

State of West Virginia

Digital Television Antenna Systems

Request for Quotation

RFQ # EBA326



RADIO FREQUENCY SYSTEMS
The Clear Choice®



RECEIVED

2011 JAN -5 A 11: 41

PLANNING DIVISION
STATE OF WV



Date
January 4th, 2011

Department of Administration
Purchasing Division
Building 15
2019 Washington Street, East
Charleston, WV 25305-0130

West Virginia Public Broadcasting Channel 34 Digital Antenna Bid

Dear Ms. Murray,

Please find enclosed our bid response to the WVA Public Broadcasting Channel 34 Digital Antenna Bid. As a total system manufacturer we manufacture and supply from beginning to end, high quality broadcast television systems designed to meet your needs.

With our manufacturing experience RFS Broadcast manufacturers within a total quality environment. All products are produced according to ISO-9001 procedures and meet applicable MIL, EIA, FCC and other national and international standards.

Please note that our bid response for the antenna system also included the radome and transmission line.

RFS Broadcast can offer the state of WVA a "Total System" package of engineering services, antenna, transmission line, combiners, and installation, thus taking responsibility for your complete RF system.

Please don't hesitate to contact me at 203-630-3311 x-1114 regarding any questions you may have.

Sincerely,

Thomas Nowik
Broadcast System Sales Engineer
Radio Frequency Systems, Inc.



RADIO FREQUENCY SYSTEMS
The Clear Choice®

Broadcast Products

[Print page](#)

Offering a total solution for Broadcasters

Radio Frequency Systems manufactures a complete range of broadcast antennas and combining equipment for VHF/UHF TV and FM services. All of our products are supported with design, project management, installation and commissioning services.

Radio Frequency Systems represents a strategic platform for Broadcasters, providing:

Access to the very latest advanced technologies through our own Research and Development facilities

A worldwide network from fellow members of the worldwide Radio Frequency Systems group

A commitment to maintaining accreditation to the highest international quality standards

A market focused responsiveness

With over 25 years of proven experience, we not only aim to design and manufacture products of the highest quality, we are also committed to talking with our customers to ensure that we offer the most cost effective solutions that are fully tailored to our customers' needs. Every aspect of our operation is focused to ensure the end customer receives the best value solutions and service.

Meeting and Exceeding Requirements

Engineering Services

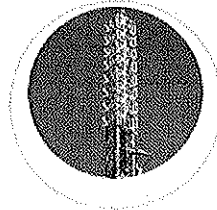
Both commercial and specialized RFS-development software form a comprehensive resource to allow synthesis and analysis of antenna and filter networks. When coupled with our sophisticated computer aided measuring equipment, including antenna test range facilities we ensure our customers' needs are totally satisfied. These tools are crucial for us to minimize product development lead times.

Quality System – ISO9001

At Radio Frequency Systems we define quality to be the value you, the customer, enjoy over a long association with us. We are committed to a philosophy of total quality and have a corporate goal of meeting international quality standards as they become effective. Radio Frequency Systems is certified to International Standard ISO9001 which spans every aspect of our operations from product design through to post installation. This ensures that clients receive systems that meet their needs over a long period.

Manufacturing

Our factory production system is controlled by a computer based purchasing and scheduling system which helps to ensure cost effectiveness and reliability of product delivery dates. We are also able to confirm progress during manufacturing and take corrective action as necessary. The extensive use of CNC machines and advanced welding techniques give us an advantage in providing precision equipment at cost effective prices.





State of West Virginia
 Department of Administration
 Purchasing Division
 2019 Washington Street East
 Post Office Box 60130
 Charleston, WV 25305-0130

Request for Quotation

RFQ NUMBER
 EBA326

PAGE
 1

ADDRESS CORRESPONDENCE TO ATTENTION OF
 SHELLY MURRAY
 304-558-8801

RFQ COPY
 TYPE NAME/ADDRESS HERE

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EDUCATIONAL BROADCASTING
 AUTHORITY
 VARIOUS LOCALES AS INDICATED
 BY ORDER

DATE PRINTED 11/29/2010	TERMS OF SALE	SHIP VIA	F.O.B.	FREIGHT TERMS
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BID OPENING DATE: 12/16/2010 BID OPENING TIME 01:30PM

LINE	QUANTITY	UOP	CAT NO	ITEM NUMBER	UNIT PRICE	AMOUNT
0001	1	EA		840-10		
ANTENNAS AND ACCESSORIES, TELEVISION REQUEST FOR QUOTATION THE PURCHASING DIVISION IS SOLICITING BIDS FOR THE WEST VIRGINIA EDUCATIONAL BROADCASTING AUTHORITY TO PROVIDE (1) DIGITAL CHANNEL 34 SIDE MOUNT ANTENNA WITH RADOME, WHICH INCLUDES A TRANSMISSION LINE TO ADAPTER OF ANTENNA AND TOWER MOUNTING ADAPTERS. ATTACHMENTS: BID SHEETS PURCHASING AFFIDAVIT BANKRUPTCY: IN THE EVENT THE VENDOR/CONTRACTOR FILES FOR BANKRUPTCY PROTECTION, THE STATE MAY DEEM THE CONTRACT NULL AND VOID, AND TERMINATE SUCH CONTRACT WITHOUT FURTHER ORDER. THE MODEL/BRAND/SPECIFICATIONS NAMED HEREIN ESTABLISH THE ACCEPTABLE LEVEL OF QUALITY ONLY AND ARE NOT INTENDED TO REFLECT A PREFERENCE OR FAVOR ANY PARTICULAR BRAND OR VENDOR. VENDORS WHO ARE BIDDING ALTERNATES SHOULD SO STATE AND INCLUDE PERTINENT LITERATURE AND SPECIFICATIONS. FAILURE TO PROVIDE INFORMATION FOR ANY ALTERNATES MAY BE GROUNDS FOR REJECTION OF THE BID. THE STATE RESERVES THE RIGHT TO WAIVE MINOR IRREGULARITIES IN BIDS OR SPECIFICATIONS IN ACCORDANCE WITH SECTION 148-1-4(F) OF THE WEST VIRGINIA LEGISLATIVE RULES AND REGULATIONS.						

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE T.M.	TELEPHONE	DATE
TITLE	FEIN	ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'

GENERAL TERMS & CONDITIONS PURCHASE ORDER/CONTRACT

1. **ACCEPTANCE:** Seller shall be bound by this order and its terms and conditions upon receipt of this order.
2. **APPLICABLE LAW:** The laws of the State of West Virginia and the *Legislative Rules* of the Purchasing Division shall govern all rights and duties under the Contract, including without limitation the validity of this Purchase Order/Contract.
3. **NON-FUNDING:** All services performed or goods delivered under State Purchase Orders/Contracts are to be continued for the terms of the Purchase Order/Contract, contingent upon funds being appropriated by the Legislature or otherwise being made available. In the event funds are not appropriated or otherwise available for these services or goods, this Purchase Order/Contract becomes void and of no effect after June 30.
4. **COMPLIANCE:** Seller shall comply with all federal, state and local laws, regulations and ordinances including, but not limited to, the prevailing wage rates of the WV Division of Labor.
5. **MODIFICATIONS:** This writing is the parties' final expression of intent. No modification of this order shall be binding unless agreed to in writing by the Buyer.
6. **ASSIGNMENT:** Neither this Order nor any monies due, or to become due hereunder may be assigned by the Seller without the Buyer's consent.
7. **WARRANTY:** The Seller expressly warrants that the goods and/or services covered by this order will:
(a) conform to the specifications, drawings, samples or other description furnished or specified by the Buyer; (b) be merchantable and fit for the purpose intended; and/or (c) be free from defect in material and workmanship.
8. **CANCELLATION:** The Director of Purchasing may cancel any Purchase Order/Contract upon 30 days written notice to the seller.
9. **SHIPPING, BILLING & PRICES:** Prices are those stated in this order. No price increase will be accepted without written authority from the Buyer. All goods or services shall be shipped on or before the date specified in this Order.
10. **LATE PAYMENTS:** Payments may only be made after the delivery of goods or services. Interest may be paid on late payments in accordance with the *West Virginia Code*.
11. **TAXES:** The State of West Virginia is exempt from federal and state taxes and will not pay or reimburse such taxes.
12. **RENEWAL:** Any reference to automatic renewal is hereby deleted. The Contract may be renewed only upon mutual written agreement of the parties.
13. **BANKRUPTCY:** In the event the vendor/contractor files for bankruptcy protection, the State may deem this contract null and void, and terminate such contract without further order.
14. **HIPAA BUSINESS ASSOCIATE ADDENDUM:** The West Virginia State Government HIPAA Business Associate Addendum (BAA), approved by the Attorney General, is available online at www.state.wv.us/admin/purchase/vrc/hipaa.htm and is hereby made part of the agreement provided that the Agency meets the definition of a Cover Entity (45 CFR §160.103) and will be disclosing Protected Health Information (45 CFR §160.103) to the vendor.
15. **CONFIDENTIALITY:** The vendor agrees that he or she will not disclose to anyone, directly or indirectly, any such personally identifiable information or other confidential information gained from the agency, unless the individual who is the subject of the information consents to the disclosure in writing or the disclosure is made pursuant to the agency's policies, procedures, and rules. Vendor further agrees to comply with the Confidentiality Policies and Information Security Accountability Requirements, set forth in <http://www.state.wv.us/admin/purchase/privacy/noticeConfidentiality.pdf>.
16. **LICENSING:** Vendors must be licensed and in good standing in accordance with any and all state and local laws and requirements by any state or local agency of West Virginia, including, but not limited to, the West Virginia Secretary of State's Office, the West Virginia Tax Department, West Virginia Insurance Commission, or any other state agency or political subdivision. Furthermore, the vendor must provide all necessary releases to obtain information to enable the Director or spending unit to verify that the vendor is licensed and in good standing with the above entities.
17. **ANTITRUST:** In accepting this purchase order or signing this contract with any agency for the State of West Virginia, the vendor agrees to convey, sell, assign, or transfer to the State of West Virginia all rights, title, and interest in and to all causes of action it may now or hereafter acquire under the antitrust laws of the United States and the State of West Virginia for price fixing and/or unreasonable restraints of trade relating to the particular commodities or services purchased or acquired by the State of West Virginia. Such assignment shall be made and become effective at the time the purchasing agency tenders the initial payment to vendor. Vendor certifies that this purchase order or contract is accepted or entered into without any prior understanding, agreement, or connection to any other entity that could be considered a violation of law. Vendor further certifies that this purchase order or contract is in all respects fair and without collusion or fraud.



