Approved byOMB (Office of Management and Budget) 3060-0837
September 2014

Federal Communications Commission

(DRAFT COPY - Not for submission)
License To Cover for FM Application

File Number: | Submit Date: **03/01/2022** | Lead Call Sign: **WWOF** | Facility ID: **9312**

FRN: **0026855924**

Service: **Full Power FM** | Purpose: **License To Cover** | Status: **Saved** | Status Date: **02/25/2022** | Filing Status: **Active**

General Information

Section	Question	Response
Attachments	Are attachments (other than associated schedules) being filed with this application?	No

Fees, Waivers, and Exemptions

Section	Question	Response
Fees	Is the applicant exempt from FCC application Fees?	No
	Indicate reason for fee exemption:	
	Is the applicant exempt from FCC regulatory Fees?	No
Waivers	Does this filing request a waiver of the Commission's rule (s)?	No
	Total number of rule sections involved in this waiver request:	

Application Type	Call Sign	Facility ID	Fee Code	Fee Amount
License To Cover			MHR	$235.00
			Total	

Applicant Information

Applicant Name, Type, and Contact Information

Applicant	Address	Phone	Email	Applicant Type
ADAMS RADIO OF TALLAHASSEE, LLC Doing Business As: ADAMS RADIO OF TALLAHASSEE, LLC	PO Box 430 LAKEVILLE, MN 55044 United States	+1 (952) 232-0588	RONSTONE@ADAMSRADIOGROUP.COM	LLC

Contact Representatives (2)

Contact Name	Address	Phone	Email	Contact Type
Justin Asher *Technical Consultant* Asher Broadcast Consulting, LLC	579 Babcock Road Bronson, MI 49028-9347 United States	+1 (202) 875-2986	justinasher@consultant.com	Technical Representative
GREGG P SKALL , ESQ . *Legal Counsel* Telecommunications Law Professionals, PLLC	1025 Connecticut Avenue, NW Suite 1011 Washington, DC 20036 United States	+1 (202) 789-3121	gskall@tlp.law	Legal Representative

Legal Certifications

Section	Question	Response
Obligations	Licensee/Permittee certifies that all terms, conditions, and obligations set forth in the underlying construction permit have been fully met.	
	Licensee/Permittee certifies that, apart from changes already reported, no cause or circumstance has arisen since the grant of the underlying construction permit which would result in any statement or representation contained in the construction permit application to be now incorrect.	
Character Issues	Applicant certifies that neither the applicant nor any party to the application has or had any interest in, or connection with: (a) any broadcast application in any proceeding where character issues were left unresolved or were resolved adversely against the applicant or party to the application; or (b) any pending broadcast application in which character issues have been raised.	
Adverse Findings	Applicant certifies that, with respect to the applicant and any party to the application, no adverse finding has been made, nor has an adverse final action been taken by any court or administrative body in a civil or criminal proceeding brought under the provisions of any laws related to any of the following: any felony; mass media-related antitrust or unfair competition; fraudulent statements to another governmental unit; or discrimination.	
Program Service Certification	Applicant certifies that it is cognizant of and will comply with its obligations as a Commission licensee to present a program service responsive to the issues of public concern facing the station's community of license and service area.	
Local Public Notice	Applicant certifies that it has or will comply with the public notice requirements of 47 C.F.R. Section 73.3580.	
Equal Employment Opportunity (EEO)	If the applicant proposes to employ five or more full-time employees, applicant certifies that it is filing simultaneously with this application a Model EEO Program Report.	
Operational Compliance	Applicant certifies that it is not the licensee or permittee of the commercial primary station being rebroadcast and that neither it nor any parties to the application have any interest in or connection with the commercial primary station being rebroadcast? See 47 C.F.R. Section 74.1232(d).	
	Applicant certifies that the FM translator's (a) 1mV/m coverage contour does not extend beyond the protected contour of the commercial FM primary station to be rebroadcast, or (b) entire 1mV/m coverage contour is contained within the greater of either: (i) the 2 mV/m daytime contour of the commercial AM primary station to be rebroadcast, or (ii) a 25-mile radius centered at the commercial AM primary station's transmitter site.	
Support Compliance	The applicant, if for a commercial FM translator station with a coverage contour extending beyond the protected contour of the commercial primary station being rebroadcast, certifies that it has not received any support, before or after constructing, directly or indirectly, from the licensee /permittee of the primary station or any person with an interest in or connection with the licensee or permittee of the primary station, except for technical assistance as provided for under 47 C.F.R. Section 74.1232(e).	

Rebroadcast Certification	For applicants proposing translator rebroadcasts that are not the licensee of the primary station, the applicant certifies that written authority has been obtained from the licensee of the station whose programs are to be retransmitted.	
Station Ready for Operation	Applicant certifies that station is now in satisfactory operating condition and ready for regular operation.	
Programming	The applicant certifies that it is the licensee of the primary station or the applicant certifies that written authority has been obtained from the licensee of the primary station whose programming is to be retransmitted.	
Eligibility Certifications	The applicant certifies that it is a:	
	If the applicant is submitting multiple applications, is this application the "priority" application? See Creation of a Low Power Radio Service, Memorandum Opinion and Order on Reconsideration, 15 FCC Rcd 19208, 19239-40, 79-80, paras. 79-80 (2000).	
	The applicant certifies that the Commission has previously granted a broadcast application identified here by file number that found this applicant qualified as a noncommercial educational entity with a qualifying educational program, and that the applicant will use the proposed station to advance a program similar to that the Commission has found qualifying in applicant's previous application.	
	The applicant certifies that its governing documents (e.g., articles of incorporation, by-laws, charter, enabling statute, and/or other pertinent organizational document) permit the applicant to advance an educational program and that there is no provision in any of those documents that would restrict the applicant from advancing an educational program or complying with any Commission rule, policy, or provision of the Communications Act of 1934, as amended.	
Community-Based Criteria	Applicants must certify that they are local to be eligible for LPFM authorizations. An applicant must select "yes" to at least one of the certifications below to be eligible for an LPFM license. The applicant certifies that: it is a nonprofit educational institution or organization that is physically headquartered or has a campus within 16.1 kilometers (10 miles), if applicant is in the top 50 urban markets, or 32.1 kilometers (20 miles) if applicant is outside the top 50 urban markets, of the proposed transmitting antenna site set forth in this application	
	it is a nonprofit educational institution or organization that has 75 percent of its board members residing within 16.1 kilometers (10 miles), if applicant is in the top 50 urban markets, or 32.1 kilometers (20 miles) if applicant is outside the top 50 urban markets, of the proposed transmitting antenna site set forth in this application	
	it is a Tribe and its Tribal Lands, as that term is defined in Section 73.7000 of the Commission's rules, are within the service area of the proposed LPFM station; or it is a Tribal organization owned or controlled by a Tribe (or Tribes) and such Tribe's (or Tribes') Tribal Lands, as that term is defined in Section 73.7000 of the Commission's rules, are within the service area of the proposed LPFM station. See 47 C.F.R. Sections 73.853(c) and 73.7000.	
	it proposes a public safety radio service and has jurisdiction within the service area of the proposed LPFM station.	

Ownership	The applicant certifies that: no party to this application has an attributable interest in any low power FM broadcast station	
	1. no party to this application has an attributable interest in any non-LPFM broadcast station, including any full power AM or FM station, FM translator station, full or low power television station, or any other media subject to the Commission's broadcast ownership restrictions	
	2. no party to this application has pending an application for a low power FM, full power AM or FM station, FM translator station, or full or low power television station;	
	the applicant is in compliance with the Commission's policies relating to media interests of immediate family members; and	
	the applicant is in compliance with the Commission's policies relating to investor insulation and the non-participation of non-party investors and creditors.	
Unlicensed Operation	The applicant certifies, under penalty of perjury, that neither the applicant nor any party to the application has engaged in any manner, individually or with other persons, groups, organizations, or other entities, in the unlicensed operation of any station in violation of Section 301 of the Communications Act of 1934, as amended, 47 U.S.C. Section 301.	
Financial	The applicant certifies that sufficient net liquid assets are on hand or that sufficient funds are available from committed sources to construct and operate the requested facilities for three months without revenue.	
Holding Period Certifications	Applicant certifies that this application does not propose a modification to an authorization that was awarded on the basis of a preference for fair distribution of service pursuant to 47 U.S.C. Section 307(b).	
	Applicant certifies that this application does not propose a modification to an authorized station that received a credit for superior technical parameters under the point system selection method in 47 C.F.R. Section 73.7003.	
Fair Distribution of Service Pursuant to 47 U.S.C. Section 307(b)	Applicant certifies that the proposed station will provide a first rural (reception) service.	
	Applicant certifies that: (a) it is a Tribal Applicant, as defined in 47 C.F.R. Section 73.7000; (b) the facilities proposed in this Application will provide Tribal Coverage, as defined in 47 C.F.R. Section 73.7000, of Tribal Lands occupied by the applicant Tribe(s); (c) the proposed community of license is located on Tribal Lands, as defined in 47 C.F.R. Section 73.7000; and (d) the proposed facility would be the first local Tribal-owned noncommercial educational transmission service at the proposed community of license	
	Applicant certifies that the proposed station will provide a first noncommercial educational aural service to (a) at least 10 percent of the people residing within the station's 60 dBu (1mV/m) service contour and (b) to a minimum of 2,000 people.	
	Applicant certifies that the proposed station will provide a second noncommercial educational aural service, or an aggregated first and second noncommercial educational aural service, to (a) at least 10 percent of the people residing within the station's 60 dBu (1 mV/m) service contour and (b) to a minimum of 2,000 people.	

Auction Authorization	If the application is being submitted to obtain a construction permit for which the applicant was the winning bidder in an auction, then the applicant certifies, pursuant to 47 C.F.R. Section 73.5005(a), that it has attached an exhibit containing the information required by 47 C.F.R. Sections 1.2107(d), 1.2110(i), 1.2112(a) and 1.2112(b), if applicable.	
Tribal Priority – Threshold Qualifications	Is the Applicant applying for an FM allotment set forth in a Public Notice announcing a Tribal Threshold Qualifications window?	
Petition for Rulemaking /Counterproposal to Add New FM Channel to FM Table of Allotments	This application is being submitted concurrently with a Petition for Rulemaking or Counterproposal to Amend the FM Table of Allotments (47 C.F.R. Section 73.202) to add a new FM channel allotment. The petitioner/counter-proponent certifies that, if the FM channel allotment requested is allotted, petitioner/counter- proponent will apply to participate in the auction of the channel allotment requested and specified in this application.	

Channel and Facility Information

Section	Question	Response
Program Test Authority	The application is operating pursuant to automatic program test authority	Yes
	The applicant is requesting program test authority	No
Proposed Community of License	State	
	City	
	Channel	276
	Frequency	103.1
Facility Type	Facility Type	Commercial
Station Class	Station Class	C1

Antenna Location Data

Section	Question	Response
Antenna Structure Registration	Do you have an FCC Antenna Structure Registration (ASR) Number?	
	ASR Number	1030679
Coordinates (NAD83)	Latitude	30° 29' 17.1" N+
	Longitude	084° 16' 47.1" W-
	Structure Type	TOWER-A free standing or guyed struct
	Overall Structure Height	192.1 meters
	Support Structure Height	182.8 meters
	Ground Elevation (AMSL)	65.5 meters
Antenna Data	Height of Radiation Center Above Ground Level	Horizontal:170 meters Vertical:170 meters
	Height of Radiation Center Above Average Terrain	Horizontal:198 meters Vertical:198 meters
	Height of Radiation Center Above Mean Sea Level	Horizontal:236 meters Vertical:236 meters

	Effective Radiated Power	Horizontal:100 Vertical: 100
	Transmitter Power Output	27.0 kW
Proposed Allotment or Assignment - Coordinates (NAD83)	Latitude	
	Longitude	

Antenna Technical Data

Section	Question	Response
Antenna Type	Antenna Type	Non-Directional
Primary Station	Call Sign	
	Facility ID	
	Frequency	
	Channel	
	Service Code	
	City	
	State	
Delivery Method	Delivery Method	
	If Other, Please specify:	
Transmitting Antenna	Manufacturer:	ERI
	Model	SHPX-8AC
	Antenna Number of Sections:	8
	Antenna Spacing Between Sections:	1.0

Directional Antenna Relative Field Value

Degree	Value	Degree	Value	Degree	Value	Degree	Value

Additional Azimuths

Degree	Value

Technical Certifications

Section	Question	Response
Environmental Effect	Would a Commission grant of Authorization for this location be an action which may have a significant environmental effect? (See 47 C.F.R. Section 1.1306)	No
Broadcast Facility	Does the proposed facility comply with the applicable engineering standards and assignment requirements of 47 C.F.R. Sections 73.203, 73.207, 73.213, 73.315, 73.509, 73.515, 73.525, and 73.1125?	Yes
Contour Protection	Does the proposed facility request processing pursuant to the contour protection provisions of 47 C.F.R Section 73.215?	Yes

Community of License Change - Section 307(b)	Is the application being submitted to change the facility's community of license? If 'Yes', an exhibit is required containing information demonstrating that the proposed community of license change constitutes a preferential arrangement of assignments under Section 307(b) of the Communications Act of 1934, as amended (47 U.S.C. Section 307(b))	No
Proposal Compliance	Does the applicant certify that the proposal is for a fill-in translator or booster?	
	Does the applicant certify that the proposal complies with Sections 74.1204, 74.1205, 74.1232, 74.1234 and 74.1235?	
Interference	Does the applicant certify that the proposed facility complies with the engineering requirements of 47 CFR Section 73.807 (a) through (g), 73.825 and 73.827(a)?	
Transmitter Power Output	Does the operating transmitter power output produce the authorized effective radiated power?	Yes
Constructed Facility	The facility was constructed as authorized in the underlying construction permit or complies with 47 C.F.R. Section 73.1690?	Yes
Special Operating Conditions	Was the facility constructed in compliance with all special operating conditions, terms, and obligations described in the construction permit?	Yes
Environmental	Would a Commission grant of Authorization for this location be an action which may have a significant environmental effect? (See 47 C.F.R. Section 1.1306)	No
Reasonable Site Assurance	Applicant certifies that it has reasonable assurance in good faith that the site or proposed structure at the location of its transmitting antenna will be available to the applicant for the applicant's intended purpose.	
	If reasonable assurance is not based on applicant's ownership of the proposed site or structure, applicant certifies that it has obtained such reasonable assurance by contacting the owner or person possessing control of the site or structure.	
	Name of the person contacted	
	Phone number of the person contacted	
	Person contacted is	

Modification of License Certifications

Section	Question	Response
Change in effective radiated power, transmitter output power, replacing a directional or non-directional antenna, deleting contour protection status, or correcting coordinates	Is this application being filed to authorize a change in Effective Radiated Power and/or a change in transmitter output power, and/or replacing a directional or non-directional antenna and/or deleting contour protection status and/or correcting coordinates, as authorized by 47 CFR Sections 73.1690(c)(1) through (c)(11)?	No
Using a formerly licensed main facility as an auxiliary facility.	Is this application being filed pursuant to 47 CFR Section 73.1675(c)(1) to request authorization to use a formerly licensed main facility as an auxiliary facility and/or change the ERP of the proposed auxiliary facility?	
Change the license status	Is this application being filed to authorize a change in license status from commercial to non-commercial or from noncommercial to commercial, pursuant to 47 CFR Section 73.1690(c)(9)?	No

Change in hours of operation	Is this application being filed to authorize a change in hours of operation?	
Replacement of Antenna	Is this application being filed to authorize the replacement of the licensed nondirectional antenna with another nondirectional antenna within 2 meters above or 4 meters below the licensed antenna center of radiation? See 47 CFR Section 73.875(c)(1)?	
Replacement of transmission line	Is this application being filed to authorize a replacement of the transmission line that resulted in a change in licensed transmitter power output, but not the effective radiated power? See 47 CFR Section 73.875(c)(2)?	

