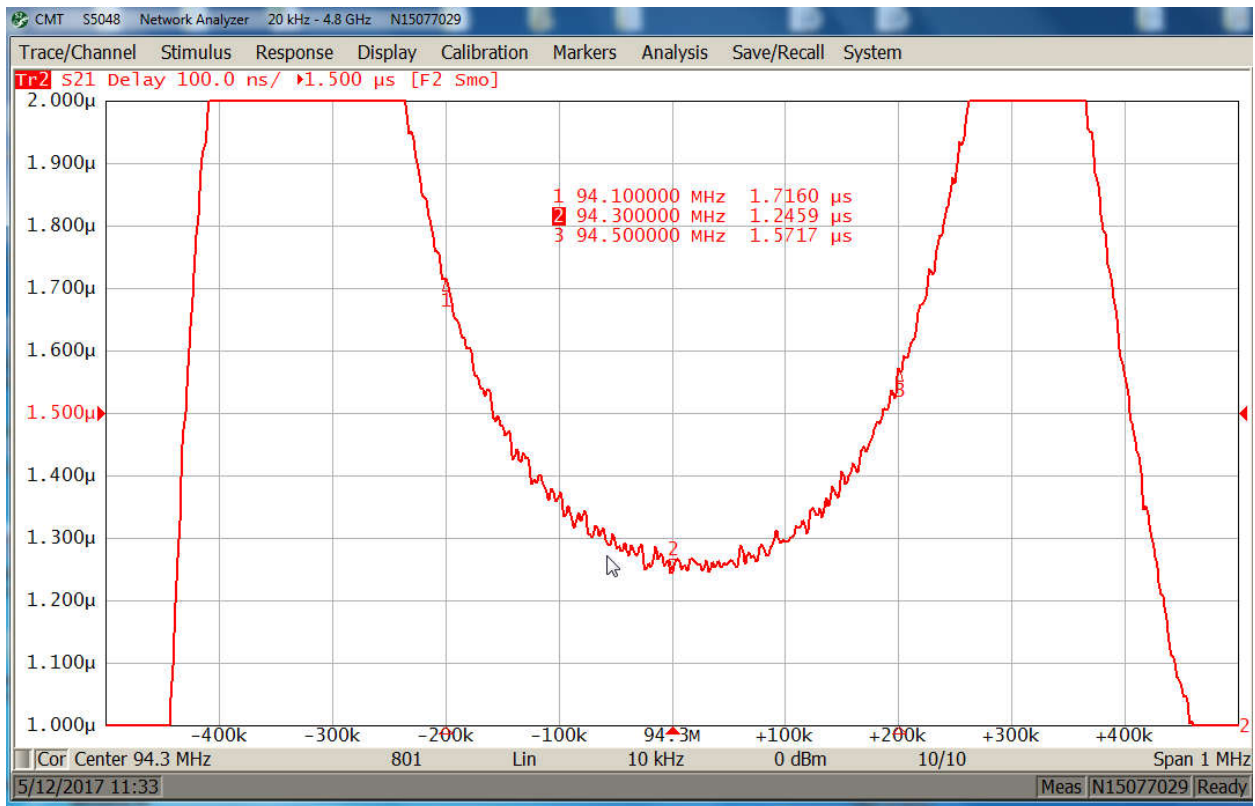
Measurement 4: Match and Insertion Loss of 94.3 MHz.