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PAGE
2

ADDRESS CORRESPONDENCE TO ATTENTION OF:
SHELLY MURRAY
304-558-8801

RFQ COPY
 TYPE NAME/ADDRESS HERE

VENDOR

SHIP TO

**EDUCATIONAL BROADCASTING
 AUTHORITY
 VARIOUS LOCALES AS INDICATED
 BY ORDER**

DATE PRINTED	TERMS OF SALE	SHIP VIA	F.O.B.	FREIGHT TERMS
11/29/2010				
BID OPENING DATE: 12/16/2010		BID OPENING TIME 01:30PM		

LINE	QUANTITY	UOP	CAT NO.	ITEM NUMBER	UNIT PRICE	AMOUNT
<p>NOTICE</p> <p>A SIGNED BID MUST BE SUBMITTED TO:</p> <p>DEPARTMENT OF ADMINISTRATION PURCHASING DIVISION BUILDING 15 2019 WASHINGTON STREET, EAST CHARLESTON, WV 25305-0130</p> <p>THE BID SHOULD CONTAIN THIS INFORMATION ON THE FACE OF THE ENVELOPE OR THE BID MAY NOT BE CONSIDERED:</p> <p>SEALED BID</p> <p>BUYER: 31</p> <p>RFQ. NO.: EBA326</p> <p>BID OPENING DATE: 12/16/2010</p> <p>BID OPENING TIME: 01:30 PM</p> <p>PLEASE PROVIDE A FAX NUMBER IN CASE IT IS NECESSARY TO CONTACT YOU REGARDING YOUR BID:</p> <p><u>203-634-2132</u></p> <p>CONTACT PERSON (PLEASE PRINT CLEARLY):</p> <p><u>Thomas Nowik</u></p>						

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE: T-N. TELEPHONE: _____ DATE: _____

TITLE: _____ FEIN: _____ ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'

RFQ EBA326

The West Virginia Educational Broadcasting Authority is conducting a request for quotations for a digital capable Channel 34 broadcast television side mount antenna.

Overview:

West Virginia Public Broadcasting operates WPBY-DT in Huntington, WV. Two of three bays have failed on the existing antenna, and the station is operating at a reduced power under a Special Temporary Authority issued by the FCC. This project will place a temporary antenna in service in preparation for the replacement and upgrade of the primary antenna. The placement of the temporary antenna is time critical.

- 1 General Mechanical Specifications**
- 2 Transmission line**
- 3 Antenna Gain and Pattern**
- 4 Tower Specifics**
- 5 Attachments**
- 6 Shipping and Delivery**
- 7 Invoicing and Billing**

1 General Mechanical Specifications

- 1.1 All structural elements shall be designed and fabricated in accordance with TIA/EIA standard RS-222-G, Structural Standards for Steel Antenna, Towers, and Supporting Structures
- 1.2 All hardware shall be constructed of non-ferrous material (Brass, Copper, Stainless Steel, etc) or be Galvanized
 - 1.2.1 Steel elements shall be hot-dip galvanized in accordance with ASTM A123
 - 1.2.2 Zinc coating shall be applied with a minimum thickness of 0.002 inches (0.05 mm) in accordance with Metco Specification MS-108A
- 1.3 Vendor shall provide mounting adapters for each antenna
- 1.4 Vendor shall certify the directional pattern and gain for each antenna
- 1.5 All antennas, transmission lines, and connectors shall be rated for the power level indicated
- 1.6 All materials shall be new, no surplus or refurbished components are allowed
- 1.7 Antenna shall be supplied with a radome for operation in icing conditions

2 Transmission line

- 2.1 There is an existing 6 1/8 rigid coaxial line currently in service which terminates just below the top of steel on the tower.
 - 2.1.1 There is a 75 to 50 Ohm transformer at the termination point.
- 2.2 EBA can provide adapters to reduce to 3 1/8 and 1 5/8 EIA flange
- 2.3 Vendor shall provide transmission line from adapter to antenna
 - 2.3.1 Antenna input connector size and interconnecting line is at vendor's discretion
- 2.4 All components must be rated greater than 3000 watts DTV average power

3 Antenna Gain and Pattern

- 3.1 Antenna shall operate on Channel 34
- 3.2 Antenna shall exhibit a peak directional gain of 16 dB referenced to halfwave dipole
- 3.3 Antenna shall have a directional pattern indicated by polar plot and tabulation attached
- 3.4 Antenna shall be rated above 3000 watts DTV average power
- 3.5 Antenna shall have a 50 ohm impedance
 - 3.5.1 Antenna shall exhibit a VSWR of less than 1.1:1
- 3.6 Beam tilt shall be 1.2 degrees

4 Tower Specifics

- 4.1 The tower is a Stainless G7
- 4.2 Site drawing showing tower orientation is attached
 - 4.2.1 Azimuth is reference to True North
- 4.3 Vendor shall provide mounts for proper azimuth orientation
 - 4.3.1 Antenna tabulation and polar plot are attached

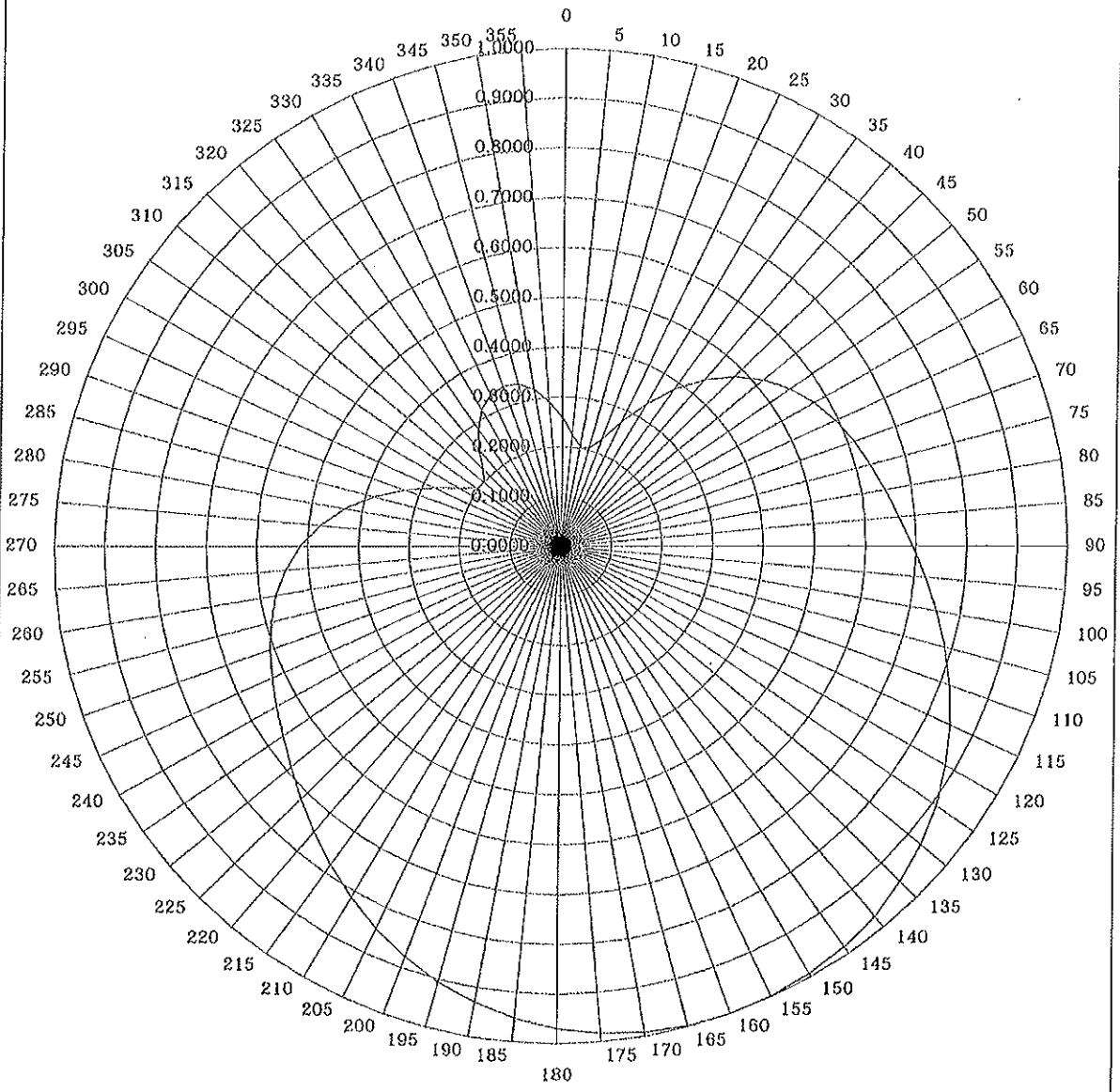
5 Attachments

5.1 Drawing of tower azimuth

5.2 Tabulation of gain

5.3 Polar plot of gain

RELATIVE FIELD AZIMUTH PATTERN



DIELECTRIC - 881-24
ORIENTED WITH BEAM MAXIMA AT 160°
MAXIMUM GAIN (HORIZONTAL AND VERTICAL PATTERN): 17.7 DBD

KESSLER & GEHMAN
TELECOMMUNICATIONS CONSULTING ENGINEERS
507 N.W. 60th Street, Suite C
Gainesville, Florida 32607