Certification

Section	Question	Response
General Certification Statements	The Applicant waives any claim to the use of any particular frequency or of the electromagnetic spectrum as against the regulatory power of the United States because of the previous use of the same, whether by authorization or otherwise, and requests an Authorization in accordance with this application (See Section 304 of the Communications Act of 1934, as amended.).	
	The Applicant certifies that neither the Applicant nor any other party to the application is subject to a denial of Federal benefits pursuant to §5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. § 862, because of a conviction for possession or distribution of a controlled substance. This certification does not apply to applications filed in services exempted under §1.2002(c) of the rules, 47 CFR . See §1. 2002(b) of the rules, 47 CFR § 1.2002(b), for the definition of "party to the application" as used in this certification § 1.2002(c). The Applicant certifies that all statements made in this application and in the exhibits, attachments, or documents incorporated by reference are material, are part of this application, and are true, complete, correct, and made in good faith.	
Authorized Party to Sign	**FAILURE TO SIGN THIS APPLICATION MAY RESULT IN DISMISSAL OF THE APPLICATION AND FORFEITURE OF ANY FEES PAID** Upon grant of this application, the Authorization Holder may be subject to certain construction or coverage requirements. Failure to meet the construction or coverage requirements will result in automatic cancellation of the Authorization. Consult appropriate FCC regulations to determine the construction or coverage requirements that apply to the type of Authorization requested in this application. WILLFUL FALSE STATEMENTS MADE ON THIS FORM OR ANY ATTACHMENTS ARE PUNISHABLE BY FINE AND/OR IMPRISONMENT (U.S. Code, Title 18, §1001) AND/OR REVOCATION OF ANY STATION AUTHORIZATION (U.S. Code, Title 47, §312(a)(1)), AND /OR FORFEITURE (U.S. Code, Title 47, §503).	
	I declare, under penalty of perjury, that I am an authorized representative of the above-named applicant for the Authorization(s) specified above.	

Attachments

File Name	Uploaded By	Attachment Type	Description	Upload Status
Engineering 1 - Summary of Schedule 302-FM Filing for WWOF(FM).pdf	Applicant	Technical Certifications		Done with Virus Scan and/or Conversion

Engineering 2 - Spurious Emissions Study for WWOF (FM) & WHTF(FM).pdf	Applicant	Technical Certifications	Done with Virus Scan and/or Conversion
Engineering 3 - FM Combiner and Antenna System Report (TPO Calculation) for WWOF(FM) & WHTF (FM).pdf	Applicant	Technical Certifications	Done with Virus Scan and/or Conversion

Call letters: WWOF(FM).C
City of License: Tallahassee, FL
Channel: CH276C1 (103.1 MHz)
File No: LMS-0000153429
Facility ID: 9312
Applicant: Adams Radio of Tallahassee, LLC

Explanation of FM License to Cover Filing and Compliance with Special Operating Conditions or Restrictions

1. The applicant certifies coordination with other users of the site to reduce power or cease operation as necessary to protect persons having access to the site, tower or antenna from radiofrequency electromagnetic fields in excess of FCC guidelines.

2. The applicant acknowledges this is a Section 215 (short-spaced) contour protection grant as requested by the applicant.

3. The applicant certifies that before Program Tests commence, sufficient measurements have been made establishing that the operation authorized in this Construction Permit is in compliance with the spurious emissions requirements of 47 C.F.R. Section(s) 73.317(b) through 73.317(d). All measurements have been made with all stations simultaneously utilizing the shared antenna. These measurements have been submitted to the Commission along with the FCC Schedule 302-FM application for license. *(see attached Spurious Emissions Study)*

ELECTRONICS RESEARCH, INC. ERI

Report Of
Intermodulation Product Findings

Tallahassee, FL.

WWOF – 103.1 MHz.
WHTF – 104.9 MHz.

Project# 39083

February 25, 2022

Electronics Research Inc.
7777 Gardner Road
Chandler, Indiana 47610
Phone (812) 925-6000 Fax (812) 925- 4030

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Report of Findings for Intermodulation Product Measurements

Exhibits Accompanying This Report

REPORT OF FINDINGS
TALLAHASSEE, FLORIDA
BROADCAST FACILITY

Introduction: This report of findings is based on data collected at the FM broadcast facility located in Tallahassee, FL. The report includes measurements offered as proof that the combined operations of WWOF (103.1 MHz.) and WHTF (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). WXTY (99.9 MHz), WQTL (106.1 MHz.) operates into a separate antenna that is co-located on the tower. Their effects on the stations operating from the system are considered in this report. In brief, the collection of measurements presented in this report shows that all possible third order inter-modulation (IM) products generated by this multiplexed and single station systems are less than the maximum allowable level as required by section 73.317 (b) through (d). Jeff Taylor of Electronics Research, Inc. located in Chandler, Indiana performed the measurements summarized herein on February 25, 2022.

The following exhibits are provided:

Exhibit A:
- A-1 Drawing Depicting Antenna.
- A-2 SHPX-8AC Antenna Specification Sheet.
- A-3 Drawing Depicting Diplexed Scheme.
- A-4 Diplexer Specification Sheet.
- A-5 Theoretical Vertical Plane Relative Field Antenna Plots

Exhibit B:
- B-1 Equipment Employed In Intermodulation Product Measurement.
- B-2 Broadcasting Scheme of the Multiplexed Systems.

Table 1. Carrier Reference Levels.
Table 2. Calculated Third Order Products.
Table 3. Intermodulation Analysis Measurements.

Exhibits Accompanying Report: Exhibit A provides comprehensive information on both antenna and filters used by these radio stations. Exhibit B illustrates the broadcasting scheme of each station, the layout of the equipment used to isolate and measure potential intermodulation products and forward carrier reference levels. Found within Table 1 are the narrow band carrier frequency measurements that provide relative output signal levels for the IM analysis. Table 2 lists the calculated third order products that can be generated from FM transmitters broadcasting from the multiplexed system. The IM Analysis Measurements, in Table 3, provides detailed information obtained from the product frequency investigation.

The Nature of Intermodulation Products (IM): Intermodulation products result from inadequate transmitter-to-transmitter isolation. Intermodulation products are commonly generated from radio stations operating into multiplexed facilities and congested antenna broadcast sites. The mechanics associated with the phenomenon have been well documented. When two or more transmitters are coupled to each other, new spectral components are produced by the mixing of the station frequencies in the active circuits of each transmitter. The common term used to describe this phenomenon is third order product denoted by the mathematical expression $[2(F_1)-(F_2)]$, where F_1 signifies the frequency of the transmitter that is generating the intermodulation product, and F2 signifies the frequency causing the interference.

The Multiplexed System: These measurements were taken with both FM stations operating from the antenna system. The WWOF and WHTF, diplexed system is fundamentally comprised of antenna, feed line and diplexer unit. The SHPX-8AC antenna, 783-4 combiner units, are products of Electronics Research, Inc. The 3 1/8" feedline is Electronics Research, Inc. and the HJ11-50 is a product of Comscope.
Refer to Exhibit B-1, for an illustration of the Broadcasting Scheme of these stations.

To accomplish the aggregation of two transmitter signals into a common feed and provide transmitter-to-transmitter isolation, a diplexed scheme consisting of a 783-4 "TEE" Combiner" was installed. Specifically, the combiner uses one 783-4 module for frequency (103.1 MHz.), and one 783-4 module for frequency (104.9 MHz.). An interconnecting "T" is required to complete the combiner. The "T" combiner, fully assembled, exhibited transmitter port-to-port isolation in excess of -62 dB. Other performance measurements, such as match, loss, group-delay, etc, revealed that the "T" combiner unit was in proper working condition. Refer to Exhibit A-4 for the Combiner Specification Sheet.

The IM Investigation: Directional Couplers were placed at key locations throughout the combiner to monitor and maintain the multiplexer's performance. All couplers furnished with the system are factory calibrated and capable of delivering accurate and repeatable RF measurements. To facilitate the taking of the measurements, the coupler located at the antenna output of the multiplexed system was used. Care was taken in the selection of the measurement location to ensure that the measurements would be made far removed from transmitters and any filtering used to reduce broadcast emissions. The coupler selected would normally be used for antenna reflection measurements and thus would provide greater than -35 dB directivity and a forward signal sample of -46 dB.

The forward port of the coupler was used for sampling the outgoing carrier levels and IM products. The IM sampled signal was fed by shielded cable into a Band Pass Filter where all extraneous energy was steeply attenuated. Various attenuation pads were used, when needed, on the band pass filter and/or the Spectrum Analyzer to ensure an adequate signal level for measurements without overloading the measurement equipment. A Rohde & Schwarz Spectrum Analyzer serial# 100396 was employed to record the level of all signals investigated. A Rohde & Schwarz Network Analyzer serial# 100396 was used for selective tuning of the Band Pass Filter. The Rohde & Schwarz Spectrum Analyzer was also used to measure the close in spectral attenuation of each carrier and wide band search for any anomalies that may need further investigation. See attached Exhibit B-1 for an illustration of the measurement equipment.

Prior to recording measurements, all pertinent broadcasting equipment including Transmitters, Multiplexer, Feed Line and Antenna were adjusted to optimal performance. Also, it was confirmed before taking any measurements that all transmitters were operating at full licensed power. From the equipment setup described above, the relative output signal level of each stations forward carrier was made. The resulting signal levels of these measurements are listed in Table 1, column labeled "Adjusted Level". This level will be used as the reference level for possible IM products of each carrier and was necessary to confirm that no significant levels of spurious energy, referenced to each carrier, were present from any transmitter operating from the multiplexed system.

Table 1 - Carrier Reference Levels.

Carrier Frequency (MHz)	Pad One (dB)	Full Scale Range (dB)	Scale Reading (dBm)	**Carrier Level (dBm)**	Notes
WWOF 103.1	**10**	**---**	**16.03**	**26.03**	
WHTF 104.9	**10**	**---**	**10.19**	**20.19**	

Predictable third-order products due to system harmonics mixed with all on-site interfering frequencies that could be generated from the multiplexed system are calculated and listed in Table 2.

Table 2 - Third order Products.

	Carrier Frequencies	
Interfering Frequencies	**103.1**	**104.9**
99.9 MHz.	106.3	109.9
103.1 MHz.	----	106.7
104.9 MHz.	101.3	----
106.1 MHz.	100.1	103.7

Using the equipment previously described the IM product measurements were recorded and are listed in Table 3. The signal levels referenced to the carriers are calculated and listed in the column labeled "Level Referenced to Carrier". Refer to Exhibit B-2 for a layout of the measurement equipment.

Table 3 – Intermodulation Measurements

IM Measurements Taken in Tallahassee, Florida										
Product Frequency (MHz)	**Transmitter Frequency (MHz)**	**Interfering Frequency (MHz)**	**Pad (dB)**	**Bandpass Filter Loss (dB)**	**Total Loss**	**Measured Level (dB)**	**Adjusted Level (dB)**	**Carrier Reference Level (dB)**	**Level Referenced to Carrier (dB)**	**Notes***
Transmitter Mixes										
	103.1	**Ref.**	10		10	16.03	26.03	**26.03**		
	104.9	**Ref.**	10		10	10.19	20.19	**20.19**		
100.1	103.1	106.1	10	12.3	22.3	-82.1	-59.8	26.03	**-85.83**	
101.3	103.1	104.9	10	12.6	22.6	-84.44	-61.84	26.03	**-87.87**	
103.7	104.9	106.1	10	12.1	22.1	-82.7	-60.6	20.19	**-80.79**	
106.3	103.1	99.9	10	12.2	22.2	-85.5	-63.3	26.03	**-89.33**	
106.7	104.9	103.1	10	12.1	22.1	-83.93	-61.83	20.19	**-82.02**	
109.9	104.9	99.9	10	11.9	21.9	-85.7	-63.8	20.19	**-83.99**	

The Spectrum Analyzer was used to check the close in spectral attenuation of the carrier to confirm the operation of the transmitter, are in compliance with Sections (b) and (c) of the FCC Rules and Regulations.

As a final proof of the systems IM Product performance, a wide band search was undertaken using the Spectrum Analyzer. The purpose for this measurement was to look for suspicious anomalies that may warrant further investigation. My search ranged the complete frequency span of the receiver and resulted in no additional investigations.

Conclusion: Based upon my observations and measurements taken on February 25, 2022 as summarized in this document, I, Jeff Taylor, find the subject system, specifically the transmitters and filter systems for the operation of WWOF and WHTF into the antenna to be in proper working order. Furthermore, based on the measured data, it is my opinion that there are no inter-modulation products in excess of -80 dB below carrier levels generated from or within the station operating on the installed system. Based on this recorded data, I conclude that WWOF and WHTF, are in compliance with the requirements of Section 73.317 paragraph (b) through (d) of the FCC Rules and Regulations.

Respectfully submitted,
Electronics Research, Inc.

Jeff Taylor, Field Technician

State of Indiana)
) SS:
County of Warrick)

AFFIDAVIT

I, Jeff Taylor, hereby declare that the following statements are true and correct to the best of my knowledge and belief :

1.) I am a Field Technician for Electronics Research, Inc ("ERI ") and have been employed by ERI for 25 years. I am familiar with and have assisted in the design, manufacturing and installation of FM Antennas and FM Multiplexers in my long tenure with ERI.

2.) I have either prepared and/or directly supervised the preparation of all technical information contained in this Report of Findings and to my knowledge to be accurate and true.

3.) ERI has been requested by Adams Radio Group on behalf of radio Stations WWOF and WHTF in Tallahassee, FL. to prepare this Report Of Findings.

Jeff Taylor; Field Technician

Jeff Taylor

Subscribed and sworn to before me on this 28th, day of February, 2022.

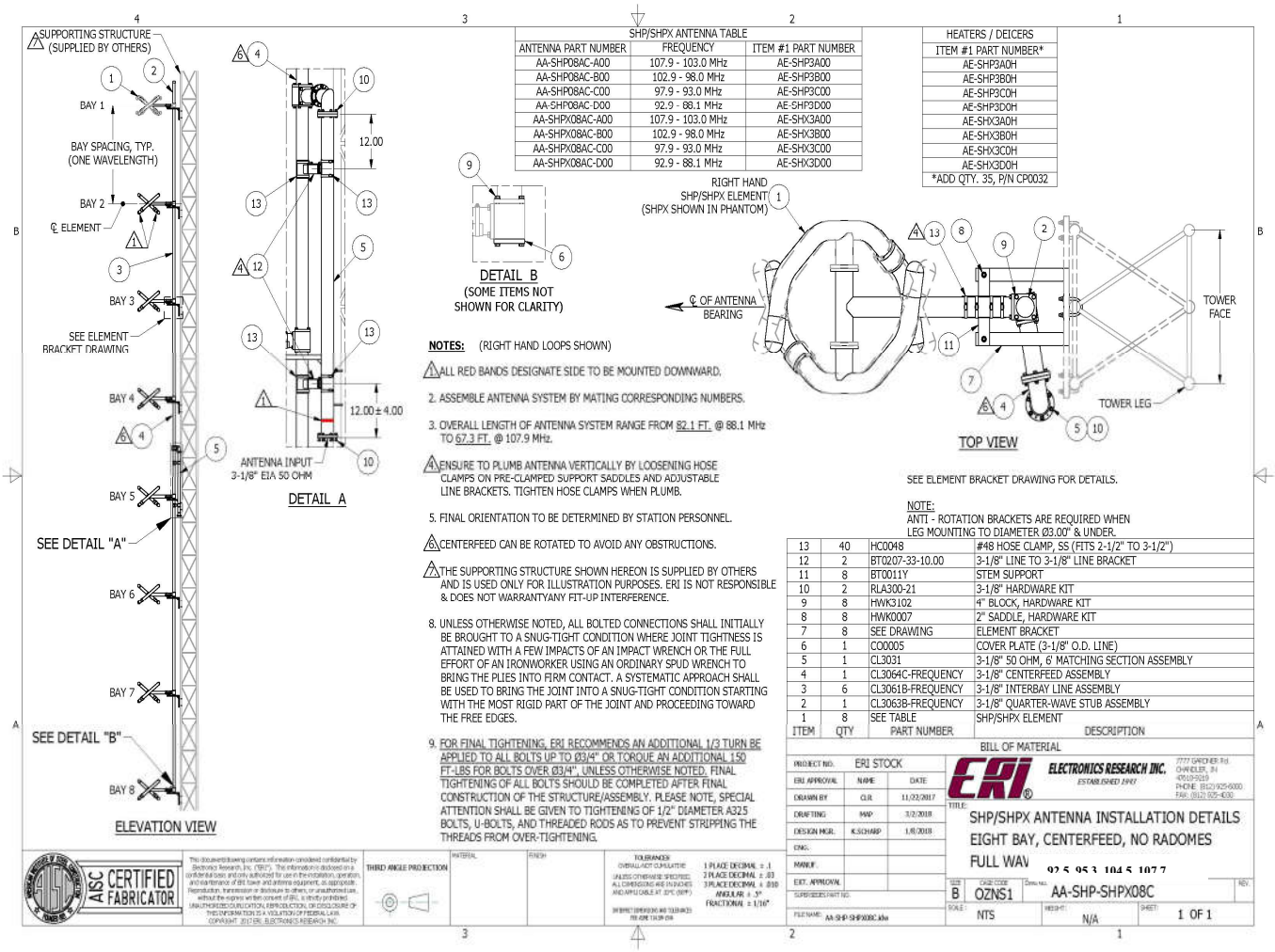
Cindy D Tomes; Notary Public
My commission expires September 17, 2022