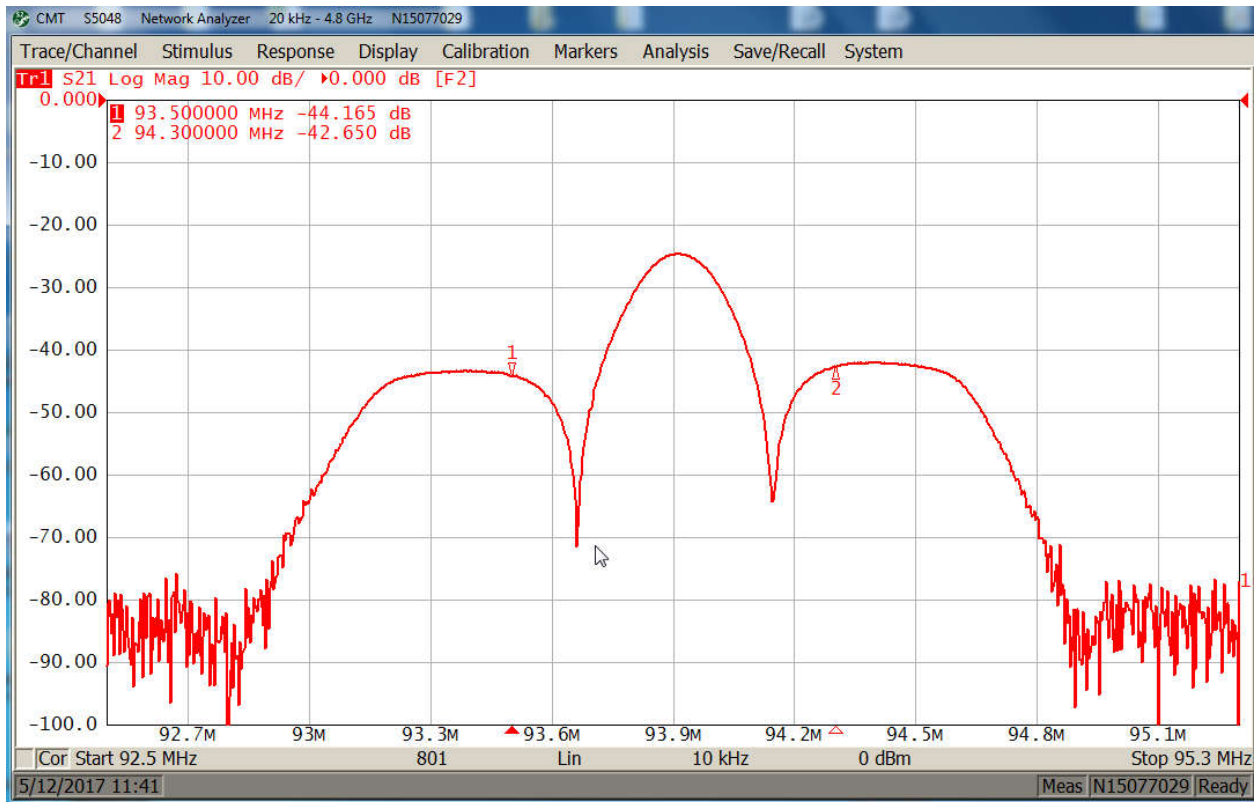
Measurement 5: Isolation - 800 KHz. of 94.3 MHz.



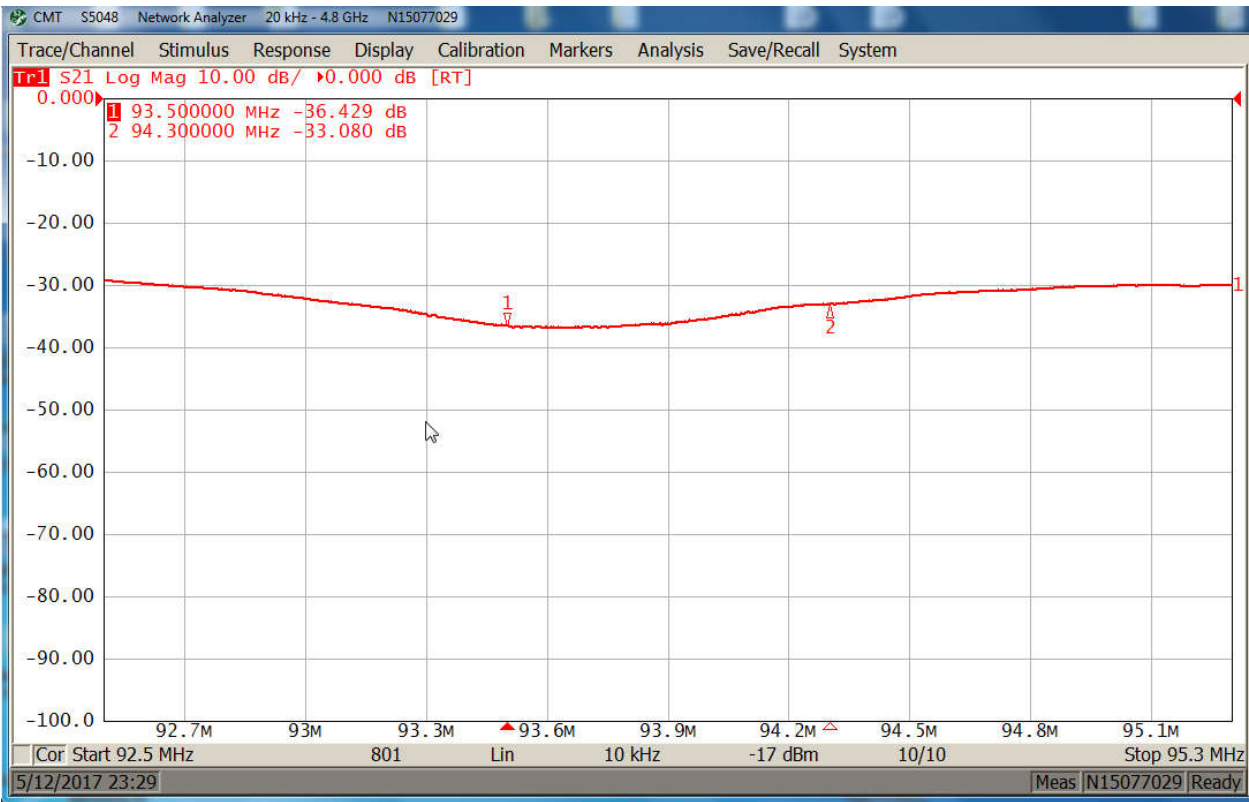
Measurement 6: Group Delay of 94.3 MHz.