WPBY-DT
HUNTINGTON, WV

20030220

EXHIBIT E4B

WPBY-DT

HUNTINGTON, WEST VIRGINIA

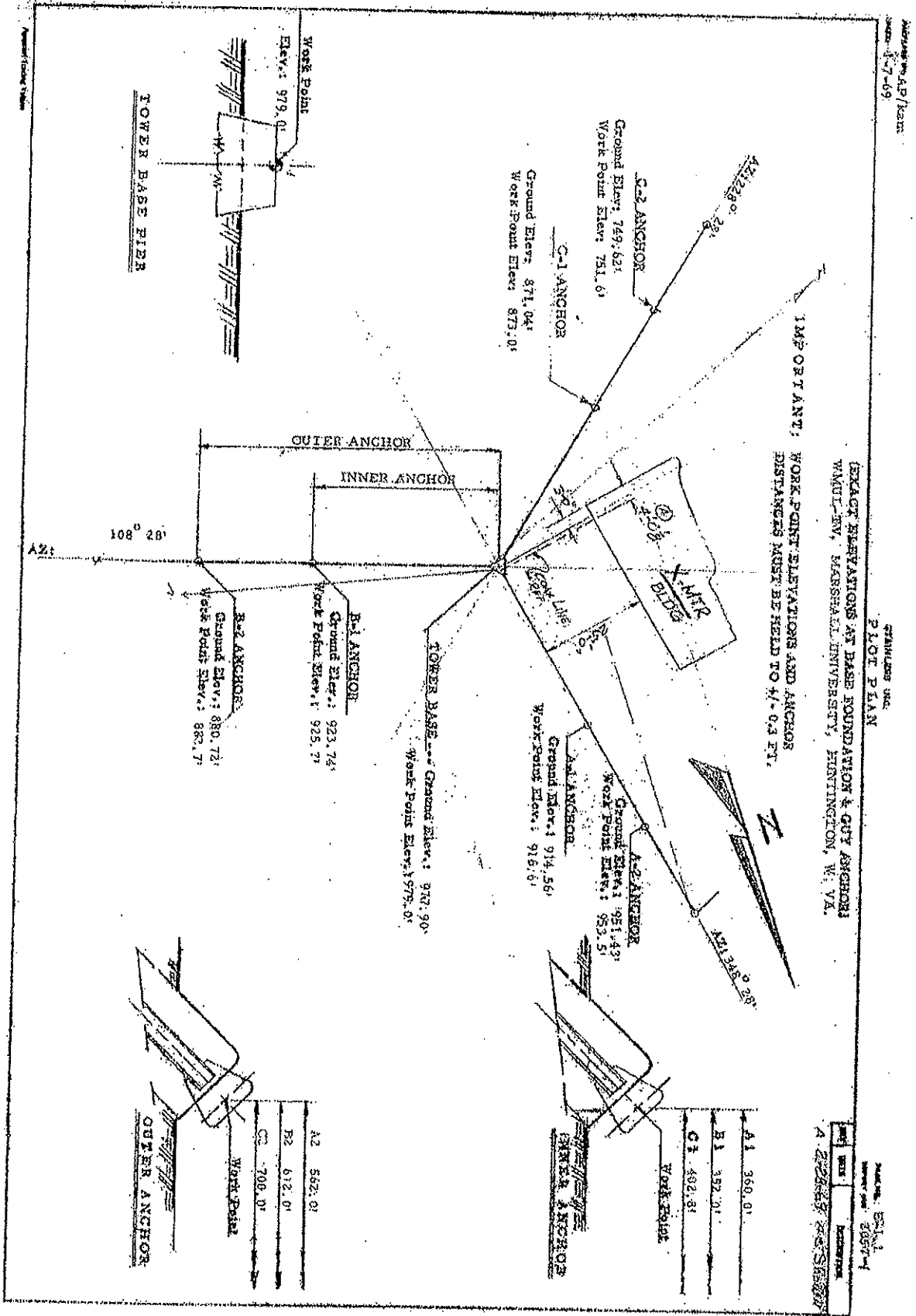
TABULATION OF RELATIVE FIELD FOR PROPOSED DIRECTIONAL ANTENNA

<u>AZIMUTH</u>	<u>RELATIVE FIELD</u>	<u>AZIMUTH</u>	<u>RELATIVE FIELD</u>
N000°E	0.254	N180°E	0.970
N005°E	0.221	N185°E	0.952
N010°E	0.200	N190°E	0.931
N015°E	0.202	N195°E	0.907
N020°E	0.229	N200°E	0.879
N025°E	0.275	N205°E	0.849
N030°E	0.328	N210°E	0.816
N035°E	0.382	N215°E	0.783
N040°E	0.433	N220°E	0.751
N045°E	0.478	N225°E	0.720
N050°E	0.515	N230°E	0.691
N055°E	0.546	N235°E	0.666
N060°E	0.571	N240°E	0.645
N065°E	0.591	N245°E	0.626
N070°E	0.609	N250°E	0.609
N075°E	0.626	N255°E	0.591
N080°E	0.645	N260°E	0.571
N085°E	0.666	N265°E	0.546
N090°E	0.691	N270°E	0.515
N095°E	0.720	N275°E	0.478
N100°E	0.751	N280°E	0.433
N105°E	0.783	N285°E	0.382
N110°E	0.816	N290°E	0.328
N115°E	0.849	N295°E	0.275
N120°E	0.879	N300°E	0.229
N125°E	0.907	N305°E	0.202
N130°E	0.931	N310°E	0.200
N135°E	0.952	N315°E	0.221
N140°E	0.970	N320°E	0.254
N145°E	0.983	N325°E	0.288
N150°E	0.992	N330°E	0.317
N155°E	0.998	N335°E	0.335
N160°E	1.000	N340°E	0.341
N165°E	0.998	N345°E	0.335
N170°E	0.992	N350°E	0.317
N175°E	0.983	N355°E	0.288

MAXIMUM OF 1.000 AT N160°E
 MINIMUM OF 0.200 AT N010°E AND N310°E

KESSLER & GEHMAN
 TELECOMMUNICATIONS CONSULTING ENGINEERS
 507 N.W. 60th Street, Suite C
 Gainesville, Florida 32607

WPBY-DT
HUNTINGTON, WV
 20030220 EXHIBIT E4A



6 Shipping and Delivery

6.1 Vendor shall provide shipping and it will be included in equipment pricing.

6.2 The receiving facility will be the WPBY Transmitter site

9283 Barker's Ridge Church Road

Milton, WV 25541

6.3 Shipper shall provide 24 hours notice to arrange off-loading

Contact Dave McClanahan

600 Capitol Street

Charleston, WV 25302

Office 304-556-4914

Cell 304-533-6808

Backup Jeff Queen 304-533-6810

Backup Ernie Maggard 304-533-6811

7 Invoicing and Billing

7.1 The billing address is:

West Virginia Public Broadcasting

PO Box 9004

Beckley, WV 25802

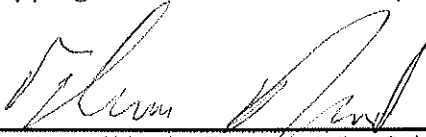
Jeff Bennett

304-254-7899

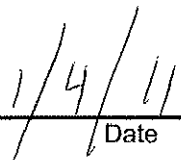
**EBA326 Pricing Page Digital Channel 34 Sidemount Television
Broadcast Antenna**

<u>Quantity</u>	<u>Description</u>	<u>Unit Price</u>	<u>Extended Price</u>
1	Digital Channel 34 Side Mount antenna with Radome	<u>\$29,540</u>	<u>\$32,240</u> (Includes Shipping)
1	Transmission Line (from main tower transmission line to adapter of antenna)	<u></u>	<u>\$4,651.48</u>
1 lot	Antenna to tower mounting adaptors	<u></u>	<u>\$1700</u>
Total			<u>\$38591.48</u>

Shipping shall be included in equipment pricing.



 Signature of Vendor Representative Submitting Bid



 Date

STATE OF WEST VIRGINIA
Purchasing Division

PURCHASING AFFIDAVIT

West Virginia Code §5A-3-10a states: No contract or renewal of any contract may be awarded by the state or any of its political subdivisions to any vendor or prospective vendor when the vendor or prospective vendor or a related party to the vendor or prospective vendor is a debtor and the debt owed is an amount greater than one thousand dollars in the aggregate.

DEFINITIONS:

"Debt" means any assessment, premium, penalty, fine, tax or other amount of money owed to the state or any of its political subdivisions because of a judgment, fine, permit violation, license assessment, defaulted workers' compensation premium, penalty or other assessment presently delinquent or due and required to be paid to the state or any of its political subdivisions, including any interest or additional penalties accrued thereon.

"Debtor" means any individual, corporation, partnership, association, limited liability company or any other form or business association owing a debt to the state or any of its political subdivisions. "Political subdivision" means any county commission; municipality; county board of education; any instrumentality established by a county or municipality; any separate corporation or instrumentality established by one or more counties or municipalities, as permitted by law; or any public body charged by law with the performance of a government function or whose jurisdiction is coextensive with one or more counties or municipalities. "Related party" means a party, whether an individual, corporation, partnership, association, limited liability company or any other form or business association or other entity whatsoever, related to any vendor by blood, marriage, ownership or contract through which the party has a relationship of ownership or other interest with the vendor so that the party will actually or by effect receive or control a portion of the benefit, profit or other consideration from performance of a vendor contract with the party receiving an amount that meets or exceeds five percent of the total contract amount.

EXCEPTION: The prohibition of this section does not apply where a vendor has contested any tax administered pursuant to chapter eleven of this code, workers' compensation premium, permit fee or environmental fee or assessment and the matter has not become final or where the vendor has entered into a payment plan or agreement and the vendor is not in default of any of the provisions of such plan or agreement.

Under penalty of law for false swearing (*West Virginia Code* §61-5-3), it is hereby certified that the vendor affirms and acknowledges the information in this affidavit and is in compliance with the requirements as stated.

WITNESS THE FOLLOWING SIGNATURE

Vendor's Name: Radio Frequency Systems, Inc.

Authorized Signature: [Signature] Date: 1/24/10

State of CA

County of New Haven, to-wit:

Taken, subscribed, and sworn to before me this 4th day of January, 2010.