Cindy D. Tomes

CINDY D TOMES
Notary Public, State of Indiana
Warrick County
Commission # 658197
My Commission Expires
September 17, 2022

8

EXHIBIT, A-1



SHP/SHPX ANTENNA TABLE		
ANTENNA PART NUMBER	FREQUENCY	ITEM #1 PART NUMBER
AA-SHP08AC-A00	107.9 - 103.0 MHz	AE-SHP3A00
AA-SHP08AC-B00	102.9 - 98.0 MHz	AE-SHP3B00
AA-SHP08AC-C00	97.9 - 93.0 MHz	AE-SHP3C00
AA-SHP08AC-D00	92.9 - 88.1 MHz	AE-SHP3D00
AA-SHPX08AC-A00	107.9 - 103.0 MHz	AE-SHX3A00
AA-SHPX08AC-B00	102.9 - 98.0 MHz	AE-SHX3B00
AA-SHPX08AC-C00	97.9 - 93.0 MHz	AE-SHX3C00
AA-SHPX08AC-D00	92.9 - 88.1 MHz	AE-SHX3D00

HEATERS / DEICERS
ITEM #1 PART NUMBER*
AE-SHP3A0H
AE-SHP3B0H
AE-SHP3C0H
AE-SHP3D0H
AE-SHX3A0H
AE-SHX3B0H
AE-SHX3C0H
AE-SHX3D0H
*ADD QTY. 35, P/N CP0032

NOTES: (RIGHT HAND LOOPS SHOWN)

1. ALL RED BANDS DESIGNATE SIDE TO BE MOUNTED DOWNWARD.
2. ASSEMBLE ANTENNA SYSTEM BY MATING CORRESPONDING NUMBERS.
3. OVERALL LENGTH OF ANTENNA SYSTEM RANGE FROM 82.1 FT. @ 88.1 MHz TO 67.3 FT. @ 107.9 MHz.
4. ENSURE TO PLUMB ANTENNA VERTICALLY BY LOOSENING HOSE CLAMPS ON PRE-CLAMPED SUPPORT SADDLES AND ADJUSTABLE LINE BRACKETS. TIGHTEN HOSE CLAMPS WHEN PLUMB.
5. FINAL ORIENTATION TO BE DETERMINED BY STATION PERSONNEL.
6. CENTERFEED CAN BE ROTATED TO AVOID ANY OBSTRUCTIONS.
7. THE SUPPORTING STRUCTURE SHOWN HEREON IS SUPPLIED BY OTHERS AND IS USED ONLY FOR ILLUSTRATION PURPOSES. ERI IS NOT RESPONSIBLE & DOES NOT WARRANTYANY FIT-UP INTERFERENCE.
8. UNLESS OTHERWISE NOTED, ALL BOLTED CONNECTIONS SHALL INITIALLY BE BROUGHT TO A SNUG-TIGHT CONDITION WHERE JOINT TIGHTNESS IS ATTAINED WITH A FEW IMPACTS OF AN IMPACT WRENCH OR THE FULL EFFORT OF AN IRONWORKER USING AN ORDINARY SPUD WRENCH TO BRING THE PLIES INTO FIRM CONTACT. A SYSTEMATIC APPROACH SHALL BE USED TO BRING THE JOINT INTO A SNUG-TIGHT CONDITION STARTING WITH THE MOST RIGID PART OF THE JOINT AND PROCEEDING TOWARD THE FREE EDGES.
9. FOR FINAL TIGHTENING, ERI RECOMMENDS AN ADDITIONAL 1/3 TURN BE APPLIED TO ALL BOLTS UP TO Ø3/4" OR TORQUE AN ADDITIONAL 150 FT-LBS FOR BOLTS OVER Ø3/4", UNLESS OTHERWISE NOTED. FINAL TIGHTENING OF ALL BOLTS SHOULD BE COMPLETED AFTER FINAL CONSTRUCTION OF THE STRUCTURE/ASSEMBLY. PLEASE NOTE, SPECIAL ATTENTION SHALL BE GIVEN TO TIGHTENING OF 1/2" DIAMETER A325 BOLTS, U-BOLTS, AND THREADED RODS AS TO PREVENT STRIPPING THE THREADS FROM OVER-TIGHTENING.

SEE ELEMENT BRACKET DRAWING FOR DETAILS.

NOTE:
ANTI - ROTATION BRACKETS ARE REQUIRED WHEN LEG MOUNTING TO DIAMETER Ø3.00" & UNDER.

ITEM	QTY	PART NUMBER	DESCRIPTION
13	40	HC0048	#48 HOSE CLAMP, SS (FITS 2-1/2" TO 3-1/2")
12	2	BT0207-33-10.00	3-1/8" LINE TO 3-1/8" LINE BRACKET
11	8	BT0011Y	STEM SUPPORT
10	2	RLA300-21	3-1/8" HARDWARE KIT
9	8	HWK3102	4" BLOCK, HARDWARE KIT
8	8	HWK0007	2" SADDLE, HARDWARE KIT
7	8	SEE DRAWING	ELEMENT BRACKET
6	1	CO0005	COVER PLATE (3-1/8" O.D. LINE)
5	1	CL3031	3-1/8" 50 OHM, 6' MATCHING SECTION ASSEMBLY
4	1	CL3064C-FREQUENCY	3-1/8" CENTERFEED ASSEMBLY
3	6	CL3061B-FREQUENCY	3-1/8" INTERBAY LINE ASSEMBLY
2	1	CL3063B-FREQUENCY	3-1/8" QUARTER-WAVE STUB ASSEMBLY
1	8	SEE TABLE	SHP/SHPX ELEMENT

BILL OF MATERIAL

ASC CERTIFIED FABRICATOR

THIRD ANGLE PROJECTION

PROJECT NO.	ERI STOCK	
ERI APPROVAL	NAME	DATE
DRAWN BY	CLR	11/22/2017
DRAFTING	MAP	3/2/2018
DESIGN MGR.	K.SCHARP	1/8/2018
ENG.		
MANUF.		
EXT. APPROVAL		

SUPERSEDES PART NO.

FILE NAME: AA-SHP-SHPX08C.sldw

ELECTRONICS RESEARCH INC. ESTABLISHED 1947
7777 GARDNER Rd. CHANDLER, IN 47610-9219 PHONE: (812) 925-6000 FAX: (812) 925-4030

TITLE:
SHP/SHPX ANTENNA INSTALLATION DETAILS
EIGHT BAY, CENTERFEED, NO RADOMES
FULL WAV 92.5 95.3 104.5 107.7

SIZE	CAGE CODE	DWG NO.	REV.
B	OZNS1	AA-SHP-SHPX08C	
SCALE: NTS	WEIGHT: N/A	SHEET: 1 OF 1	

A-2 ERI Antenna Specification Sheet

TRANSMISSION SITE
TALLAHASSEE, FLORIDA

General Specifications

Antenna Type ……..…….High Power FM-Broadcast, Suitable For Diplexing
Model Number SHPX-8AC
Number of Bay Levels .....Eight
Polarization..... Right Hand Circular

Electrical Specifications

Antenna Input Power Capability . . . . . 35.5 kW Max (1)
Operating Frequency Band ..... 103.1 ~ 104.9 Megahertz.
VSWR. . . . . <1.02:1 @ Operating Frequencies(2)
Azimuthal Pattern Circularity ..... Better Then +/- 2dB From RMS (Free Space)
Power Split ..... 50/50 (Horizontal & Vertical)
Frequency Specific Information:

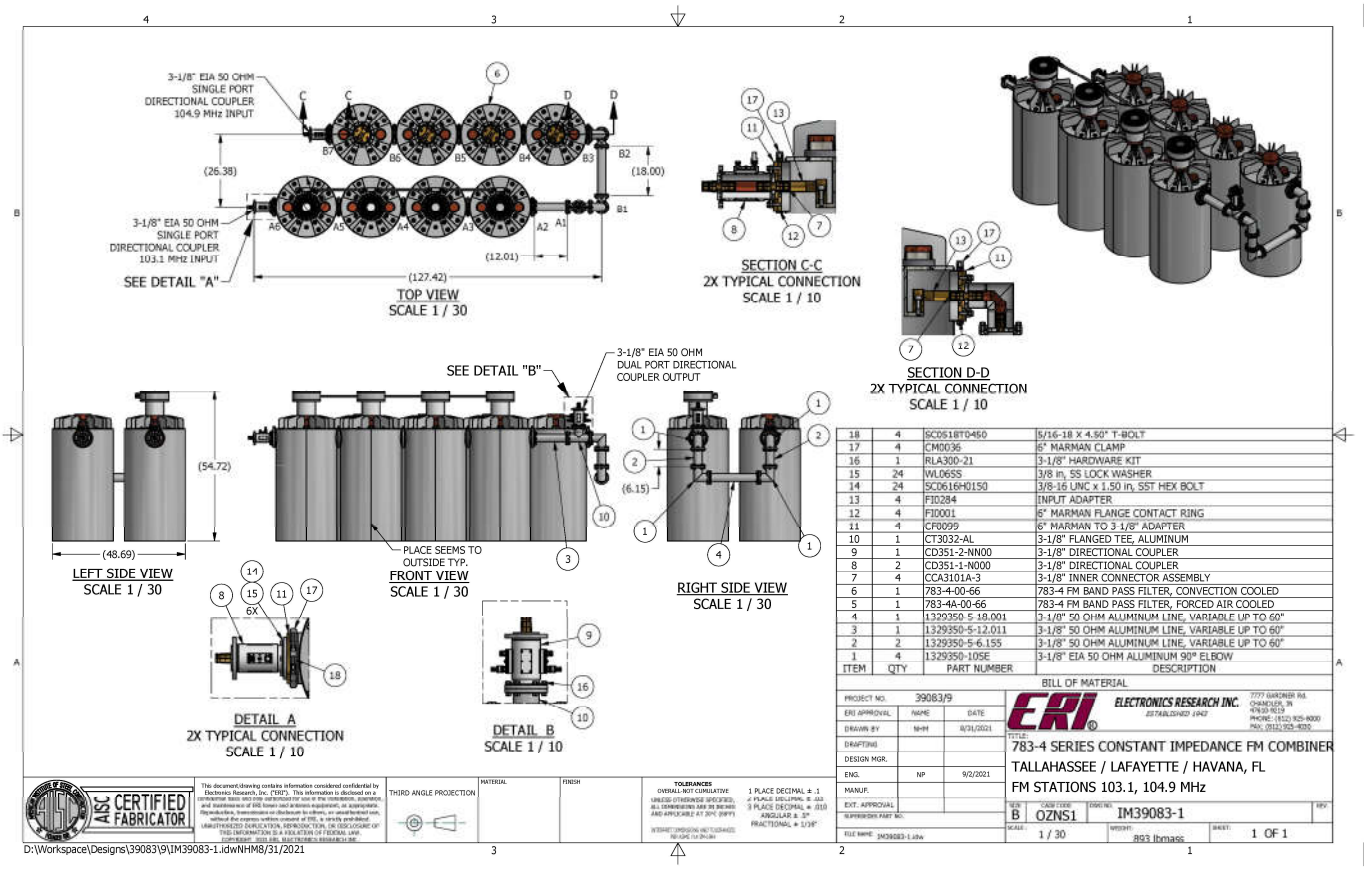
Frequency	Station ERP	Beam Tilt	First Null Fill	Second Null Fill	Power Gain	Line Loss (3)	Filter Loss (4)	Computed TPO
103.1	**100 KW**	**0.0°**	**4.3 %**	**0.0 %**	**4.484**	**-0.620 dB**	**-0.272 dB**	**27.42 kW**
104.9	**29.0 KW**	**0.0°**	**4.3 %**	**0.0 %**	**4.445**	**-0.625 dB**	**-0.288 dB**	**8.063 kW**

Mechanical Specifications

Antenna Feed System.....Single Input
Input Connector ……3 1/8”50-Ohm EIA Flanged
Element Deicing.....None
Interbay Spacing..... 113.08” Center to Center
Array Length ..... 68.5 Feet
Construction Material (Antenna)..... Brass and Stainless Steel

1) Power Capability Has Been Rated Assuming an Operating Transmission VSWR of 1.5:1
2) VSWR Specification Achieved After on Site Tuning For User Specific Frequencies.
3) Line Loss Assumes A Feed Run of 150 Feet of ERI Standard 3 1/8” Rigid 17.5 Foot Sticks & 408 Feet of HJ11-50 4” Flex.
4) Losses Taken from Actual Combiner.

EXHIBIT A-3



ITEM	QTY	PART NUMBER	DESCRIPTION
18	4	SCD518T0460	5/16-18 X 4.60" T-BOLT
17	4	CM0036	6" MARMAN CLAMP
16	1	RLA300-21	3-1/8" HARDWARE KIT
15	24	WL06SS	3/8 in, SS LOCK WASHER
14	24	SCD616H0150	3/8-16 UNC x 1.50 in, SST HEX BOLT
13	4	FI0284	INPUT ADAPTER
12	4	FI0001	6" MARMAN FLANGE CONTACT RING
11	4	CF8099	6" MARMAN TO 3 1/8" ADAPTER
10	1	CT3032-AL	3-1/8" FLANGED TEE, ALUMINUM
9	1	CD351-2-NN00	3-1/8" DIRECTIONAL COUPLER
8	2	CD351-1-N000	3-1/8" DIRECTIONAL COUPLER
7	4	CCA3101A-3	3-1/8" INNER CONNECTOR ASSEMBLY
6	1	783-4-00-66	783-4 FM BAND PASS FILTER, CONVECTION COOLED
5	1	783-4A-00-66	783-4 FM BAND PASS FILTER, FORCED AIR COOLED
4	1	1329350-5-18.001	3-1/8" 50 OHM ALUMINUM LINE, VARIABLE UP TO 60"
3	1	1329350-5-12.011	3-1/8" 50 OHM ALUMINUM LINE, VARIABLE UP TO 60"
2	2	1329350-5-6.155	3-1/8" 50 OHM ALUMINUM LINE, VARIABLE UP TO 60"
1	4	1329350-10SE	3-1/8" EIA 50 OHM ALUMINUM 90° ELBOW

BILL OF MATERIAL

PROJECT NO.	39083/9	
ERI APPROVAL	NAME	DATE
DRAWN BY	NHM	8/31/2021
DRAFTING		
DESIGN MGR.		
ENG.	NP	9/2/2021
MANUF.		
EXT. APPROVAL		

ELECTRONICS RESEARCH INC. ESTABLISHED 1947
7777 GARDNER Rd. CHANDLER, IN 47610-9119 PHONE: (812) 925-6000 FAX: (812) 925-4030

TITLE:
783-4 SERIES CONSTANT IMPEDANCE FM COMBINER
TALLAHASSEE / LAFAYETTE / HAVANA, FL
FM STATIONS 103.1, 104.9 MHz

SIZE	CAGE CODE	DWG NO.	REV
B	OZNS1	IM39083-1	
SCALE: 1 / 30	WEIGHT: 893 lbmass	SHEET: 1 OF 1	

ASC CERTIFIED FABRICATOR

THIRD ANGLE PROJECTION | MATERIAL | FINISH

TOLERANCES
OVERALL-NOT CUMULATIVE
UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN INCHES AND APPLICABLE AT 20°C (68°F)
1 PLACE DECIMAL ± .1
2 PLACE DECIMAL ± .03
3 PLACE DECIMAL ± .010
ANGULAR ± .5°
FRACTIONAL ± 1/16"

D:\Workspace\Designs\39083\9\IM39083-1.idwNHM8/31/2021

A-4 ERI "T" Combiner Specification Sheet

TRANSMISSION SITE
TALLAHASSEE, FLORIDA

General Specifications:

Multiplexer Type ..... 783-4 "T" Combiner
Number of Combining Units ..... Two
Injected Port to Injected Port Isolation ..... < - 62 dB
Output Connector ..... 3 1/8 "50 Ohm EIA (Flanged)
Output Power (Designed) ..... 35.5 kW(1)

Heat Removal ..... Natural Convection for 104.9 Forced Air Cooling for 103.1 MHz.
Physical Arrangement ..... Floor Standing

Injected Port Specifications:

Frequency Assignment ..... 103.1 ~ 104.9 MHz.
Power Rating, Each Injected Port (Designed) ..... 27.42 kW 103.1 MHz, 8.06 kW 104.9 MHz.
Input Connector ..... 3 1/8" 50 Ohm EIA (Flanged).
VSWR ..... < 1.06:1 @ +/-200 KHz.(2)
Group Delay ..... Less than 150 ns Overall Variation, Carrier @ +/- 150 KHz.
Insertion Loss (Measured):

103.1 MHz. ..... - 0.272 dB
104.9 MHz. ..... - 0.288 dB

1) Power Rating Listed is as Designed Only. Actual Power Capabilities May Vary.
2) When Terminated in 50 Ohm Resistive Load.