Measurement 7: Port to Port Isolation 93.5 to 94.3 MHz.



Measurement 8: Narrow Sweep of Antenna and Feedline.



Measurement 9: 50 to 400 MHz. Sweep of Feedline with Antenna as a Load (TDR).

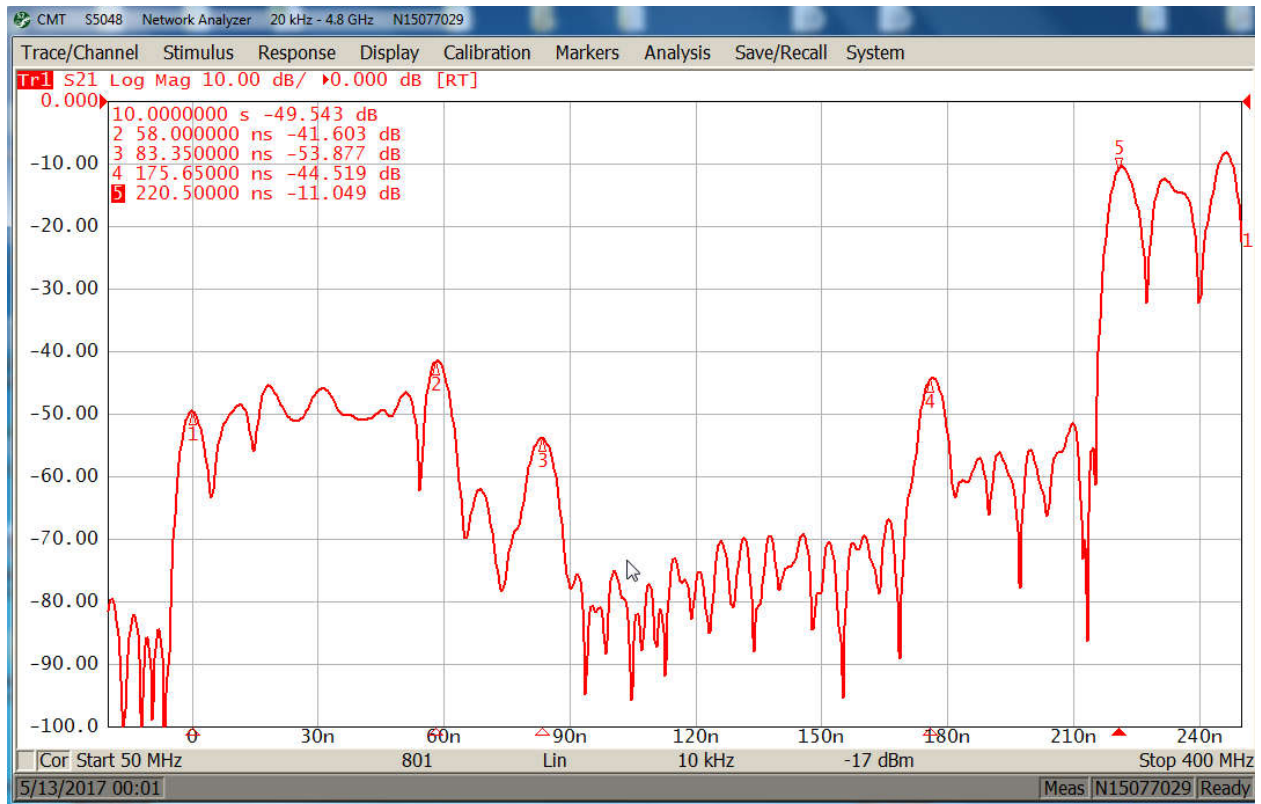
Mkr#1 is Test Transition @ 0 Feet.