My Commission expires _____, 20____.

AFFIX SEAL HERE

NOTARY PUBLIC [Signature]

My Commission Expires Apr. 30, 2013
My Commission Expires Apr. 30, 2013



State of West Virginia
 Department of Administration
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ADDRESS CORRESPONDENCE TO ATTENTION OF
SHELLY MURRAY
304-558-8801

VENDOR

*709062038 203-630-3311
 RADIO FREQUENCY SYSTEMS INC
 200 PONDVIEW DRIVE
 MERIDEN CT 06450-7915

SHIP TO

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12/10/2010				
BID OPENING DATE: 01/06/2011		BID OPENING TIME 01:30PM		

LINE	QUANTITY	UOP	CAT NO	ITEM NUMBER	UNIT PRICE	AMOUNT
----- ADDENDUM NO. 1 -----						
THIS ADDENDUM IS ISSUED TO ALLOW FOR THE SUBMISSION OF QUESTIONS.						
TECHNICAL QUESTIONS MUST BE SUBMITTED IN WRITING TO SHELLY MURRAY IN THE WEST VIRGINIA PURCHASING DIVISION VIA MAIL AT THE ADDRESS SHOWN AT THE TOP IF THIS RFQ, VIA FAX AT 304-558-4115, OR VIA E-MAIL AT SHELLY.L.MURRAY@WV.GOV. DEADLINE FOR ALL TECHNICAL QUESTIONS IS 12/20/2010 AT THE CLOSE OF BUSINESS. ALL TECHNICAL QUESTIONS RECEIVED, IF ANY, WILL BE ADDRESSED BY ADDENDUM AFTER THE DEADLINE.						
THE BID OPENING DATE HAS BEEN EXTENDED:						
FROM: 12/16/2010						
TO : 01/06/2011						
0001	1	EA		840-10		
ANTENNAS AND ACCESSORIES, TELEVISION						
EXHIBIT 10						
REQUISITION NO.: EBA326						
ADDENDUM ACKNOWLEDGEMENT						

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SIGNATURE <i>T.M.</i>	TELEPHONE	DATE
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LINE	QUANTITY	UOP	CAT. NO.	ITEM NUMBER	UNIT PRICE	AMOUNT
<p>I HEREBY ACKNOWLEDGE RECEIPT OF THE FOLLOWING CHECKED ADDENDUM(S) AND HAVE MADE THE NECESSARY REVISIONS TO MY PROPOSAL, PLANS AND/OR SPECIFICATION, ETC.</p> <p>ADDENDUM NO.'S:</p> <p>NO. 1</p> <p>NO. 2</p> <p>NO. 3</p> <p>NO. 4</p> <p>NO. 5</p> <p>I UNDERSTAND THAT FAILURE TO CONFIRM THE RECEIPT OF THE ADDENDUM(S) MAY BE CAUSE FOR REJECTION OF BIDS.</p> <p>VENDOR MUST CLEARLY UNDERSTAND THAT ANY VERBAL REPRESENTATION MADE OR ASSUMED TO BE MADE DURING ANY ORAL DISCUSSION HELD BETWEEN VENDOR'S REPRESENTATIVES AND ANY STATE PERSONNEL IS NOT BINDING. ONLY THE INFORMATION ISSUED IN WRITING AND ADDED TO THE SPECIFICATIONS BY AN OFFICIAL ADDENDUM IS BINDING.</p> <p><i>Shelly Murray</i> SIGNATURE</p> <p><i>Radio Frequency Systems, Inc.</i> COMPANY</p> <p><i>01 Jan 2011</i> DATE</p>						

SEE REVERSE SIDE FOR TERMS AND CONDITIONS		
SIGNATURE T.N.	TELEPHONE	DATE
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PO BOX
*709062038 203-630-3311 RADIO FREQUENCY SYSTEMS INC 200 PONDVIEW DRIVE MERIDEN CT 06450-7915

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12/10/2010				

BID OPENING DATE: 01/06/2011 BID OPENING TIME 01:30PM

LINE	QUANTITY	UOP	CAT NO.	ITEM NUMBER	UNIT PRICE	AMOUNT
NOTE: THIS ADDENDUM ACKNOWLEDGEMENT SHOULD BE SUBMITTED WITH THE BID.						
----- END OF ADDENDUM NO. 1 -----						
***** THIS IS THE END OF RFQ EBA326 ***** TOTAL: _____						

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE <i>T.N.</i>	TELEPHONE	DATE
FILE	FEIN	ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'



State of West Virginia
 Department of Administration
 Purchasing Division
 2019 Washington Street East
 Post Office Box 50130
 Charleston, WV 25305-0130

Request for Quotation

RFQ NUMBER
 EBA326

PAGE
 1

ADDRESS CORRESPONDENCE TO ATTENTION OF
 SHELLY MURRAY
 304-558-8801

*709062038 203-630-3311
 RADIO FREQUENCY SYSTEMS INC
 200 PONDVIEW DRIVE
 MERIDEN CT 06450-7915

VENDOR

SHIP TO

EDUCATIONAL BROADCASTING
 AUTHORITY
 VARIOUS LOCALES AS INDICATED
 BY ORDER

DATE PRINTED	TERMS OF SALE	SHIP VIA	F.O.B	FREIGHT TERMS
12/23/2010				

BID OPENING DATE: 01/06/2011 BID OPENING TIME 01:30PM

LINE	QUANTITY	UOP	CAT. NO.	ITEM NUMBER	UNIT PRICE	AMOUNT
----- ADDENDUM NO. 2 -----						
THIS ADDENDUM IS ISSUED TO ADDRESS THE QUESTIONS RECEIVED PRIOR TO THE QUESTION SUBMISSION DEADLINE OF 12/20/2010 AS ESTABLISHED IN ADDENDUM NO. 1.						
0001	1	EA		840-10		
ANTENNAS AND ACCESSORIES, TELEVISION						
EXHIBIT 10						
REQUISITION NO.: EBA326						
ADDENDUM ACKNOWLEDGEMENT						
I HEREBY ACKNOWLEDGE RECEIPT OF THE FOLLOWING CHECKED ADDENDUM(S) AND HAVE MADE THE NECESSARY REVISIONS TO MY PROPOSAL, PLANS AND/OR SPECIFICATION, ETC.						
ADDENDUM NO.'S:						
NO. 1 <input checked="" type="checkbox"/>						
NO. 2 <input checked="" type="checkbox"/>						
NO. 3 <input type="checkbox"/>						

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE *T.N.* TELEPHONE DATE

TITLE FEIN ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'



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EDUCATIONAL BROADCASTING
 AUTHORITY
 VARIOUS LOCALES AS INDICATED
 BY ORDER

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T
O

DATE PRINTED	TERMS OF SALE	SHIP VIA	F.O.B	FREIGHT TERMS
12/23/2010				

BID OPENING DATE: 01/06/2011 BID OPENING TIME 01:30PM

LINE	QUANTITY	UOP	CAT NO.	ITEM NUMBER	UNIT PRICE	AMOUNT
NO. 4					
NO. 5					
<p>I UNDERSTAND THAT FAILURE TO CONFIRM THE RECEIPT OF THE ADDENDUM(S) MAY BE CAUSE FOR REJECTION OF BIDS.</p> <p>VENDOR MUST CLEARLY UNDERSTAND THAT ANY VERBAL REPRESENTATION MADE OR ASSUMED TO BE MADE DURING ANY ORAL DISCUSSION HELD BETWEEN VENDOR'S REPRESENTATIVES AND ANY STATE PERSONNEL IS NOT BINDING. ONLY THE INFORMATION ISSUED IN WRITING AND ADDED TO THE SPECIFICATIONS BY AN OFFICIAL ADDENDUM IS BINDING.</p> <p>..... SIGNATURE Radio Frequency Systems, Inc COMPANY</p> <p>01 Jan 2011..... DATE</p> <p>NOTE: THIS ADDENDUM ACKNOWLEDGEMENT SHOULD BE SUBMITTED WITH THE BID.</p> <p>----- END OF ADDENDUM NO. 2 -----</p>						

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE T.N.	TELEPHONE	DATE
FILE	FEIN	ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'

EBA326
Addendum No. 2

QUESTION:

Transmission Line section 2.3 – how long of a cable section would we need to supply?

RESPONSE:

The 6 1/8" line terminates at approximately 1010 feet AGL. The antenna Center of Radiation is 960 Feet. This provides a vertical difference of 50 feet. The actual length would vary depending on the antenna being end fed or center fed. The vendor shall provide a connecting line 100 feet in length with one connector factory attached with the other connector provided to be field installed.

QUESTION:

Tower Specifics section 4.3 – What is the diameter of the G7 tower leg that we would be mounting too?

RESPONSE:

The diameter is 5 inches

QUESTION:

What is the proposed centerline of the temporary antenna relative to the top of the existing 6-1/8" rigid coaxial line?

RESPONSE:

The 6 1/8" line terminates at approximately 1010 feet AGL. The antenna Center of Radiation is 960 Feet. This provides a vertical difference of 50 feet. The actual length would vary depending on the antenna being end fed or center fed. The vendor shall provide a connecting line 100 feet in length with one connector factory attached with the other connector provided to be field installed.

QUESTION:

Will the proposed antenna be mounted off the tower leg or face? Or is this for the antenna supplier to decide? What are the sizes of each (tower leg and face)?

RESPONSE:

The vendor has discretion regarding face or leg mount. Either method must have reinforcement to prevent rotation of the antenna. Mounting can be either face mount or leg mount at vendor's discretion. The tower leg diameter is 5 inches. The G7 is a 7 foot face tower

QUESTION:

Can the bidder, so long as the terms don't conflict with the WV rules, provide the terms of its warranty, including duration?

RESPONSE:

Vendor shall provide a one year warranty parts and labor to repair FOB factory. Removal and reinstallation excluded.

1 General Mechanical Specifications

1.1 All Structural elements shall be designed and fabricated in accordance with TIA/EIA Standard RS-222-G, Structural Standards for Steel Antenna, Towers, and Supporting Structures.