EXHIBIT A – 5

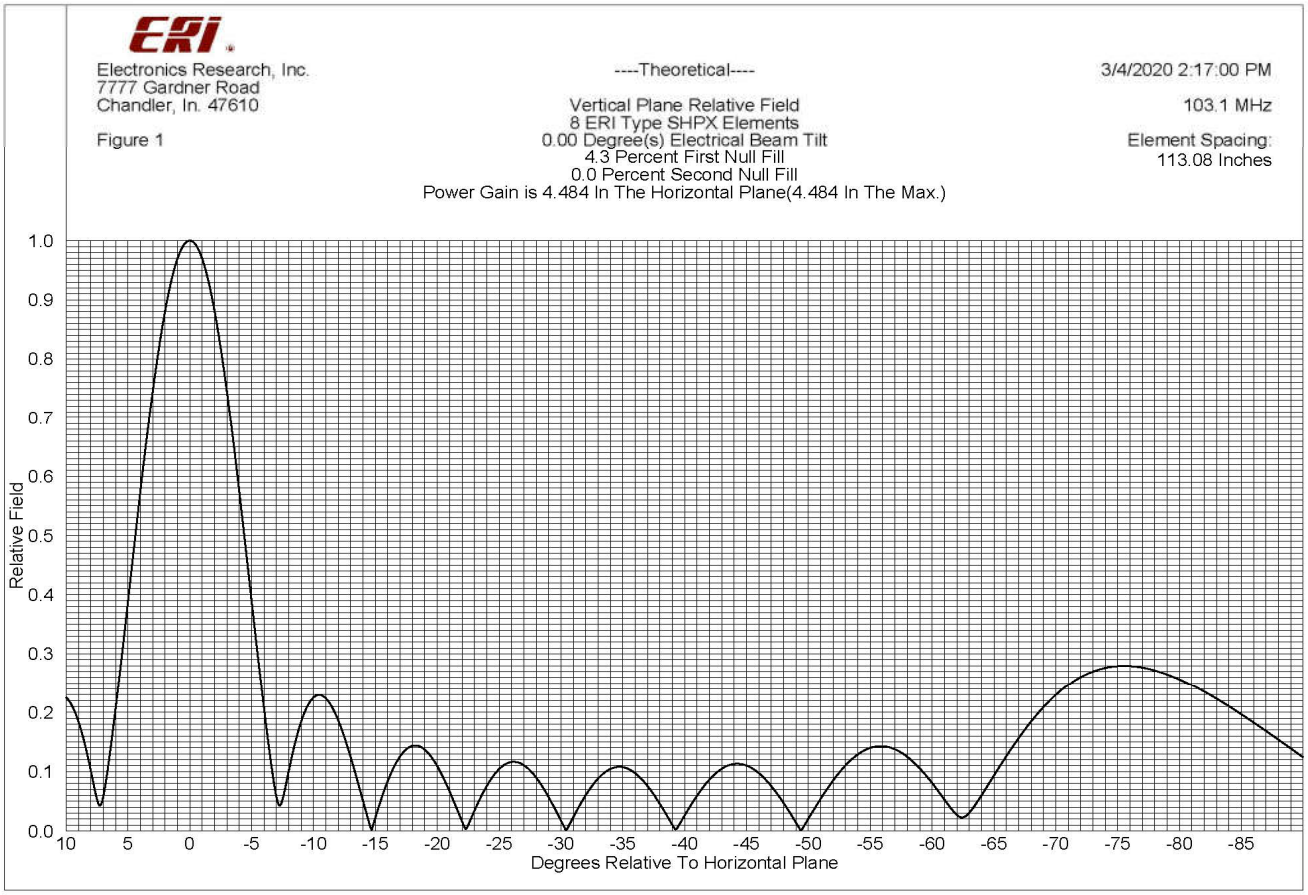
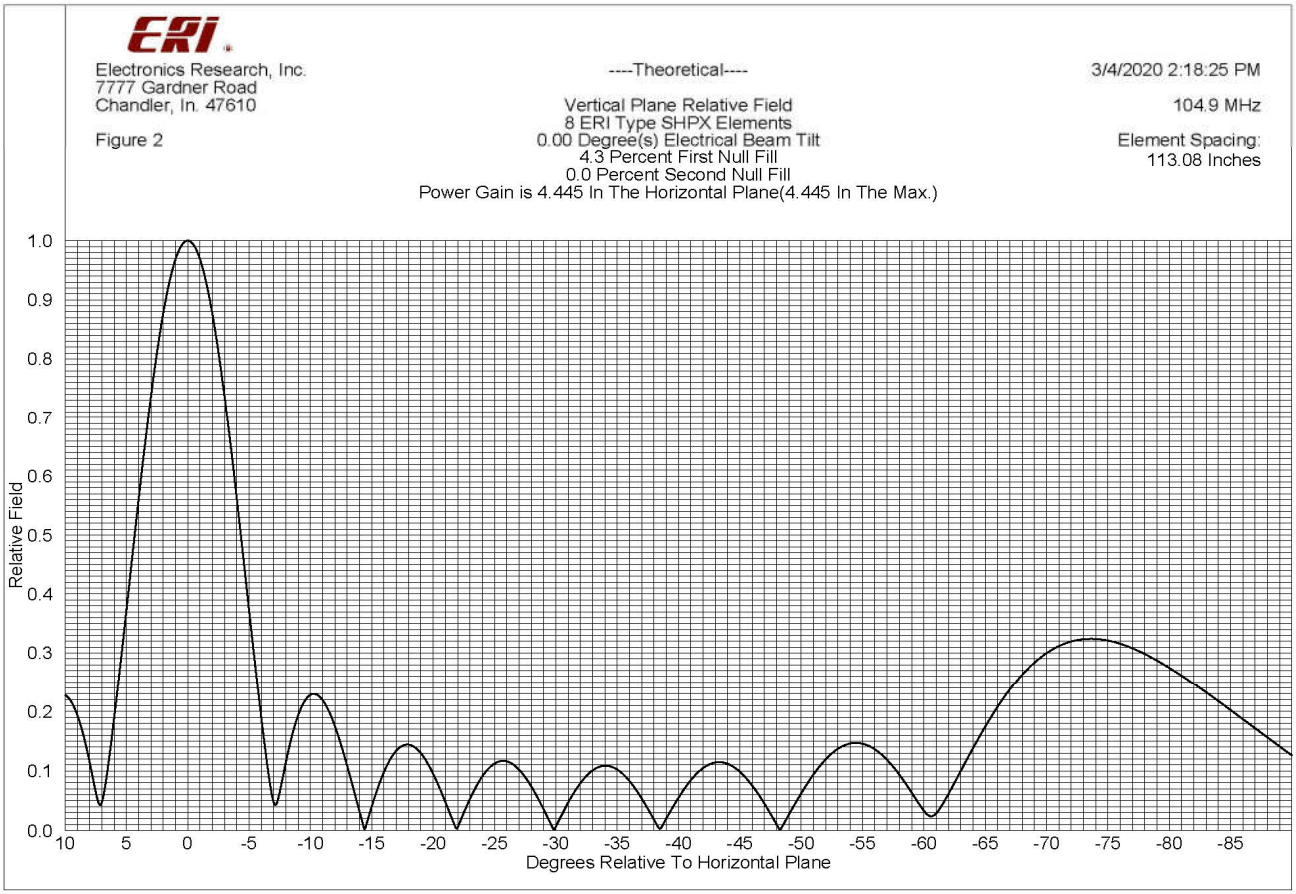

Electronics Research, Inc.
7777 Gardner Road
Chandler, In. 47610
Figure 1
----Theoretical----
Vertical Plane Relative Field
8 ERI Type SHPX Elements
0.00 Degree(s) Electrical Beam Tilt
4.3 Percent First Null Fill
0.0 Percent Second Null Fill
Power Gain is 4.484 In The Horizontal Plane(4.484 In The Max.)
3/4/2020 2:17:00 PM
103.1 MHz
Element Spacing:
113.08 Inches
Relative Field
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
10 5 0 -5 -10 -15 -20 -25 -30 -35 -40 -45 -50 -55 -60 -65 -70 -75 -80 -85
Degrees Relative To Horizontal Plane

EXHIBIT A – 5


Electronics Research, Inc.
7777 Gardner Road
Chandler, In. 47610
Figure 2
----Theoretical----
Vertical Plane Relative Field
8 ERI Type SHPX Elements
0.00 Degree(s) Electrical Beam Tilt
4.3 Percent First Null Fill
0.0 Percent Second Null Fill
Power Gain is 4.445 In The Horizontal Plane(4.445 In The Max.)
3/4/2020 2:18:25 PM
104.9 MHz
Element Spacing:
113.08 Inches
Relative Field
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
10 5 0 -5 -10 -15 -20 -25 -30 -35 -40 -45 -50 -55 -60 -65 -70 -75 -80 -85
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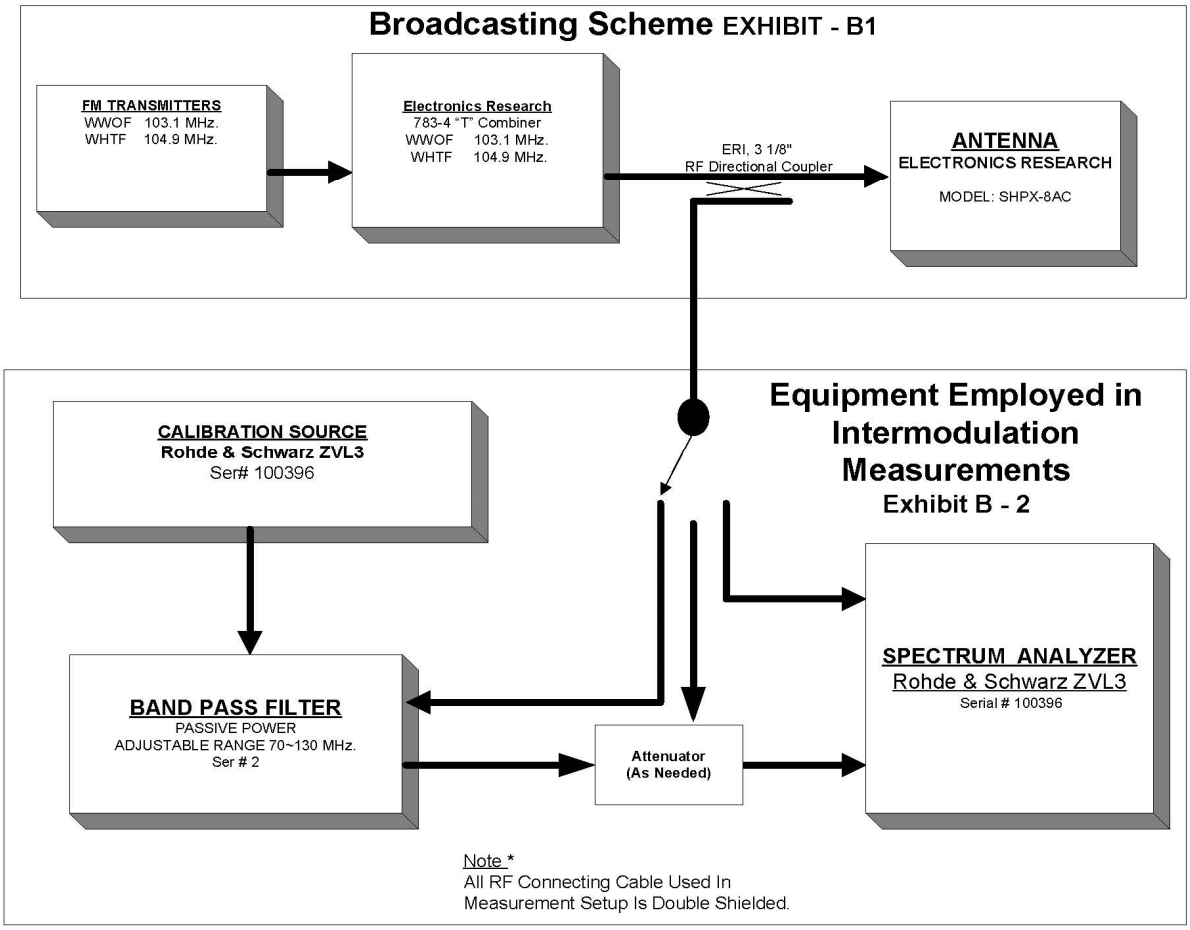


Broadcasting Scheme and Equipment Employed in Intermodulation Measurements

EXHIBIT B

ELECTRONICS RESEARCH, INC. ERI

Field Service Report
FM Combiner and Antenna System

Tallahassee, FL.
Broadcast Facility

ERI Antenna: SHP-8AC-SP
ERI 783-4 “T” Combiner
103.1 MHz. ~ 104.9 MHz.
Feedline: ERI 3 1/8” Standard 17.5’ Sticks
150 Feet and 408 Feet of HJ11-50 4”
Comscope Heliax

WWOF 103.1 MHz. ~ WHTF 104.9 MHz.

ERI Project # 39083

February 25, 2022

Submitted By:

Jeff Taylor
7777 Gardner Rd.
Chandler, In. 47610
TX: 812-925-6000 Ext. 276
Cell: 812-459-6544
EM: JTaylor@eriinc.com

TABLE OF CONTENTS

INTRODUCTION

Listed below is a summary of the data and attached are the plots collected from the WWOF ~ WHTF transmission site in Tallahassee, FL. by Jeff Taylor February 25, 2022.

- The antenna is a SHPX-8AC-SP.
- 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” elbow in the transmitter room.