Mkr#2 the Start of the 1 5/8" Flex @ Approx 29 Feet.

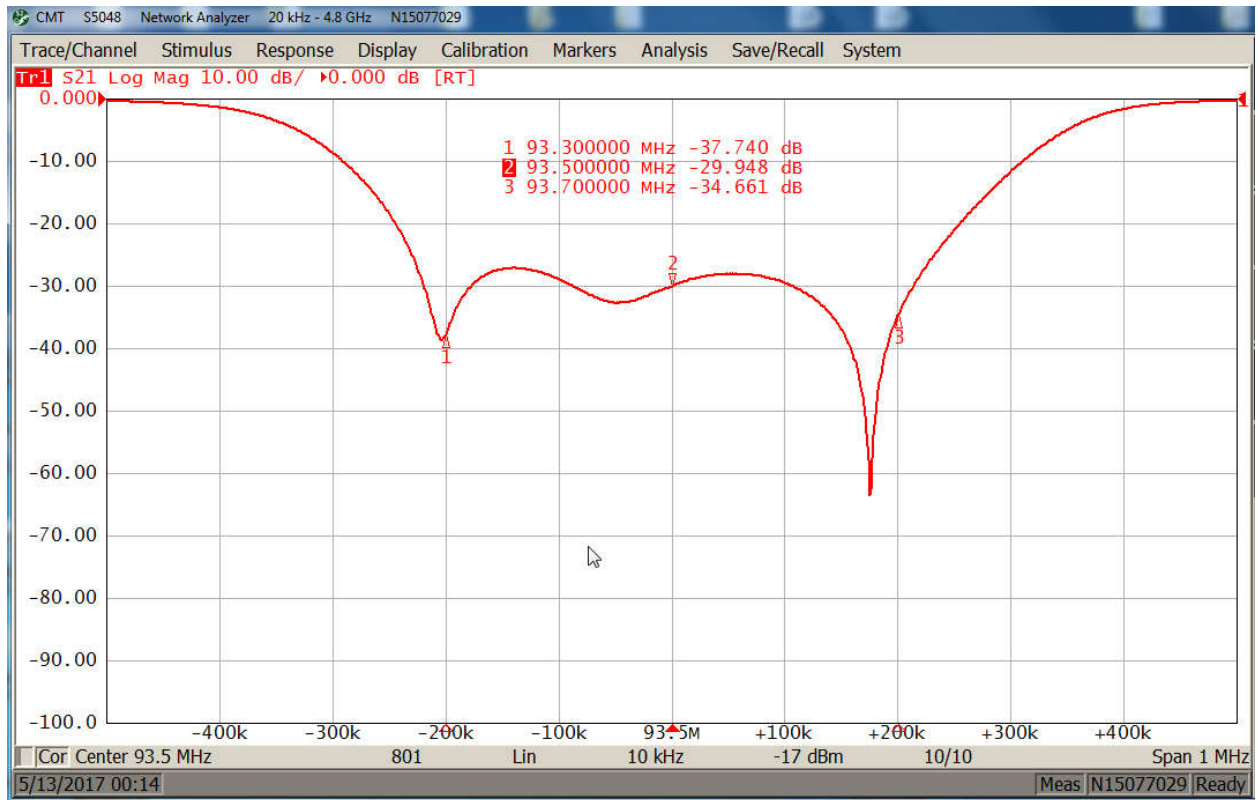
Mkr#3 is the Old Bend Radius in Flex Line @ Approx 42 Feet.

Mkr# is the 1 5/8" to 3 1/8" Connector and Elbow @ Approx 86 Feet.

Mkr#5 is the Antenna @ Approx 97 Feet.



Measurement 10: Filter to Antenna 93.5 MHz.



Measurement 11: Filter to Antenna 94.3 MHz.