RFS Response: Comply

1.2 All Hardware shall be constructed of non-ferrous material (Brass, Copper, Stainless Steel, etc) or be galvanized.

1.2.1 Steel elements shall be hot-dip galvanized in accordance with ASTM A123

1.2.2 Zinc coating shall be applied with a minimum thickness of 0.002 inches (0.05 mm) in accordance with Metco Specification MS-108A

RFS Response: Comply/Clarification

Steel elements shall be hot dipped galvanized in accordance with ASTM A123 or equivalent Australian Standard.

1.3 Vendor shall provide mounting adapters for each antenna.

RFS Response: Comply

1.4 Vendor shall certify the directional pattern and gain for each antenna.

RFS Response: Comply. Upon delivery antenna handbooks with factory data will be supplied.

1.5 All antennas, transmission lines, and connectors shall be rated for the power levels indicated.

RFS Response: Comply. In some cases, by design, RFS will supply antennas that not only meet the requirement but exceed the requirement.

1.6 All materials shall be new, no surplus or refurbished components are allowed.

RFS Response: Comply

1.7 Antenna shall be supplied with a radome for operation in icing conditions.

RFS Response: Comply

2 Transmission Line

2.1 There is an existing 6-1/8" rigid coaxial line currently in service which terminates just below the top of the steel on the tower.

2.1.1 There is a 75 to 50 Ohm transformer at the termination point

2.2 EBA can provide adapters to reduce to 3-1/8 and 1-5/8 EIA flange

RFS Response: RFS would require a 3-1/8" EIA flange for our cable.

2.3 Vendor shall provide transmission line from adapter to antenna

RFS Response: Comply. Specification of HCA300-50J HELIFLEX 3" Air Dielectric coaxial cable are included in response.

2.3.1 Antenna input connector size and interconnecting line is at vendor's discretion

RFS Response: RFS will use 3-1/8" EIA connectors on the HCA300-50J cable and on the antenna.

2.4 All components must be rated greater than 3000 watts DTV average power

RFS Response: Comply.

3 Antenna gain and Pattern

3.1 Antenna shall operate on Channel 34

RFS Response: Comply: RFS antenna is a wideband antenna (120Mhz), center tuned to channel 34

3.2 Antenna shall exhibit a peak direction gain of 16dB referenced to halfwave dipole.

RFS Response: Comply: RFS Pattern is shown in technical proposal along with tabulation data provided.

3.3 Antenna shall have a directional pattern indicated by polar plot and tabulation attached.

RFS Response: Comply

3.4 Antenna shall be rated above 3000 watts DTV average power

RFS Response: Comply

3.5 Antenna shall have a 50 ohm impedance

RFS Response: Comply

3.5.1 antenna shall exhibit a VSWR of less than 1.1:1

RFS Response: Comply

3.6 Beam tilt shall be 1.2 degrees

RFS Response: Comply

4 Tower Specifics

4.1 The tower is a Stainless G7

4.2 Site drawing showing tower orientation is attached

4.2.1 Azimuth is referenced to True North

4.3 Vendor shall provide mounts for proper azimuth orientation

RFS Response: Comply: Mounting hardware provided with antenna.

4.3.1 Antenna tabulation and polar plot are attached

RFS Response: Comply

6 Shipping and Delivery

6.1 Vendor shall provide shipping and it will be included in equipment pricing.

RFS Response: Comply

6.2 The receiving facility will be the WPBY Transmitter site

9283 Barker's Ridge Church Road

Milton, WV, 25541

RFS Response: Understood

6.3 Shipper shall provide 24 hours notice to arrange off loading

Contact Dave McClanahan

Office: 304-556-6808

Cell: 304-533-4914

Backup Jeff Queen 304-533-6810

Backup Ernie Maggard 304-533-6811

RFS Response: Understood

7 Invoice and Billing

7.1 The billing address is:

West Virginia Public Broadcasting

PO Box 9004

Beckley, WV, 25802

Jeff Bennett

304-254-7899

RFS Response: Understood



PROJECT DESCRIPTION : **UHF TV Antenna Replacement**
CUSTOMER : **Educational Broadcast Authority**
DESTINATION COUNTRY : **USA**
SITE : **WMUL-TV**

RFS MODEL : **RD16SK-578704L3S**
RFS DESCRIPTION : **UHF Television Antenna**

RFS QUOTE REFERENCE :
DOCUMENT VERSION : **1.1**
DATE PREPARED : **9th December 2010**



ANTENNA PROPOSAL– MODEL RD16SK-578704L3S

Antenna Description

The RD series cavity slot antenna has been specifically designed for the high power UHF TV market.

The RD series UHF TV slot antenna features:

- single or multiple channel operation
- suitable for analogue or DTV transmission
- power rating up to 8kW peak
- 3-1/8" EIA input
- horizontally polarized
- light weight / low wind load

ANTENNA SPECIFICATIONS

ELECTRICAL SPECIFICATIONS

Antenna Model:		RD16SK-578704L3S
Frequency Range:		578-704 MHz
Operating Channel:		Ch US34 (590 to 596 MHz)
Polarisation:		Horizontal
Impedance:		50 ohm
VSWR:	Across channels:	<1.1:1 (Return Loss > 26dB)
Input Power Rating:		1 x 8kWps (6 kW Average)
Input Connector:		3-1/8" EIA flange
Antenna Gain:		16.08 dBd (40.5 times)
Beam Tilt:		1.2 deg
Null fill:		First null filled to > 15% E/Emax

MECHANICAL SPECIFICATIONS

Approx. Height (aperture):	7.6 m (25 ft)
Approx. Weight:	378 kg (832 lbs)
Effective area:	1.66 sq m (17.9 sq ft)
Pressurisation:	Pressurized

ANTENNA MOUNTING DATA

Antenna mounting:	Side mount, 80OD pipe
Antenna system assembly (pre-installation):	Assemble to 80 OD pipe on site
Power divider network	Mounts separately to tower
Antenna brackets, clamps:	Included
Tower Interface steelwork:	Included

**ANTENNA PERFORMANCE SUMMARY**

SITE: WMUL-TV
ANTENNA MODEL: RD16SK-578704L3S

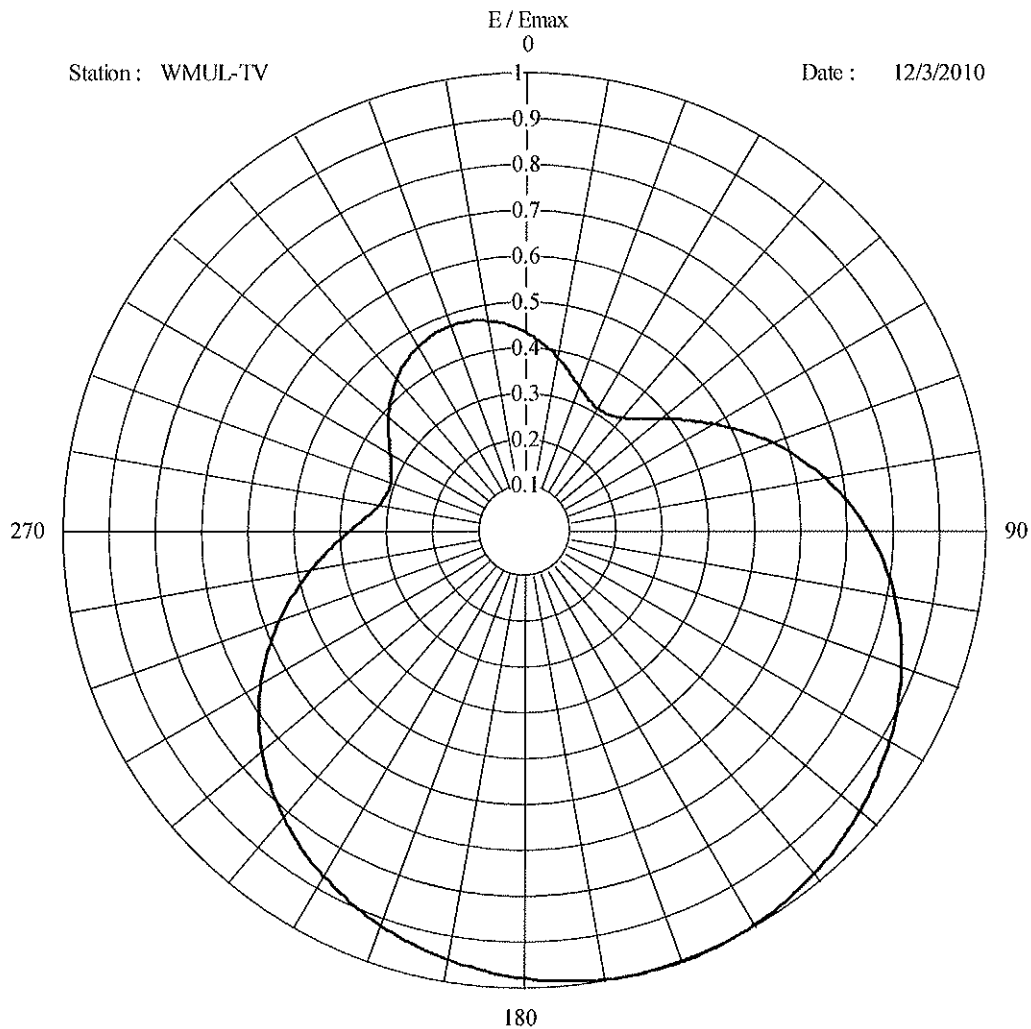
Frequency (MHz)	593
Horizontal Directivity (dB)	3.39
Number of Levels	4
Vertical Directivity (From VPAT) (dBd)	12.79
Internal Loss	-0.10
Antenna Gain	16.08
Feeder Loss (Assume 100 m HCA618-50J)	-0.50
Switchframe Loss	0.00
System Gain	15.58
Transmitter power (W)	3000
Transmitter Power (dB)	34.77
ERP (dBW)	50.35
ERP (kW)	108.47