Site Address: 3000 N. Meridian Road
Tallahassee, FL. 32312

Attendees: Jeff Taylor Electronics Research, Inc.
Rick Project Engineer
Tower Service World Wide

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

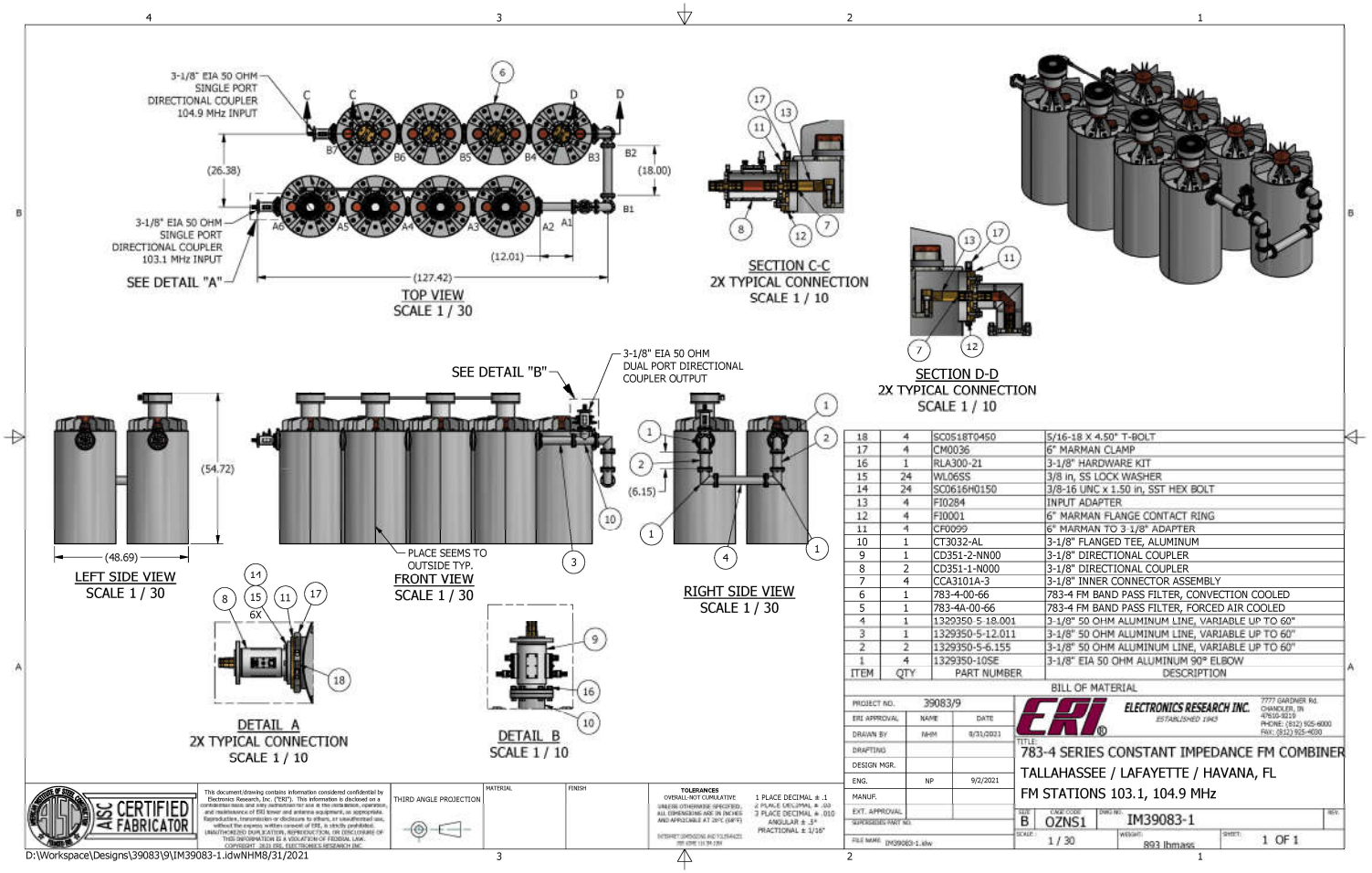
SUMMARY and RECOMMENDATIONS

All measurements were taken by Jeff Taylor of Electronics Research Inc. February 2022.

Sincerely Jeff Taylor

DRAWINGS

Drawing 1: Combiner Drawing.



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BILL OF MATERIAL

PROJECT NO.	39083/9	
ERI APPROVAL	NAME	DATE
DRAWN BY	NHM	8/31/2021
DRAFTING		
DESIGN MGR.		
ENG.	NP	9/2/2021
MANUF.		
EXT. APPROVAL		

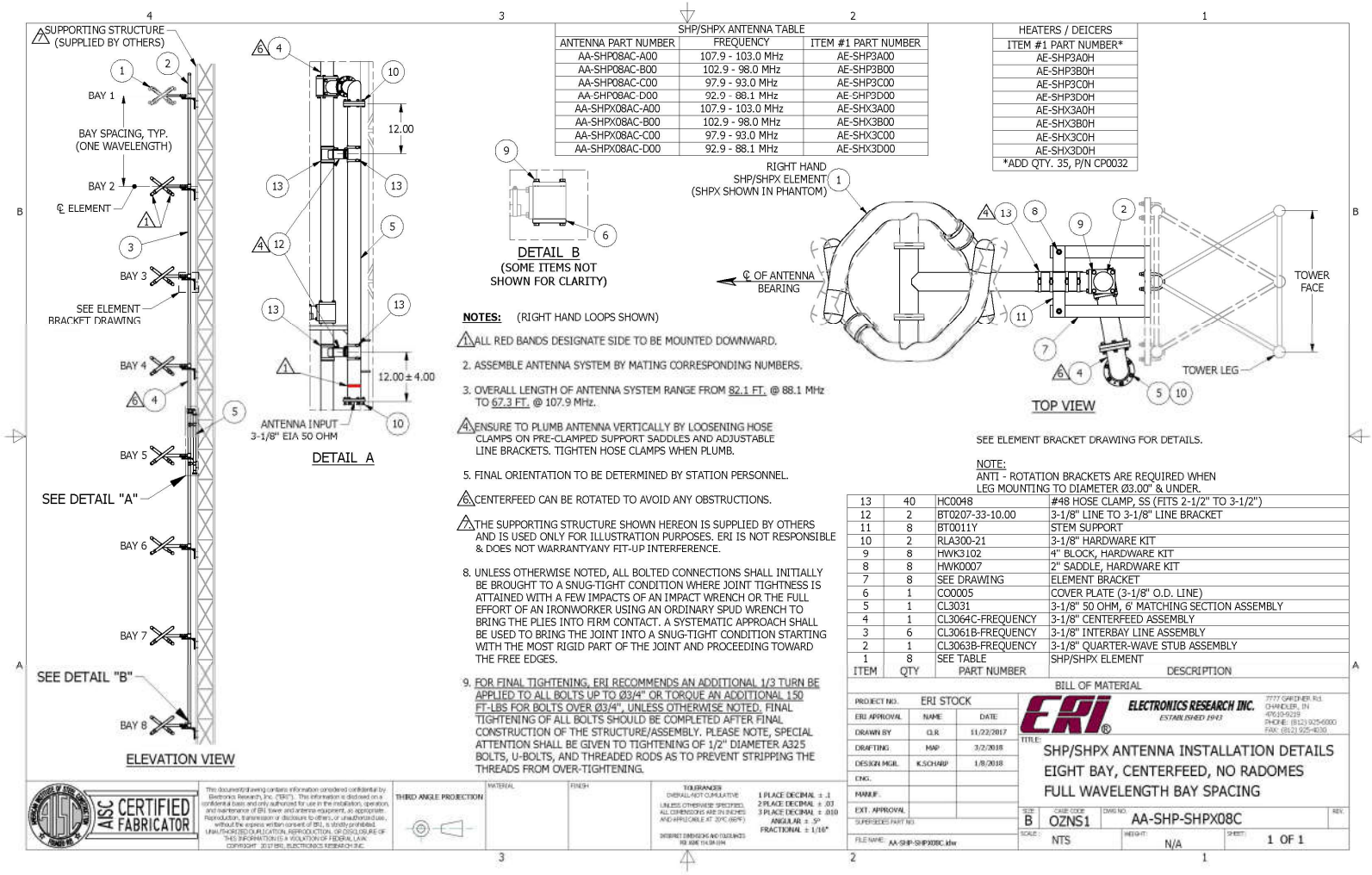
ELECTRONICS RESEARCH INC. ESTABLISHED 1945
7777 GARDNER Rd. CHANDLER, IN 47610-9219 PHONE: (812) 925-6000 FAX: (812) 925-4030

TITLE:
783-4 SERIES CONSTANT IMPEDANCE FM COMBINER
TALLAHASSEE / LAFAYETTE / HAVANA, FL
FM STATIONS 103.1, 104.9 MHz

SIZE	CAGE CODE	DWG NO.	REV.
B	OZNS1	IM39083-1	

SCALE: 1 / 30 WEIGHT: 893 lbmass SHEET: 1 OF 1

Drawing 2: Antenna Drawing.



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HEATERS / DEICERS
ITEM #1 PART NUMBER*
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AE-SHX3C0H
AE-SHX3D0H
*ADD QTY. 35, P/N CP0032

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9. FOR FINAL TIGHTENING, ERI RECOMMENDS AN ADDITIONAL 1/3 TURN BE APPLIED TO ALL BOLTS UP TO Ø3/4" OR TORQUE AN ADDITIONAL 150 FT-LBS FOR BOLTS OVER Ø3/4", UNLESS OTHERWISE NOTED. FINAL TIGHTENING OF ALL BOLTS SHOULD BE COMPLETED AFTER FINAL CONSTRUCTION OF THE STRUCTURE/ASSEMBLY. PLEASE NOTE, SPECIAL ATTENTION SHALL BE GIVEN TO TIGHTENING OF 1/2" DIAMETER A325 BOLTS, U-BOLTS, AND THREADED RODS AS TO PREVENT STRIPPING THE THREADS FROM OVER-TIGHTENING.

SEE ELEMENT BRACKET DRAWING FOR DETAILS.

NOTE:
ANTI - ROTATION BRACKETS ARE REQUIRED WHEN LEG MOUNTING TO DIAMETER Ø3.00" & UNDER.

ITEM	QTY	PART NUMBER	DESCRIPTION
13	40	HC0048	#48 HOSE CLAMP, SS (FITS 2-1/2" TO 3-1/2")
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11	8	BT0011Y	STEM SUPPORT
10	2	RLA300-21	3-1/8" HARDWARE KIT
9	8	HWK3102	4" BLOCK, HARDWARE KIT
8	8	HWK0007	2" SADDLE, HARDWARE KIT
7	8	SEE DRAWING	ELEMENT BRACKET
6	1	CO0005	COVER PLATE (3-1/8" O.D. LINE)
5	1	CL3031	3-1/8" 50 OHM, 6' MATCHING SECTION ASSEMBLY
4	1	CL3064C-FREQUENCY	3-1/8" CENTERFEED ASSEMBLY
3	6	CL3061B-FREQUENCY	3-1/8" INTERBAY LINE ASSEMBLY
2	1	CL3063B-FREQUENCY	3-1/8" QUARTER-WAVE STUB ASSEMBLY
1	8	SEE TABLE	SHP/SHPX ELEMENT

BILL OF MATERIAL

PROJECT NO. ERI STOCK

ERI APPROVAL	NAME	DATE
DRAWN BY	CLR	11/22/2017
DRAFTING	MAP	3/2/2018
DESIGN MGR.	K.SCHARP	1/8/2018
ENG.		
MANUF.		
EXT. APPROVAL		

SUPERSEDES PART NO.

FILE NAME: AA-SHP-SHPX08C.idw

ELECTRONICS RESEARCH INC.
ESTABLISHED 1949
7777 GARDNER Rd.
CHANDLER, IN
47610-9219
PHONE: (812) 925-6000
FAX: (812) 925-4030

TITLE:
SHP/SHPX ANTENNA INSTALLATION DETAILS
EIGHT BAY, CENTERFEED, NO RADOMES
FULL WAVELENGTH BAY SPACING

SIZE	CAGE CODE	DWG NO.	REV.
B	OZNS1	AA-SHP-SHPX08C	

SCALE: NTS | WEIGHT: N/A | SHEET: 1 OF 1

AISC CERTIFIED FABRICATOR

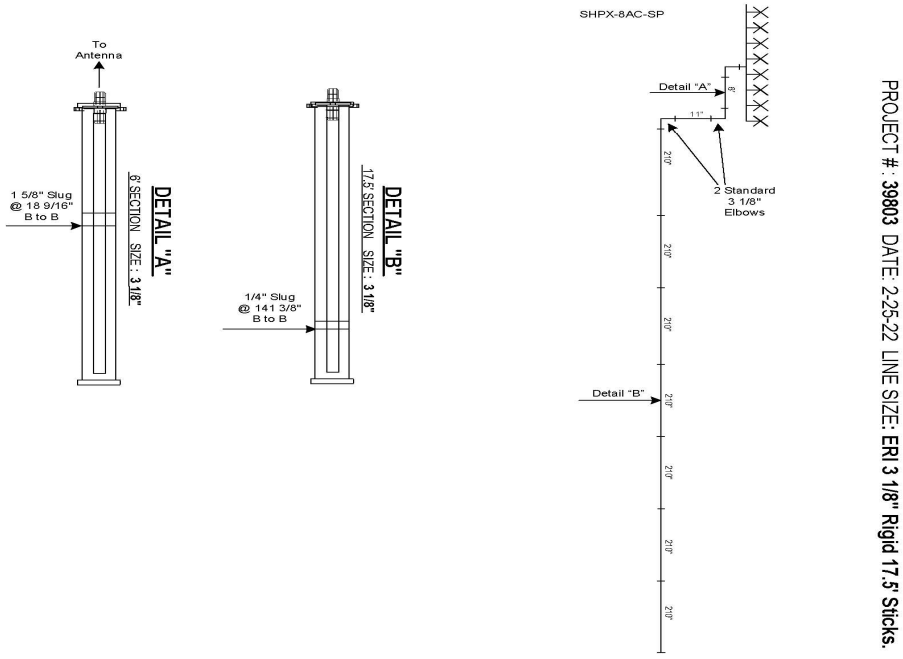
THIRD ANGLE PROJECTION

MATERIAL

FINISH

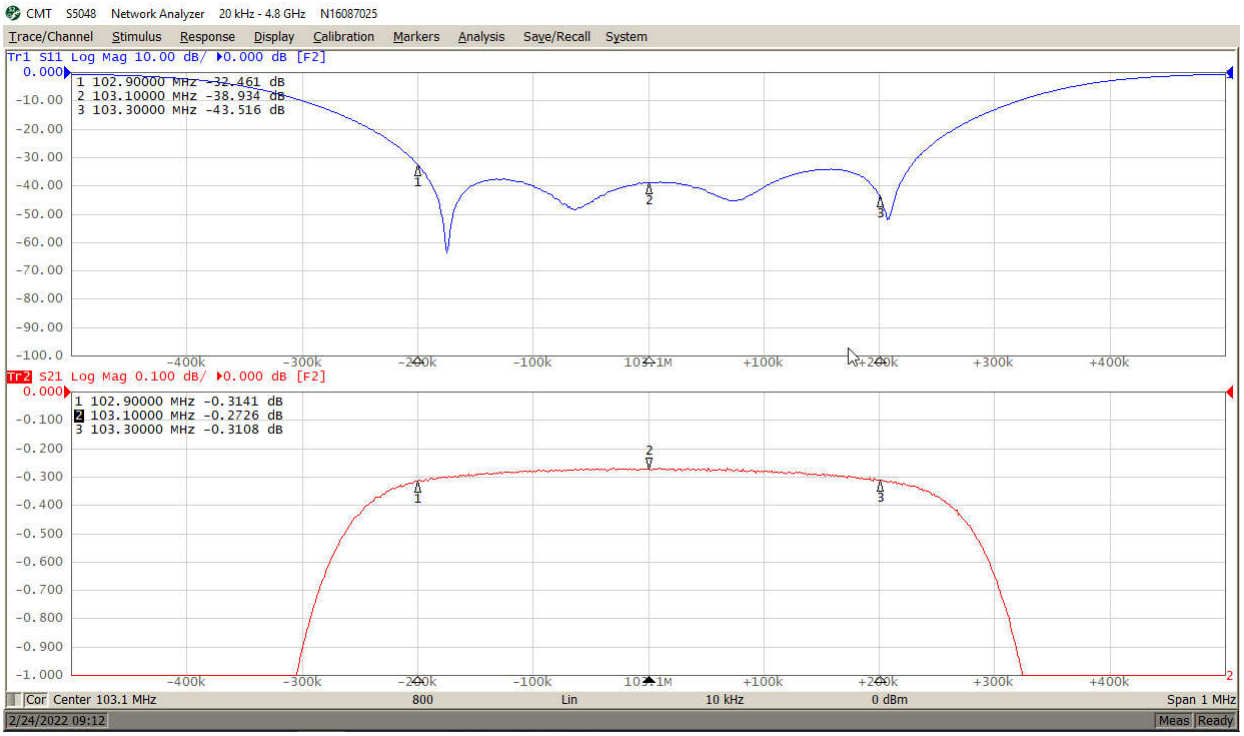
TOLERANCES
UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES AND APPLICABLE AT 20°C (68°F)
DECIMALS ARE CUMULATIVE
1 PLACE DECIMAL ± .1
2 PLACE DECIMAL ± .03
3 PLACE DECIMAL ± .010
ANGULAR ± .5°
FRACTIONAL ± 1/16"

Drawing 3: Tuning Slug Location.