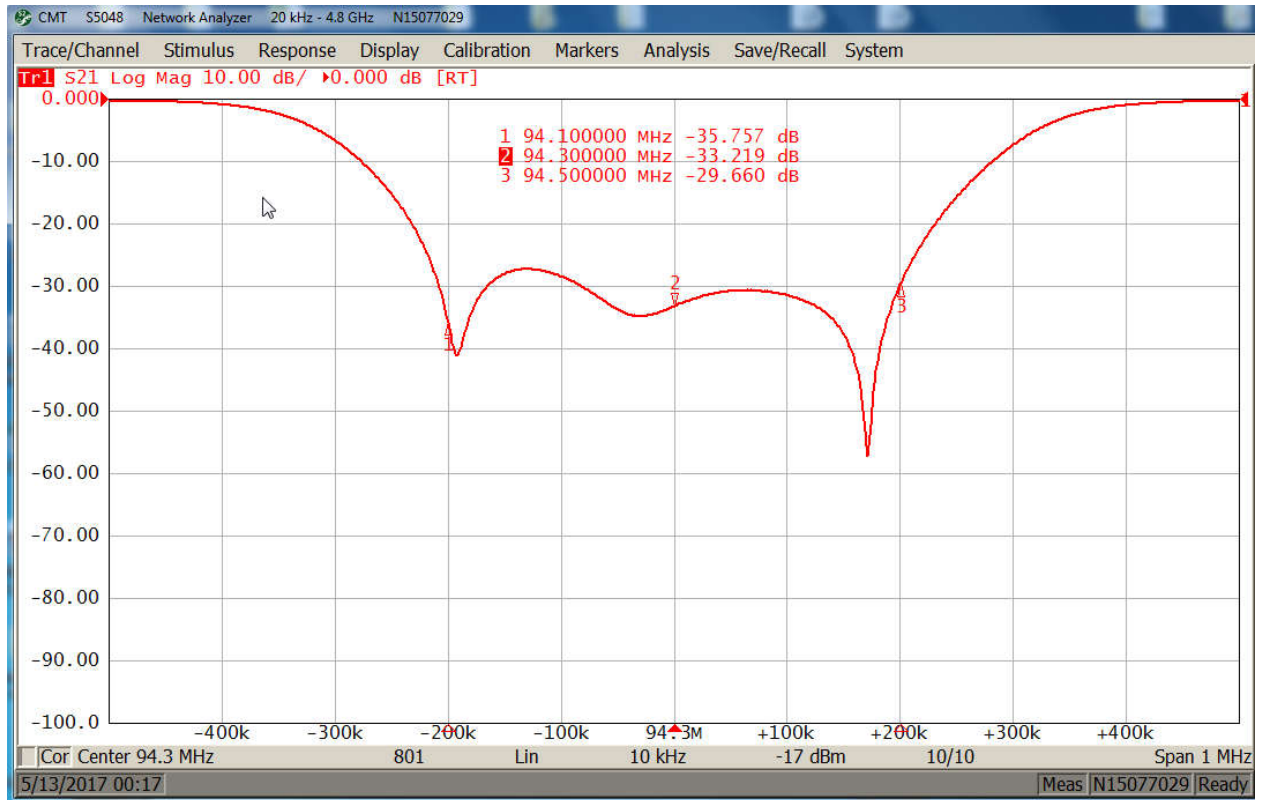


Table 1: Loss Budget Table 93.5 & 94.3 MHz.