Horizontal Radiation Pattern

Station : WMUL-TV

Date : 12/3/2010



Model : RD16SK

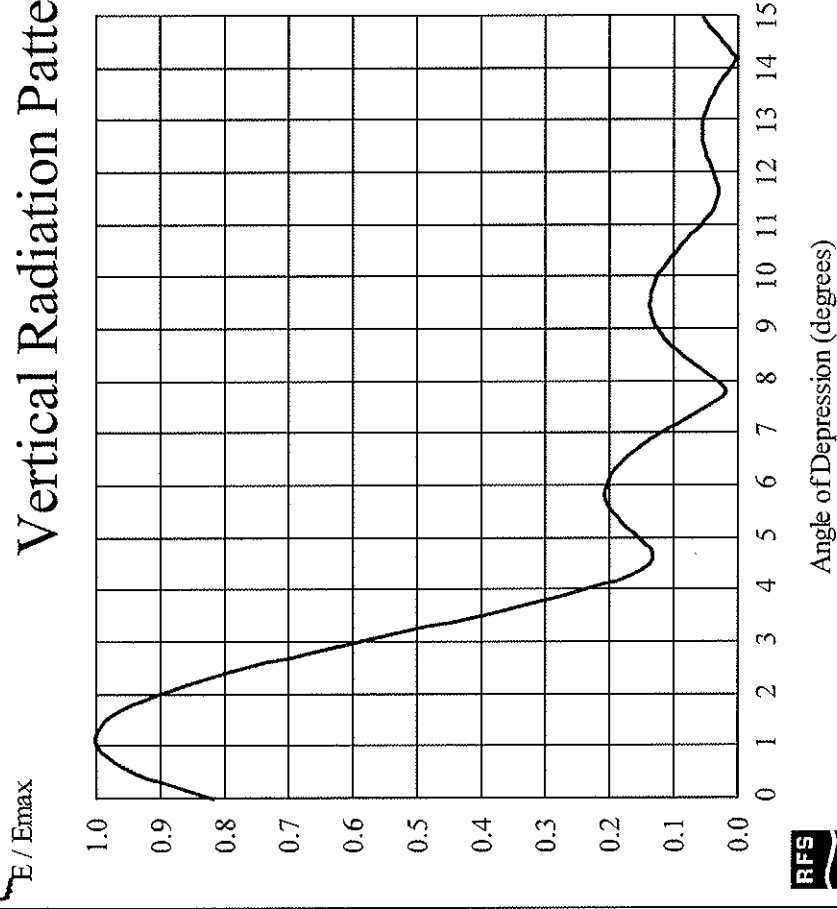
Polarisation : Horizontal
Frequency (MHz) : 593.00
Directivity : 3.39 dB
Elevation Angle : 1.2 degrees
Horizontal Unit Pattern
File = RD-SK.pat

Pattern Tolerance +/- 5% of Emax



Vertical Radiation Pattern

Date : 12/3/2010
Station : WMUL-TV
Model : RD16SK
Frequency (MHz) : 593.00
Directivity : 12.79 dBd
Tilt : 1.2 degrees
Azimuth Angle : 160 degrees
Vertical Unit Pattern : Gen 0.1 6.30

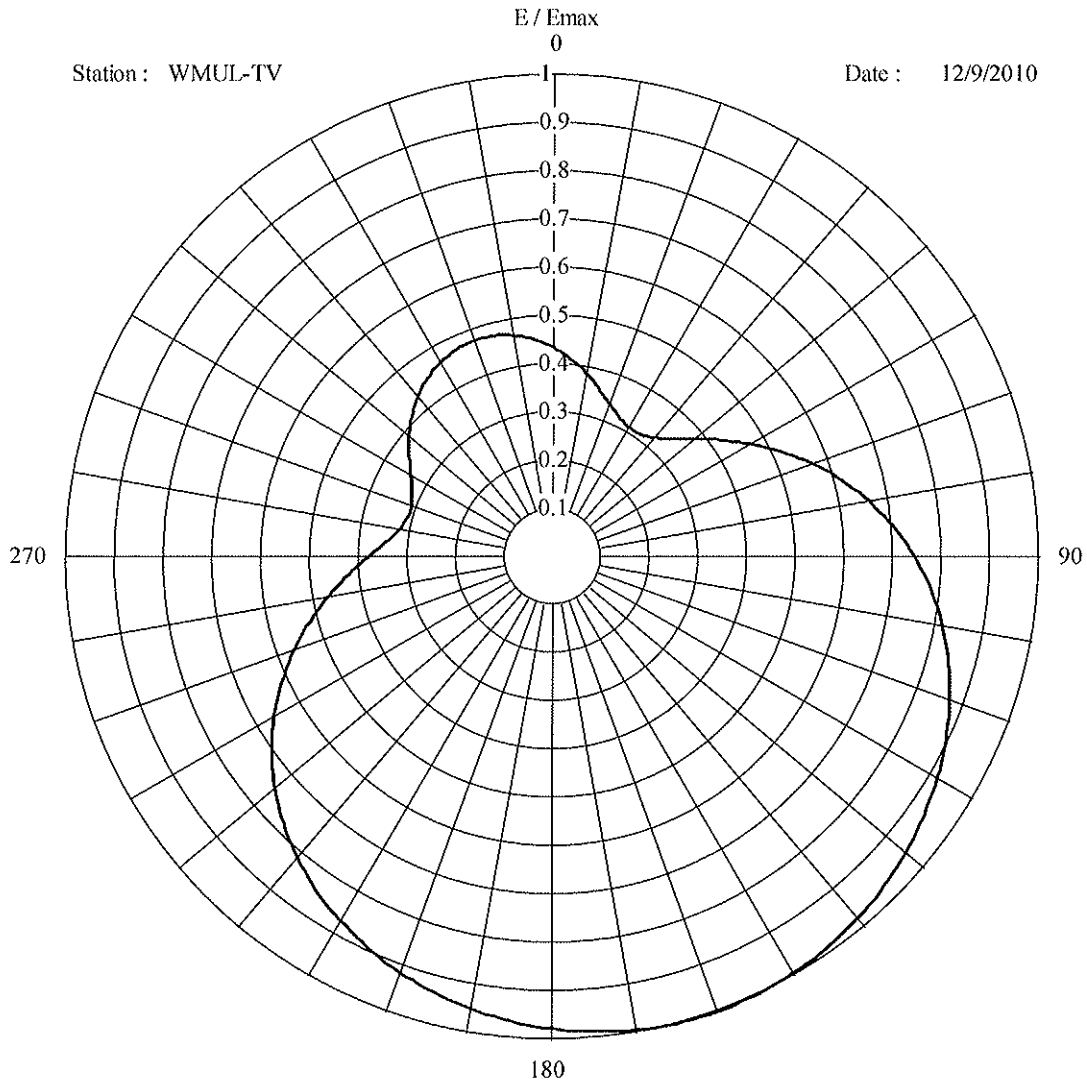




Horizontal Radiation Pattern

Station : WMUL-TV

Date : 12/9/2010



Model : RD16SK

Polarisation : Horizontal

Frequency (MHz) : 593.00

Directivity : 3.39 dB

Elevation Angle : 1.2 degrees

Horizontal Unit Pattern

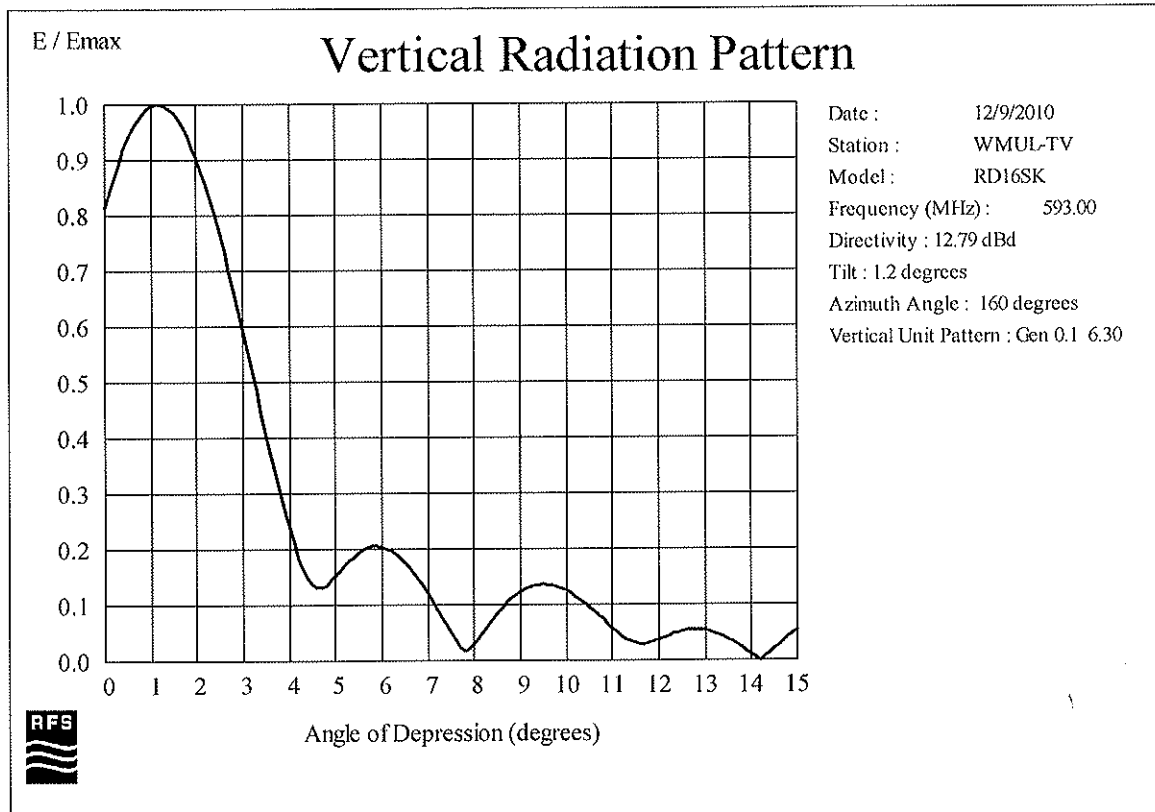
File = RD-SK.pat

Pattern Tolerance +/- 5% of Emax

RFS Horizontal Radiation Pattern Data E / Emax (voltage)