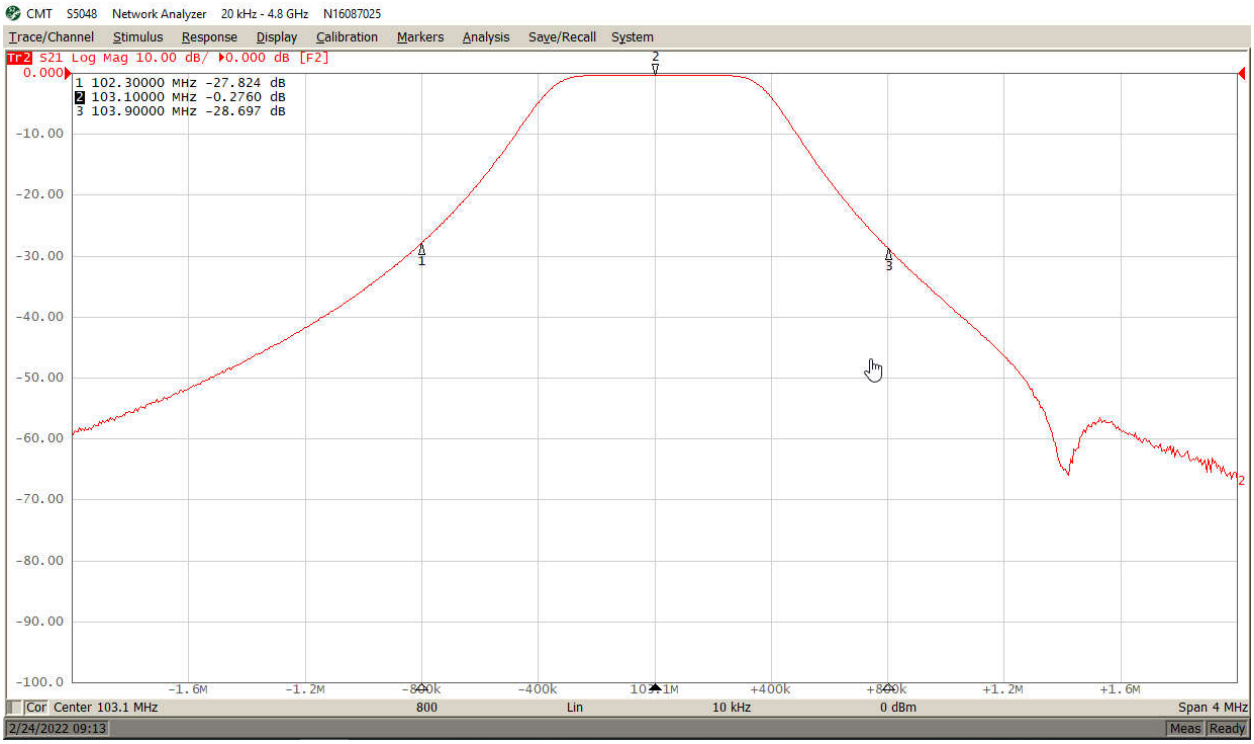


PROJECT # : **39803** DATE: 2-25-22 LINE SIZE: **ERI 3 1/8" Rigid 17.5' Sticks.**

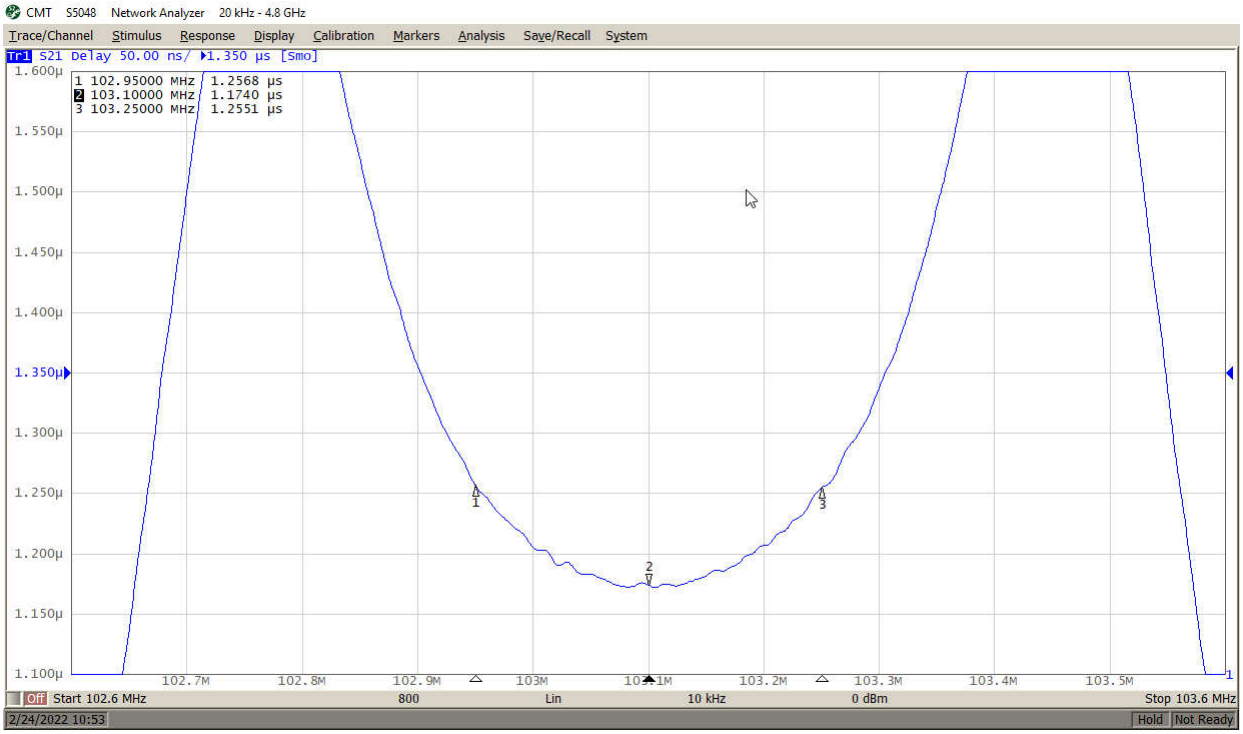
Measurement 1: Match and Insertion Loss of 103.1 MHz.



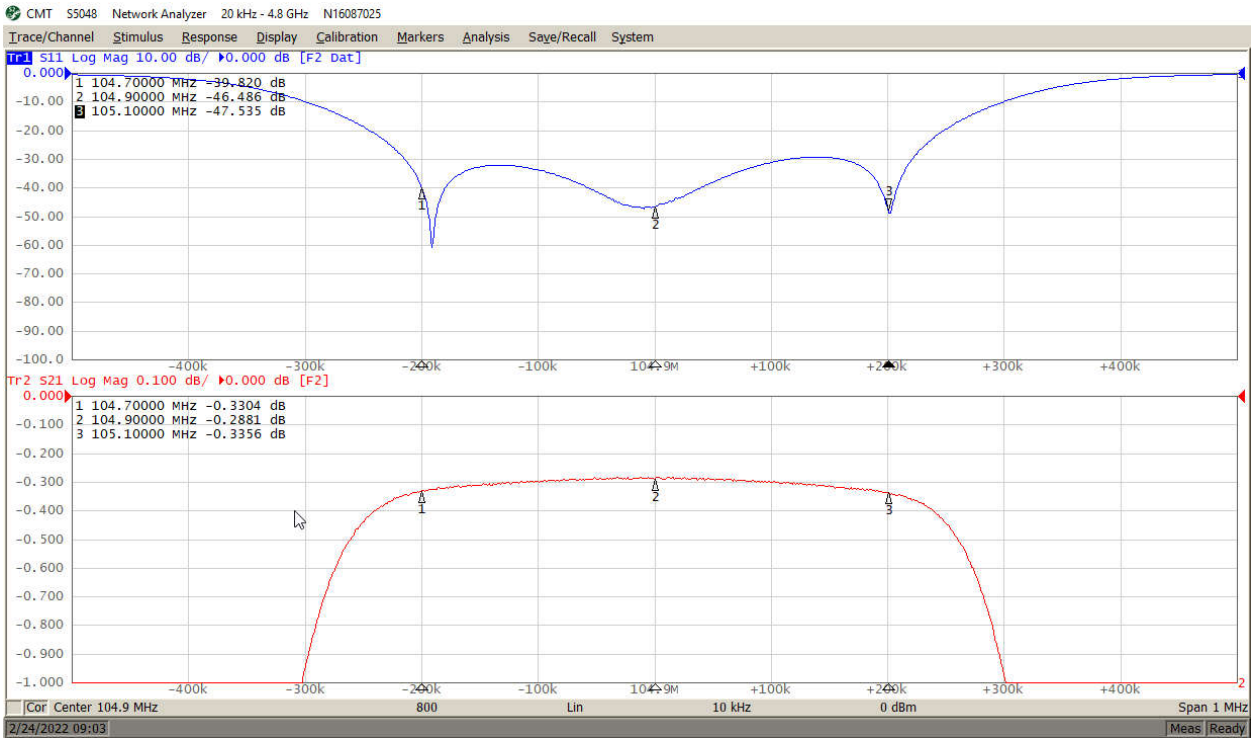
Measurement 2: Isolation +/- 800 KHz. of 103.1 MHz.



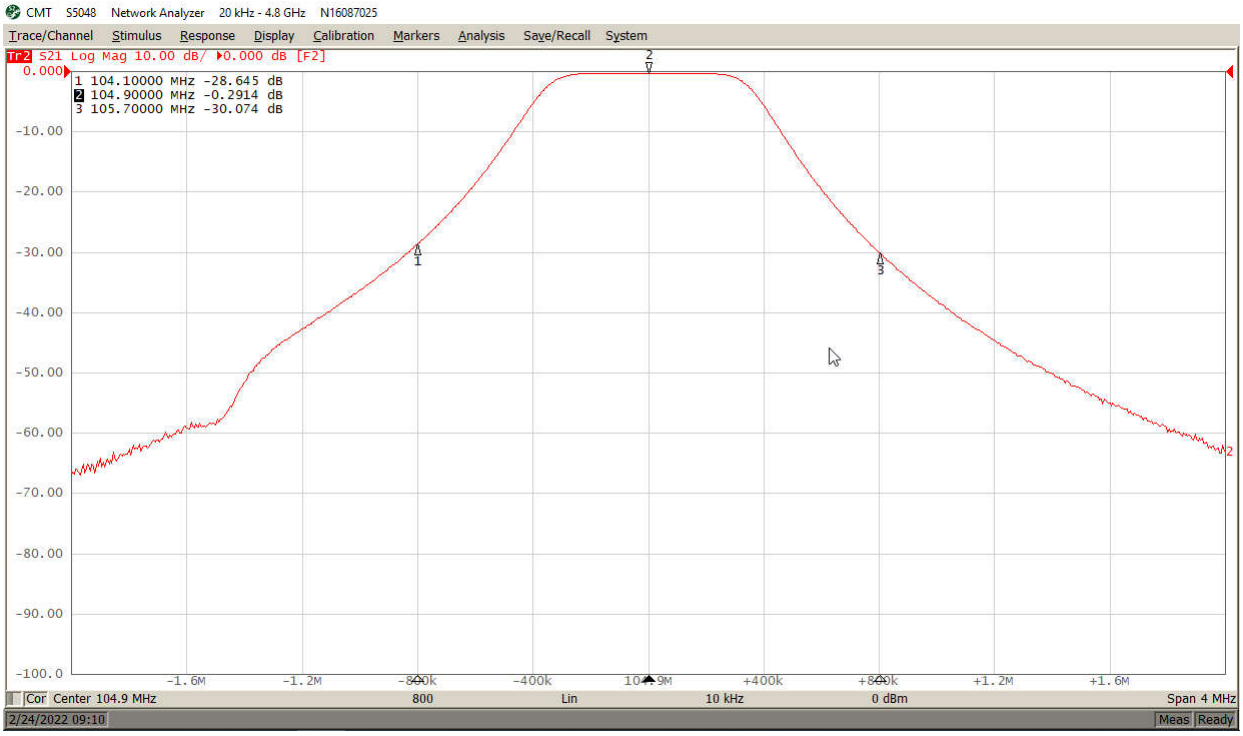
Measurement 3: Group Delay of 103.1 MHz.



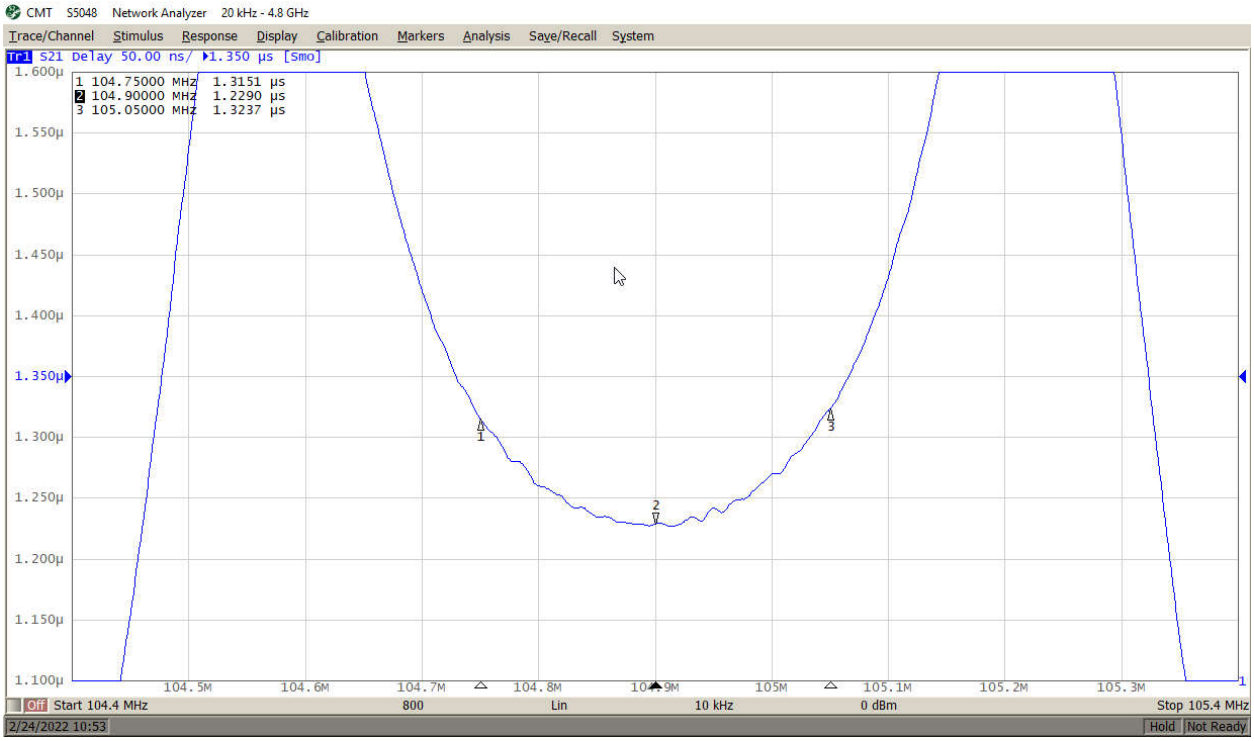
Measurement 4: Match and Insertion Loss of 104.9 MHz.