Antenna Model: SHPX-2AE-HW		
Call Letters: WVIX (FM), Lemont, IL		
Frequency: 93.5 MHz		
ERP:	3.500 kW	5.441 dBk
Polarization: Circular		
Antenna Gain:	0.698 Numeric	-1.561 dB
Antenna Input Power:	5.014 kW	7.002 dBk
Peak Voltage: 708 volts		
Transmission Line Type - Vertical Run:	1 5/8" Rigid	
Vertical Run Length:	44 feet	
Vertical Run Attenuation:	0.183 dB/100-feet	
Transmission Line Type - Horizontal Run:	HJ7-50A 1-05/8-inch Air HELIAX	
Horizontal Run Length:	53 feet	
Horizontal Run Attenuation:	0.196 dB/100-feet	
Line Loss:	-0.219 kW	0.185 dB
Line Efficiency:	95.822%	
Power Output from Combiner:	5.233 kW	7.187 dBk
Peak Voltage:	723 volts	
Combiner Losses:	-0.465 kW	0.370 dB
Transmitter Power Output:	5.698 kW	7.557 dBk
Call Letters: WJKL (FM) Glendale Heights, IL		
Frequency: 94.3 MHz		
ERP:	3.500 kW	5.441 dBk
Polarization: Circular		
Antenna Gain:	0.702 Numeric	-1.537 dB
Antenna Input Power:	4.986 kW	6.977 dBk
Peak Voltage: 706 volts		
Transmission Line Type - Vertical Run:	1 5/8" Rigid	
Vertical Run Length:	44 feet	
Vertical Run Attenuation:	0.184 dB/100-feet	
Transmission Line Type - Horizontal Run:	HJ7-50A 1-05/8-inch Air HELIAX	
Horizontal Run Length:	53 feet	
Horizontal Run Attenuation:	0.197 dB/100-feet	
Line Loss:	-0.219 kW	0.186 dB
Line Efficiency:	95.800%	
Power Output from Combiner:	5.204 kW	7.164 dBk
Peak Voltage:	721 volts	
Combiner Losses:	-0.493 kW	0.393 dB
Transmitter Power Output:	5.698 kW	7.557 dBk
Combined Power into Antenna:	10.000 kW	1,414 volts
Combined Power into Transmission Line:	10.437 kW	1,445 volts

Figure 3: Vertical Plane Relative Field Plot 93.5 MHz.

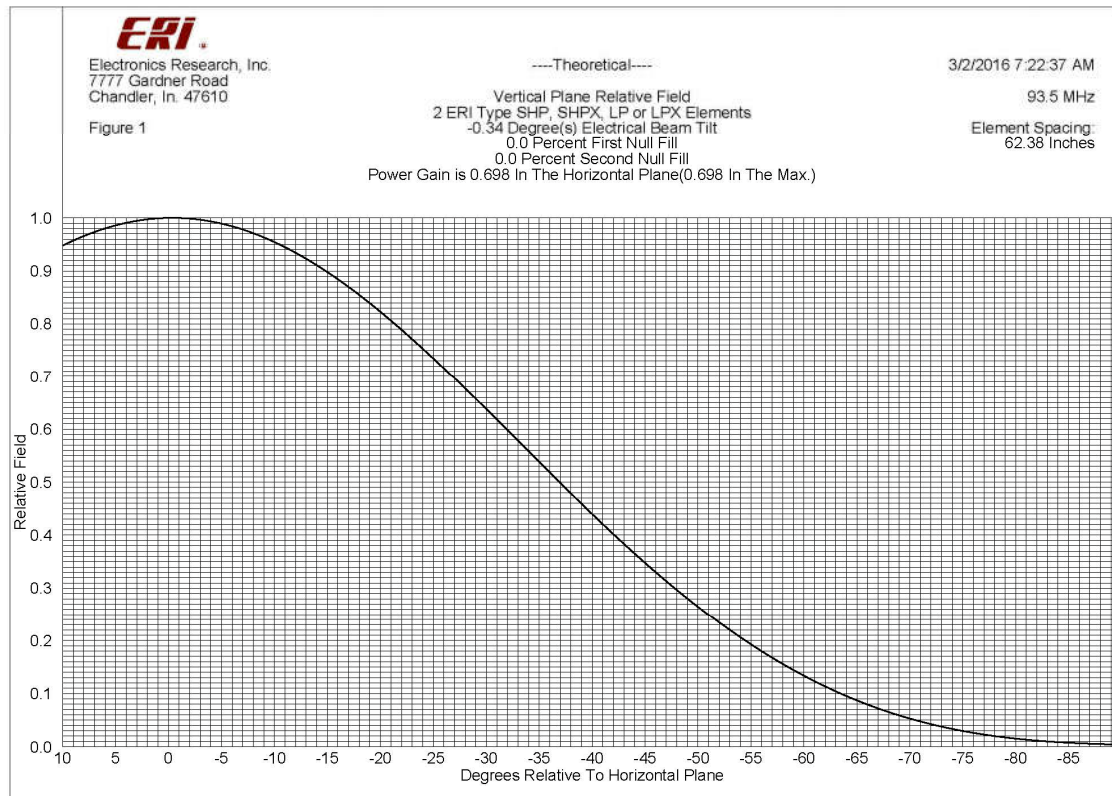


Figure 4: Vertical Plane Relative Field Plot 94.3 MHz.