Angle	Magnitude						
-180	0.9764	-136	0.7866	-92	0.3955	-48	0.3964
-179	0.9741	-135	0.7798	-91	0.3874	-47	0.4014
-178	0.9717	-134	0.7727	-90	0.3796	-46	0.4063
-177	0.9692	-133	0.7656	-89	0.3721	-45	0.4110
-176	0.9666	-132	0.7582	-88	0.3649	-44	0.4157
-175	0.9640	-131	0.7507	-87	0.3580	-43	0.4202
-174	0.9613	-130	0.7431	-86	0.3515	-42	0.4246
-173	0.9584	-129	0.7353	-85	0.3454	-41	0.4289
-172	0.9556	-128	0.7274	-84	0.3397	-40	0.4330
-171	0.9526	-127	0.7193	-83	0.3345	-39	0.4369
-170	0.9495	-126	0.7110	-82	0.3297	-38	0.4407
-169	0.9463	-125	0.7026	-81	0.3254	-37	0.4444
-168	0.9431	-124	0.6941	-80	0.3216	-36	0.4478
-167	0.9397	-123	0.6855	-79	0.3182	-35	0.4511
-166	0.9363	-122	0.6767	-78	0.3153	-34	0.4542
-165	0.9328	-121	0.6678	-77	0.3130	-33	0.4571
-164	0.9291	-120	0.6589	-76	0.3110	-32	0.4599
-163	0.9254	-119	0.6498	-75	0.3096	-31	0.4624
-162	0.9216	-118	0.6407	-74	0.3087	-30	0.4648
-161	0.9176	-117	0.6314	-73	0.3081	-29	0.4670
-160	0.9136	-116	0.6221	-72	0.3081	-28	0.4689
-159	0.9095	-115	0.6127	-71	0.3085	-27	0.4706
-158	0.9053	-114	0.6033	-70	0.3093	-26	0.4722
-157	0.9010	-113	0.5937	-69	0.3105	-25	0.4734
-156	0.8966	-112	0.5841	-68	0.3121	-24	0.4745
-155	0.8921	-111	0.5744	-67	0.3141	-23	0.4753
-154	0.8875	-110	0.5647	-66	0.3165	-22	0.4759
-153	0.8829	-109	0.5549	-65	0.3192	-21	0.4763
-152	0.8781	-108	0.5450	-64	0.3223	-20	0.4764
-151	0.8733	-107	0.5351	-63	0.3257	-19	0.4763
-150	0.8683	-106	0.5252	-62	0.3293	-18	0.4759
-149	0.8633	-105	0.5153	-61	0.3332	-17	0.4753
-148	0.8582	-104	0.5055	-60	0.3374	-16	0.4745
-147	0.8529	-103	0.4957	-59	0.3417	-15	0.4734
-146	0.8475	-102	0.4859	-58	0.3463	-14	0.4722
-145	0.8421	-101	0.4763	-57	0.3510	-13	0.4706
-144	0.8364	-100	0.4667	-56	0.3559	-12	0.4689
-143	0.8307	-99	0.4573	-55	0.3608	-11	0.4670
-142	0.8248	-98	0.4480	-54	0.3658	-10	0.4648
-141	0.8188	-97	0.4389	-53	0.3709	-9	0.4624
-140	0.8127	-96	0.4298	-52	0.3761	-8	0.4599
-139	0.8064	-95	0.4210	-51	0.3812	-7	0.4571
-138	0.8000	-94	0.4123	-50	0.3863	-6	0.4542
-137	0.7934	-93	0.4038	-49	0.3914	-5	0.4511

-4	0.4478	42	0.3297	88	0.7274	134	0.9613
-3	0.4444	43	0.3345	89	0.7353	135	0.9640
-2	0.4407	44	0.3397	90	0.7431	136	0.9666
-1	0.4369	45	0.3454	91	0.7507	137	0.9692
0	0.4330	46	0.3515	92	0.7582	138	0.9717
1	0.4289	47	0.3580	93	0.7656	139	0.9741
2	0.4246	48	0.3649	94	0.7727	140	0.9764
3	0.4202	49	0.3721	95	0.7798	141	0.9786
4	0.4157	50	0.3796	96	0.7866	142	0.9807
5	0.4110	51	0.3874	97	0.7934	143	0.9827
6	0.4063	52	0.3955	98	0.8000	144	0.9847
7	0.4014	53	0.4038	99	0.8064	145	0.9865
8	0.3964	54	0.4123	100	0.8127	146	0.9882
9	0.3914	55	0.4210	101	0.8188	147	0.9898
10	0.3863	56	0.4298	102	0.8248	148	0.9913
11	0.3812	57	0.4389	103	0.8307	149	0.9927
12	0.3761	58	0.4480	104	0.8364	150	0.9940
13	0.3709	59	0.4573	105	0.8421	151	0.9951
14	0.3658	60	0.4667	106	0.8475	152	0.9961
15	0.3608	61	0.4763	107	0.8529	153	0.9971
16	0.3559	62	0.4859	108	0.8582	154	0.9978
17	0.3510	63	0.4957	109	0.8633	155	0.9985
18	0.3463	64	0.5055	110	0.8683	156	0.9990
19	0.3417	65	0.5153	111	0.8733	157	0.9995
20	0.3374	66	0.5252	112	0.8781	158	0.9998
21	0.3332	67	0.5351	113	0.8829	159	0.9999
22	0.3293	68	0.5450	114	0.8875	160	1.0000
23	0.3257	69	0.5549	115	0.8921	161	0.9999
24	0.3223	70	0.5647	116	0.8966	162	0.9998
25	0.3192	71	0.5744	117	0.9010	163	0.9995
26	0.3165	72	0.5841	118	0.9053	164	0.9990
27	0.3141	73	0.5937	119	0.9095	165	0.9985
28	0.3121	74	0.6033	120	0.9136	166	0.9978
29	0.3105	75	0.6127	121	0.9176	167	0.9971
30	0.3093	76	0.6221	122	0.9216	168	0.9961
31	0.3085	77	0.6314	123	0.9254	169	0.9951
32	0.3081	78	0.6407	124	0.9291	170	0.9940
33	0.3081	79	0.6498	125	0.9328	171	0.9927
34	0.3087	80	0.6589	126	0.9363	172	0.9913
35	0.3096	81	0.6678	127	0.9397	173	0.9898
36	0.3110	82	0.6767	128	0.9431	174	0.9882
37	0.3130	83	0.6855	129	0.9463	175	0.9865
38	0.3153	84	0.6941	130	0.9495	176	0.9847
39	0.3182	85	0.7026	131	0.9526	177	0.9827
40	0.3216	86	0.7110	132	0.9556	178	0.9807
41	0.3254	87	0.7193	133	0.9584	179	0.9786



RFS Vertical Radiation Pattern Data E / Emax (voltage)

Angle	Magnitude	Angle	Magnitude	Angle	Magnitude	Angle	Magnitude
-90.0	0.0044	-88.5	0.0111	-87.0	0.0066	-85.5	0.0015
-89.9	0.0140	-88.4	0.0108	-86.9	0.0063	-85.4	0.0011
-89.8	0.0139	-88.3	0.0106	-86.8	0.0060	-85.3	0.0008
-89.7	0.0137	-88.2	0.0103	-86.7	0.0056	-85.2	0.0004
-89.6	0.0135	-88.1	0.0100	-86.6	0.0053	-85.1	0.0001
-89.5	0.0133	-88.0	0.0097	-86.5	0.0049	-85.0	0.0003
-89.4	0.0132	-87.9	0.0094	-86.4	0.0046	-84.9	0.0006
-89.3	0.0130	-87.8	0.0092	-86.3	0.0043	-84.8	0.0009
-89.2	0.0127	-87.7	0.0089	-86.2	0.0039	-84.7	0.0013
-89.1	0.0125	-87.6	0.0085	-86.1	0.0036	-84.6	0.0016
-89.0	0.0123	-87.5	0.0082	-86.0	0.0032	-84.5	0.0019
-88.9	0.0121	-87.4	0.0079	-85.9	0.0029	-84.4	0.0022
-88.8	0.0118	-87.3	0.0076	-85.8	0.0025	-84.3	0.0026
-88.7	0.0116	-87.2	0.0073	-85.7	0.0022	-84.2	0.0029
-88.6	0.0114	-87.1	0.0070	-85.6	0.0018	-84.1	0.0032