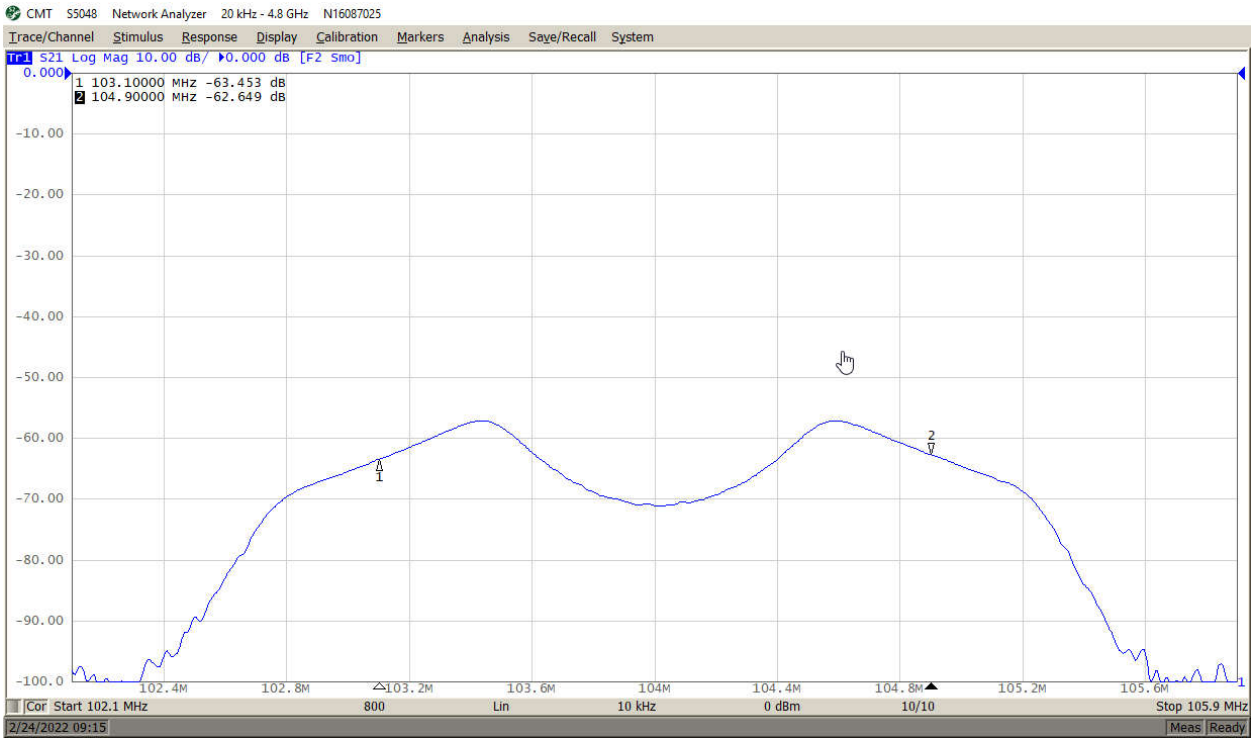
Measurement 5: Isolation +/- 800 KHz. of 104.9 MHz.



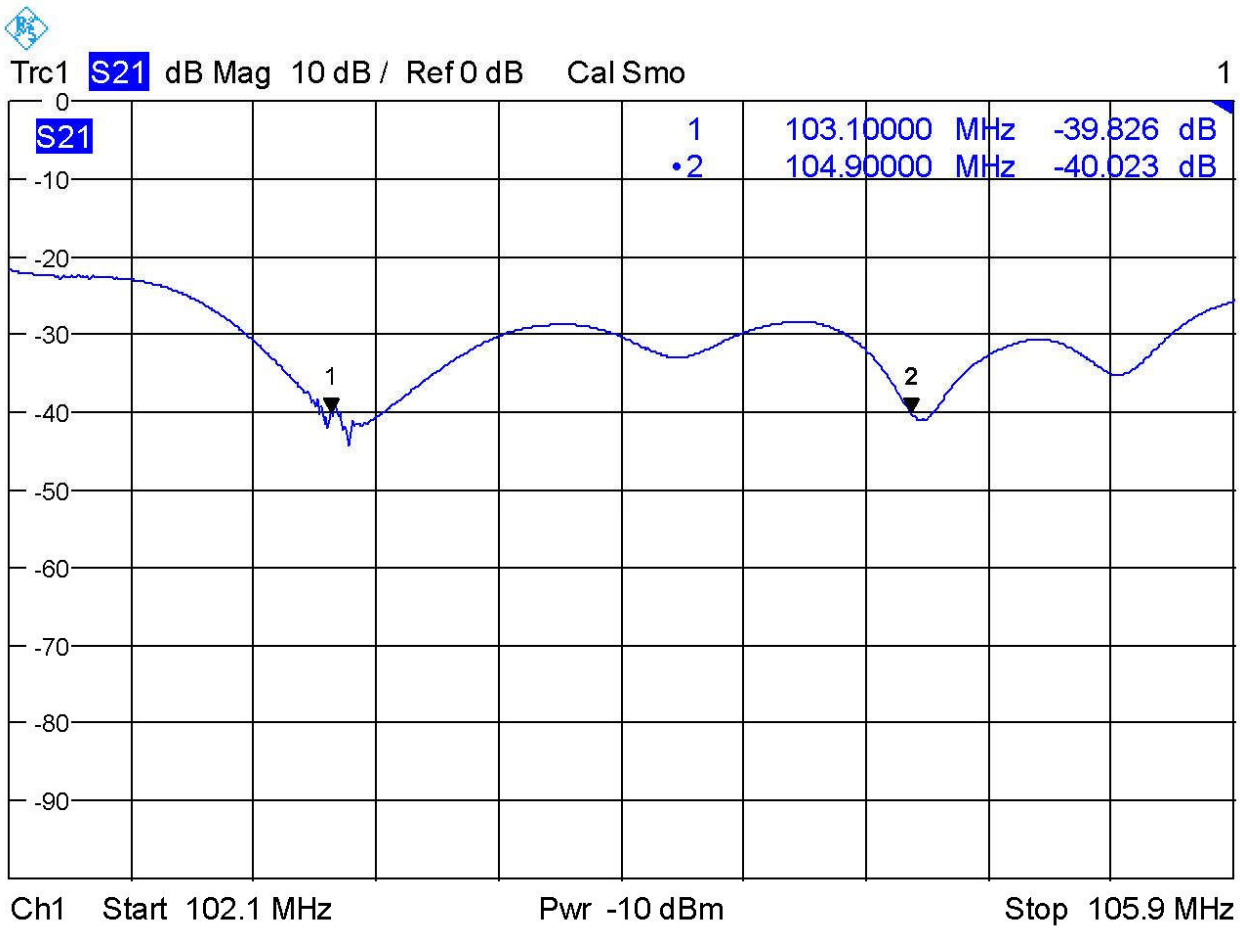
Measurement 6: Group Delay of 104.9 MHz.



Measurement 7: Port to Port Isolation 103.1 to 104.9 MHz.

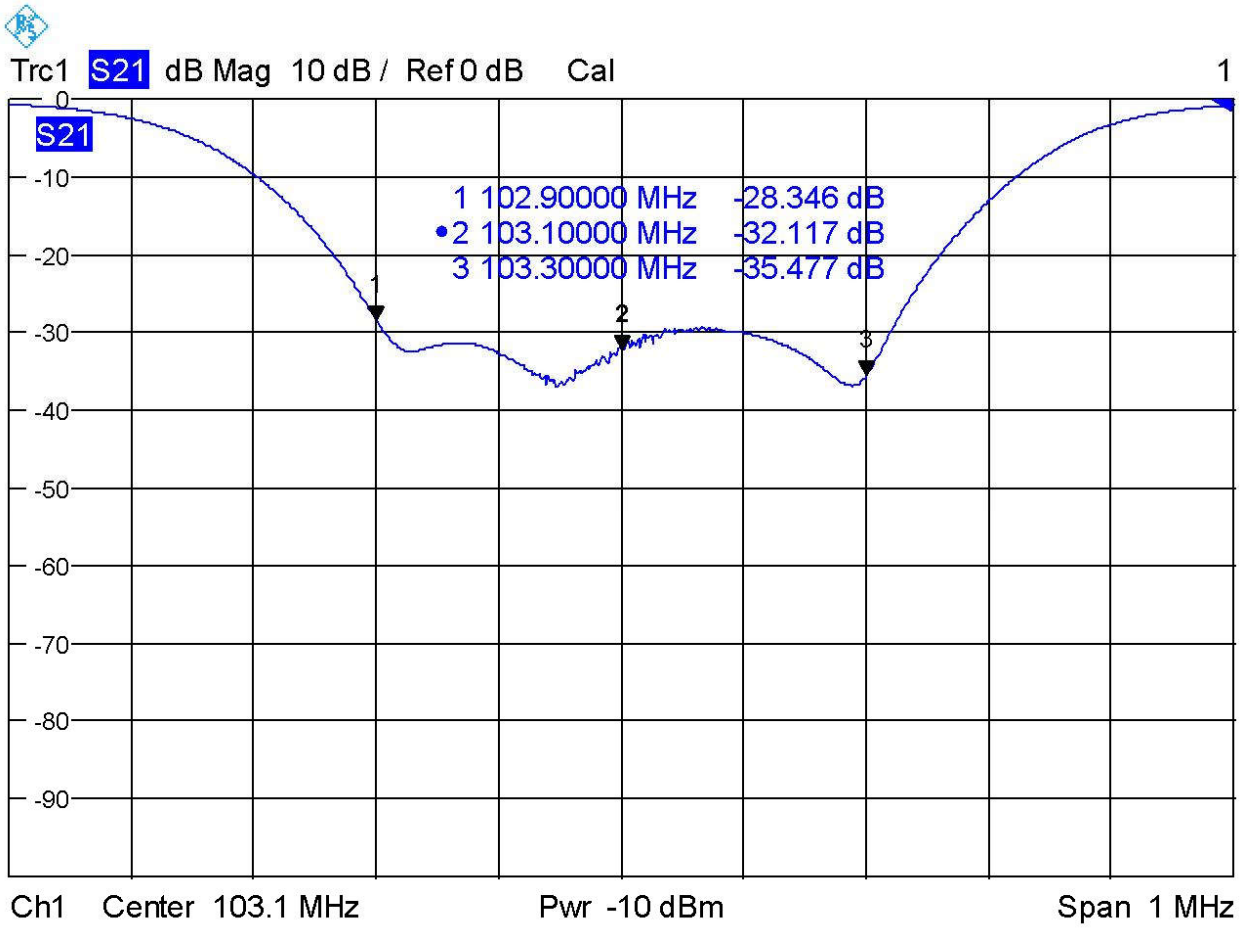


Measurement 8: Final Antenna 103.1 and 104.9 MHz.



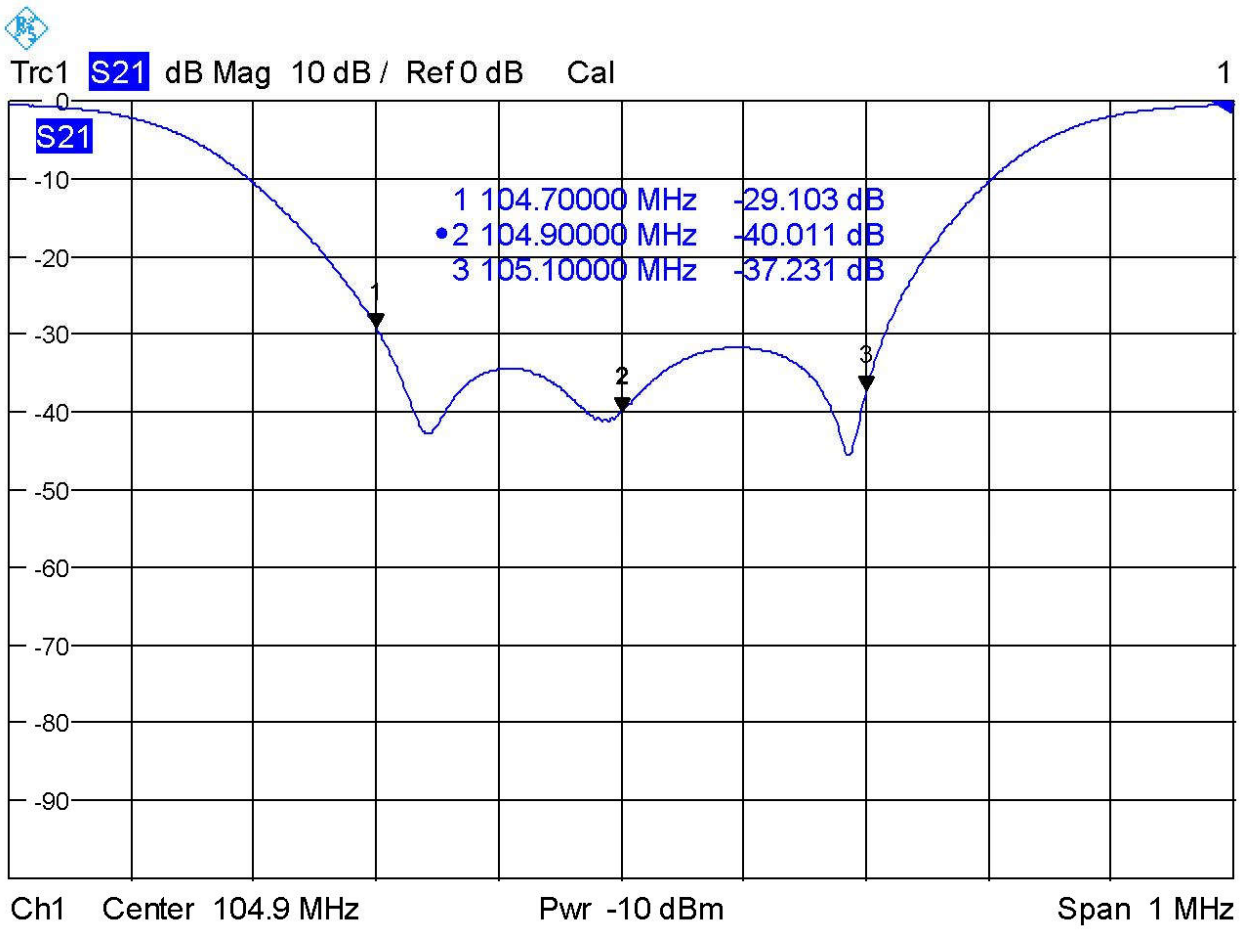
Date: 25.FEB.2022 16:31:04

Measurement 9: Filter to Antenna Match 103.1 MHz.



Date: 25.FEB.2022 16:53:21

Measurement 10: Filter to Antenna Match 104.9 MHz.

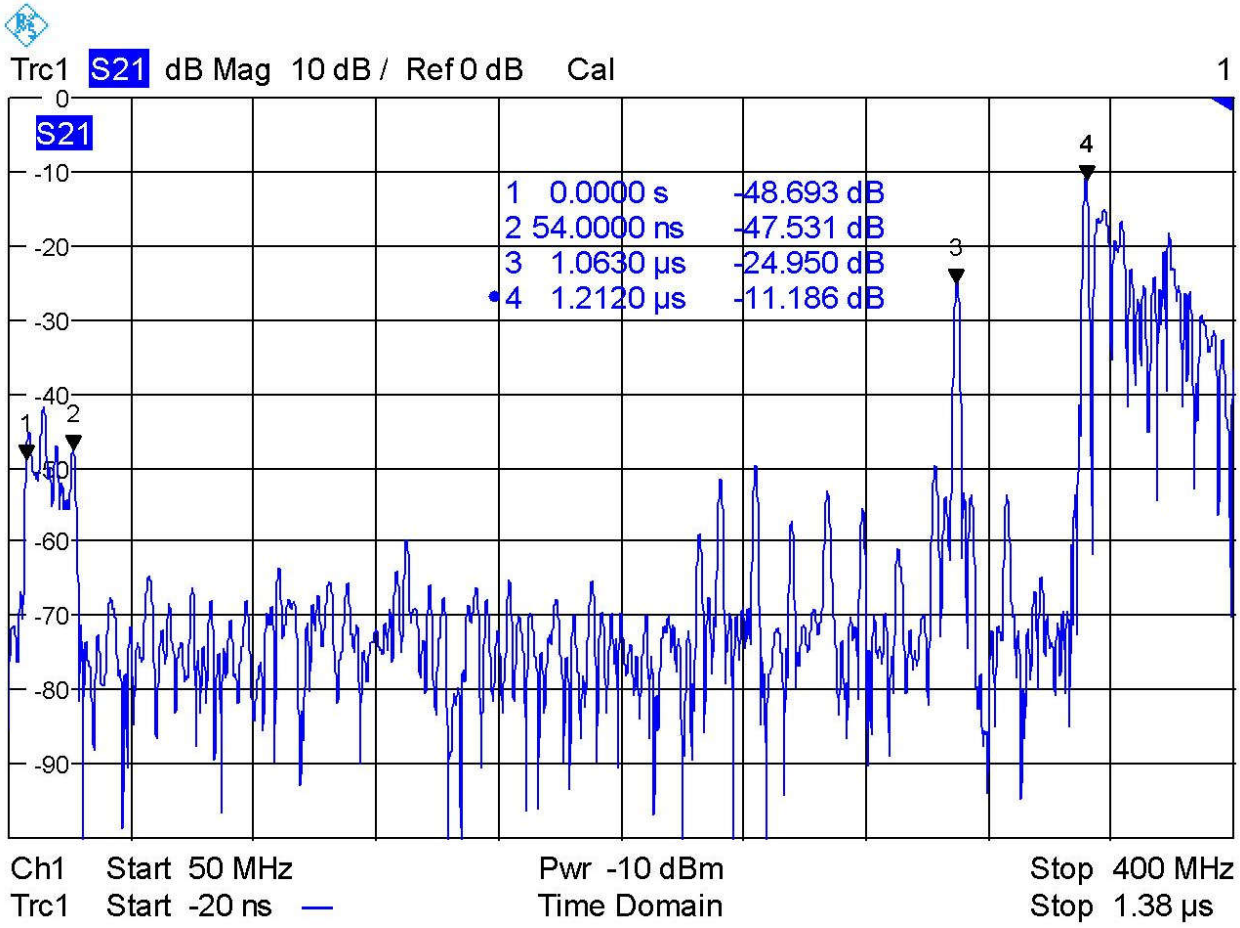


Filter to Antenna 104.9 MHz

Date: 25.FEB.2022 16:59:51

Measurement 11: 50 to 400 MHz Sweep of Antenna After Tuning.

Mkr#1 is the Test Transition @ Zero Feet.
Mkr#2 is the End of the Bottom Rigid Run @ Approx. 27 Feet.
Mkr#3 is the Bottom Tuning Slug @ Approx. 522 Feet.
Mkr#4 is the Top Tuning Slug In Matching Section @ Approx. 596 Feet.



Date: 25.FEB.2022 16:34:27

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

TDR Return Loss Measurement.
Mkr#1 is the Test Measurement Location @ Zero Feet.
Mkr#2 is the Tuning Slug in 6' Matching Section @ Approx. 27 Feet.
Mkr#3 is the End of the Flex Run @ Approx. 449 Feet.
Mkr#4 is the 50-ohm Load @ Approx. 594 Feet.

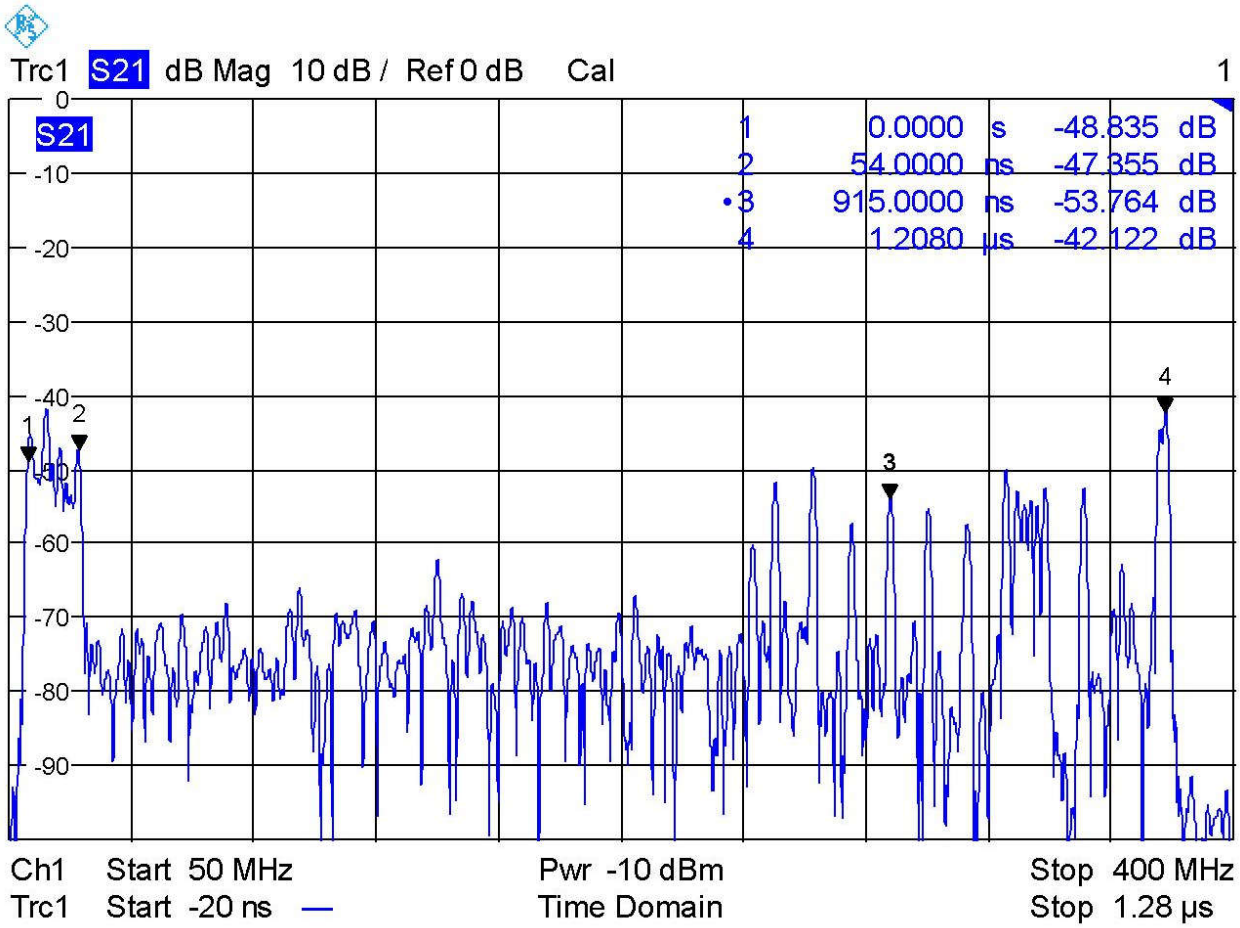


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Figure 1: Vertical Plane Relative Field Plot of 103.1 MHz.

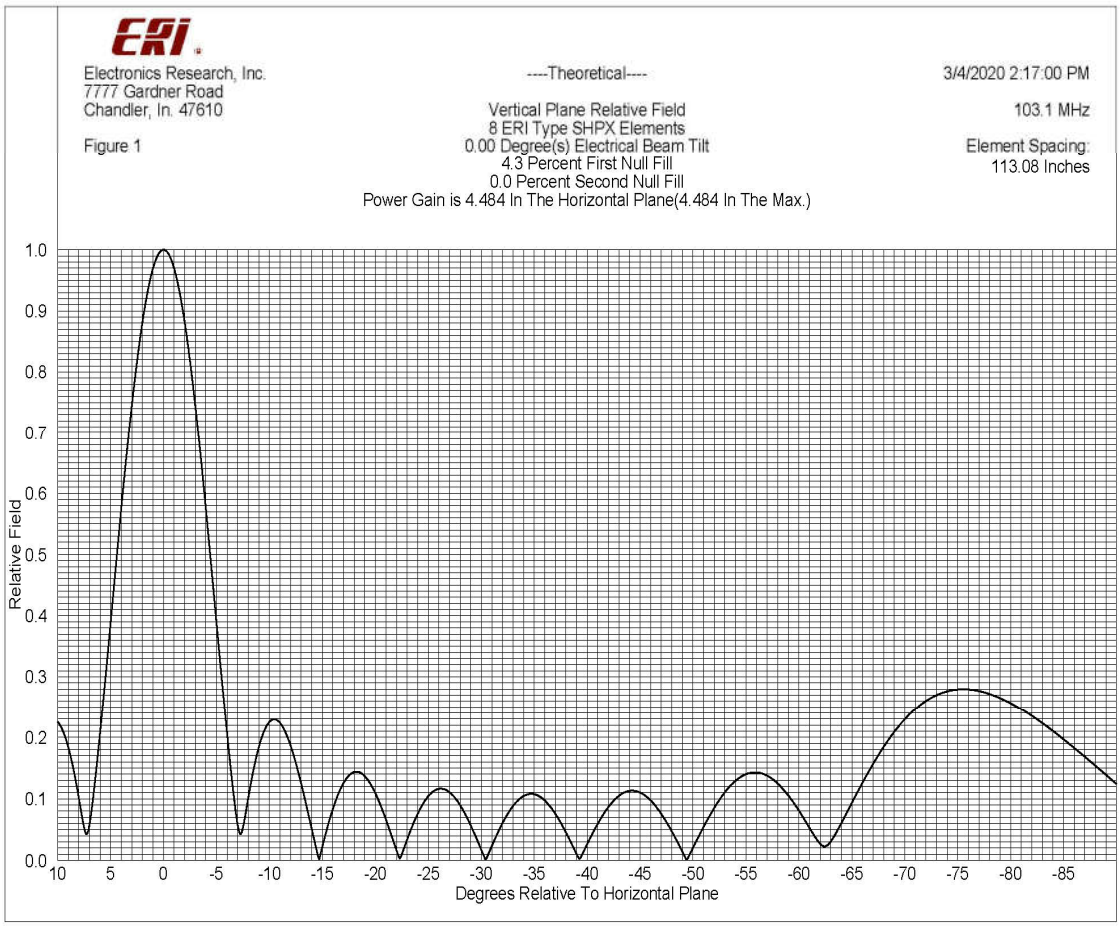

Figure 2: Vertical Plane Relative Field Plot of 104.9 MHz.

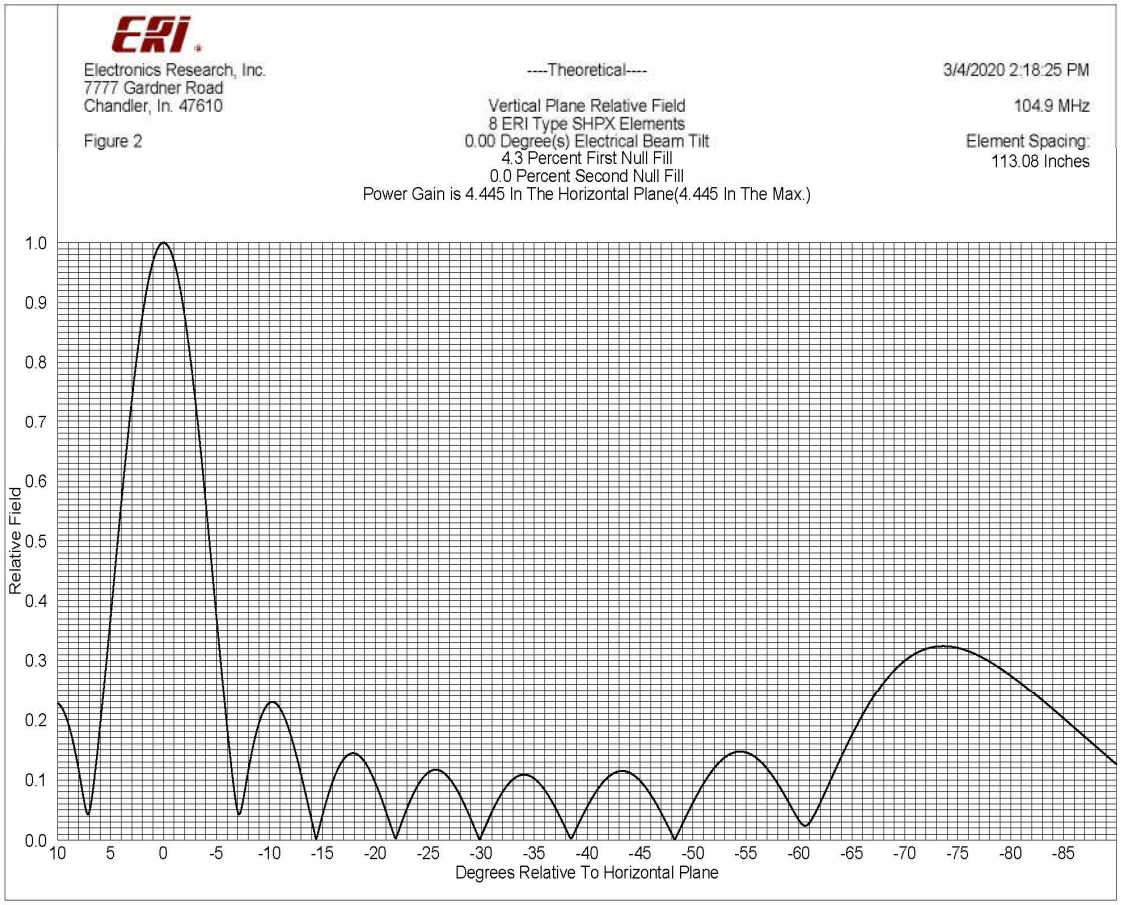

Table 1: Power Analysis for 103.1 MHz.

Antenna Model:	SHPX-8AC-SP	
	Analog	
Call Letters:	WWOF (FM), Tallahassee, Florida	
Frequency:	103.1 MHz	Channel 276
ERP:	100.000 kW	20.000 dBk
Polarization:	Circular	
Antenna RMS Gain:	4.484 Numeric	6.517 dB
Antenna Input Power:	22.302 kW	13.483 dBk
Peak Voltage:	1,493 volts	
Transmission Line Type Rigid Match:	MACX350A 3-1/8-inch MACXLine®	
Rigid Match Length:	150 feet	45.7 meters
Rigid Match Attenuation:	0.097 dB/100-feet	0.319 dB/100-meters
Transmission Line Type - Vertical Run:	HJ11-50 4-inch Air HELIAX®	
Vertical Run Length:	408 feet	124.4 meters
Vertical Run Attenuation:	0.116 dB/100-feet	0.382 dB/100-meters
Transmission Line Type - Horizontal Run:	HJ11-50 4-inch Air HELIAX®	
Horizontal Run Length:	0 feet	0.0 meters
Horizontal Run Attenuation:	0.116 dB/100-feet	0.382 dB/100-meters
Line Loss:	-3.427 kW	0.621 dB
Line Efficiency:	86.680%	
Power Output from Combiner:	25.728 kW	14.104 dBk
Peak Voltage:	1,604 volts	
Combiner Losses:	-1.663 kW	0.272 dB
Transmitter Power Output:	27.391 kW	14.376 dBk
Peak Voltage:	1,655 volts	

Table 2: Power Analysis for 104.9 MHz.

Call Letters:	WHTF (FM), Havana, Florida	
Frequency:	104.9 MHz	Channel 285
ERP:	29.000 kW	14.624 dBk
Polarization:	Circular	
Antenna RMS Gain:	4.445 Numeric	6.479 dB
Antenna Input Power:	6.524 kW	8.145 dBk
Peak Voltage:	808 volts	
Transmission Line Type Rigid Match:	MACX350A 3-1/8-inch MACXLine®	
Rigid Match Length:	150 feet	45.7 meters
Rigid Match Attenuation:	0.098 dB/100-feet	0.322 dB/100-meters
Transmission Line Type - Vertical Run:	HJ11-50 4-inch Air HELIAX®	
Vertical Run Length:	408 feet	124.4 meters
Vertical Run Attenuation:	0.117 dB/100-feet	0.385 dB/100-meters
Transmission Line Type - Horizontal Run:	HJ11-50 4-inch Air HELIAX®	
Horizontal Run Length:	0 feet	0.0 meters
Horizontal Run Attenuation:	0.117 dB/100-feet	0.385 dB/100-meters
Line Loss:	-1.013 kW	0.627 dB
Line Efficiency:	86.565%	
Power Output from Combiner:	7.537 kW	8.772 dBk
Peak Voltage:	868 volts	
Combiner Losses:	-0.517 kW	0.288 dB
Transmitter Power Output:	8.054 kW	9.060 dBk
Peak Voltage:	897 volts	