-84.0	0.0035	-79.4	0.0080	-74.8	0.0170	-70.2	0.0086
-83.9	0.0038	-79.3	0.0079	-74.7	0.0172	-70.1	0.0100
-83.8	0.0041	-79.2	0.0079	-74.6	0.0173	-70.0	0.0113
-83.7	0.0043	-79.1	0.0078	-74.5	0.0174	-69.9	0.0127
-83.6	0.0046	-79.0	0.0078	-74.4	0.0175	-69.8	0.0141
-83.5	0.0049	-78.9	0.0078	-74.3	0.0176	-69.7	0.0155
-83.4	0.0052	-78.8	0.0077	-74.2	0.0176	-69.6	0.0169
-83.3	0.0054	-78.7	0.0077	-74.1	0.0177	-69.5	0.0183
-83.2	0.0057	-78.6	0.0077	-74.0	0.0176	-69.4	0.0198
-83.1	0.0059	-78.5	0.0077	-73.9	0.0176	-69.3	0.0212
-83.0	0.0061	-78.4	0.0078	-73.8	0.0175	-69.2	0.0227
-82.9	0.0063	-78.3	0.0078	-73.7	0.0174	-69.1	0.0242
-82.8	0.0066	-78.2	0.0079	-73.6	0.0173	-69.0	0.0256
-82.7	0.0068	-78.1	0.0080	-73.5	0.0171	-68.9	0.0271
-82.6	0.0069	-78.0	0.0082	-73.4	0.0169	-68.8	0.0286
-82.5	0.0071	-77.9	0.0083	-73.3	0.0167	-68.7	0.0300
-82.4	0.0073	-77.8	0.0085	-73.2	0.0164	-68.6	0.0315
-82.3	0.0075	-77.7	0.0086	-73.1	0.0161	-68.5	0.0329
-82.2	0.0076	-77.6	0.0088	-73.0	0.0158	-68.4	0.0343
-82.1	0.0078	-77.5	0.0091	-72.9	0.0154	-68.3	0.0358
-82.0	0.0079	-77.4	0.0093	-72.8	0.0150	-68.2	0.0371
-81.9	0.0080	-77.3	0.0096	-72.7	0.0146	-68.1	0.0385
-81.8	0.0081	-77.2	0.0098	-72.6	0.0141	-68.0	0.0399
-81.7	0.0082	-77.1	0.0101	-72.5	0.0136	-67.9	0.0412
-81.6	0.0083	-77.0	0.0104	-72.4	0.0130	-67.8	0.0425
-81.5	0.0084	-76.9	0.0107	-72.3	0.0124	-67.7	0.0438
-81.4	0.0085	-76.8	0.0111	-72.2	0.0117	-67.6	0.0450
-81.3	0.0085	-76.7	0.0114	-72.1	0.0111	-67.5	0.0463
-81.2	0.0086	-76.6	0.0117	-72.0	0.0104	-67.4	0.0474
-81.1	0.0086	-76.5	0.0120	-71.9	0.0096	-67.3	0.0486
-81.0	0.0086	-76.4	0.0124	-71.8	0.0088	-67.2	0.0497
-80.9	0.0086	-76.3	0.0127	-71.7	0.0080	-67.1	0.0507
-80.8	0.0087	-76.2	0.0131	-71.6	0.0071	-67.0	0.0517
-80.7	0.0087	-76.1	0.0134	-71.5	0.0062	-66.9	0.0527
-80.6	0.0086	-76.0	0.0137	-71.4	0.0053	-66.8	0.0536
-80.5	0.0086	-75.9	0.0141	-71.3	0.0043	-66.7	0.0545
-80.4	0.0086	-75.8	0.0144	-71.2	0.0033	-66.6	0.0553
-80.3	0.0085	-75.7	0.0147	-71.1	0.0022	-66.5	0.0560
-80.2	0.0085	-75.6	0.0150	-71.0	0.0011	-66.4	0.0567
-80.1	0.0085	-75.5	0.0153	-70.9	0.0000	-66.3	0.0574
-80.0	0.0084	-75.4	0.0156	-70.8	0.0011	-66.2	0.0580
-79.9	0.0083	-75.3	0.0159	-70.7	0.0023	-66.1	0.0585
-79.8	0.0083	-75.2	0.0161	-70.6	0.0035	-66.0	0.0590
-79.7	0.0082	-75.1	0.0164	-70.5	0.0048	-65.9	0.0594
-79.6	0.0081	-75.0	0.0166	-70.4	0.0060	-65.8	0.0597
-79.5	0.0081	-74.9	0.0168	-70.3	0.0073	-65.7	0.0600

-65.6	0.0602	-61.0	0.0165	-56.4	0.0015	-51.8	0.0222
-65.5	0.0603	-60.9	0.0154	-56.3	0.0019	-51.7	0.0232
-65.4	0.0604	-60.8	0.0143	-56.2	0.0024	-51.6	0.0242
-65.3	0.0604	-60.7	0.0133	-56.1	0.0028	-51.5	0.0251
-65.2	0.0604	-60.6	0.0123	-56.0	0.0031	-51.4	0.0260
-65.1	0.0603	-60.5	0.0114	-55.9	0.0035	-51.3	0.0268
-65.0	0.0601	-60.4	0.0106	-55.8	0.0038	-51.2	0.0275
-64.9	0.0598	-60.3	0.0098	-55.7	0.0040	-51.1	0.0282
-64.8	0.0595	-60.2	0.0092	-55.6	0.0042	-51.0	0.0287
-64.7	0.0591	-60.1	0.0086	-55.5	0.0044	-50.9	0.0293
-64.6	0.0587	-60.0	0.0082	-55.4	0.0046	-50.8	0.0297
-64.5	0.0582	-59.9	0.0078	-55.3	0.0046	-50.7	0.0300
-64.4	0.0576	-59.8	0.0075	-55.2	0.0047	-50.6	0.0303
-64.3	0.0569	-59.7	0.0073	-55.1	0.0047	-50.5	0.0304
-64.2	0.0562	-59.6	0.0071	-55.0	0.0046	-50.4	0.0305
-64.1	0.0555	-59.5	0.0070	-54.9	0.0045	-50.3	0.0305
-64.0	0.0547	-59.4	0.0070	-54.8	0.0043	-50.2	0.0303
-63.9	0.0538	-59.3	0.0069	-54.7	0.0041	-50.1	0.0301
-63.8	0.0529	-59.2	0.0069	-54.6	0.0038	-50.0	0.0298
-63.7	0.0519	-59.1	0.0069	-54.5	0.0035	-49.9	0.0293
-63.6	0.0509	-59.0	0.0069	-54.4	0.0031	-49.8	0.0288
-63.5	0.0498	-58.9	0.0069	-54.3	0.0026	-49.7	0.0282
-63.4	0.0487	-58.8	0.0069	-54.2	0.0022	-49.6	0.0274
-63.3	0.0475	-58.7	0.0068	-54.1	0.0018	-49.5	0.0266
-63.2	0.0463	-58.6	0.0067	-54.0	0.0014	-49.4	0.0257
-63.1	0.0451	-58.5	0.0066	-53.9	0.0013	-49.3	0.0247
-63.0	0.0438	-58.4	0.0065	-53.8	0.0016	-49.2	0.0236
-62.9	0.0425	-58.3	0.0063	-53.7	0.0022	-49.1	0.0225
-62.8	0.0412	-58.2	0.0061	-53.6	0.0030	-49.0	0.0213
-62.7	0.0398	-58.1	0.0058	-53.5	0.0038	-48.9	0.0201
-62.6	0.0384	-58.0	0.0055	-53.4	0.0047	-48.8	0.0188
-62.5	0.0370	-57.9	0.0052	-53.3	0.0056	-48.7	0.0175
-62.4	0.0356	-57.8	0.0049	-53.2	0.0066	-48.6	0.0163
-62.3	0.0342	-57.7	0.0045	-53.1	0.0077	-48.5	0.0151
-62.2	0.0328	-57.6	0.0041	-53.0	0.0088	-48.4	0.0140
-62.1	0.0313	-57.5	0.0037	-52.9	0.0099	-48.3	0.0131
-62.0	0.0299	-57.4	0.0033	-52.8	0.0110	-48.2	0.0124
-61.9	0.0285	-57.3	0.0028	-52.7	0.0121	-48.1	0.0120
-61.8	0.0271	-57.2	0.0023	-52.6	0.0133	-48.0	0.0120
-61.7	0.0257	-57.1	0.0019	-52.5	0.0144	-47.9	0.0124
-61.6	0.0243	-57.0	0.0014	-52.4	0.0156	-47.8	0.0131
-61.5	0.0229	-56.9	0.0009	-52.3	0.0167	-47.7	0.0141
-61.4	0.0216	-56.8	0.0004	-52.2	0.0179	-47.6	0.0154
-61.3	0.0203	-56.7	0.0001	-52.1	0.0190	-47.5	0.0168
-61.2	0.0190	-56.6	0.0006	-52.0	0.0201	-47.4	0.0184
-61.1	0.0177	-56.5	0.0010	-51.9	0.0212	-47.3	0.0201

-47.2	0.0218	-42.6	0.0014	-38.0	0.0230	-33.4	0.0342
-47.1	0.0236	-42.5	0.0009	-37.9	0.0244	-33.3	0.0354
-47.0	0.0254	-42.4	0.0031	-37.8	0.0257	-33.2	0.0365
-46.9	0.0271	-42.3	0.0053	-37.7	0.0269	-33.1	0.0374
-46.8	0.0289	-42.2	0.0074	-37.6	0.0281	-33.0	0.0380
-46.7	0.0306	-42.1	0.0094	-37.5	0.0291	-32.9	0.0385
-46.6	0.0322	-42.0	0.0113	-37.4	0.0300	-32.8	0.0387
-46.5	0.0337	-41.9	0.0131	-37.3	0.0307	-32.7	0.0388
-46.4	0.0352	-41.8	0.0148	-37.2	0.0313	-32.6	0.0386
-46.3	0.0366	-41.7	0.0164	-37.1	0.0317	-32.5	0.0383
-46.2	0.0379	-41.6	0.0179	-37.0	0.0320	-32.4	0.0377
-46.1	0.0391	-41.5	0.0192	-36.9	0.0321	-32.3	0.0370
-46.0	0.0401	-41.4	0.0204	-36.8	0.0320	-32.2	0.0361
-45.9	0.0411	-41.3	0.0215	-36.7	0.0318	-32.1	0.0349
-45.8	0.0419	-41.2	0.0224	-36.6	0.0313	-32.0	0.0337
-45.7	0.0426	-41.1	0.0231	-36.5	0.0307	-31.9	0.0322
-45.6	0.0431	-41.0	0.0237	-36.4	0.0299	-31.8	0.0307
-45.5	0.0435	-40.9	0.0242	-36.3	0.0290	-31.7	0.0290
-45.4	0.0438	-40.8	0.0245	-36.2	0.0278	-31.6	0.0272
-45.3	0.0439	-40.7	0.0246	-36.1	0.0265	-31.5	0.0253
-45.2	0.0438	-40.6	0.0246	-36.0	0.0250	-31.4	0.0233
-45.1	0.0436	-40.5	0.0245	-35.9	0.0234	-31.3	0.0213
-45.0	0.0433	-40.4	0.0241	-35.8	0.0216	-31.2	0.0193
-44.9	0.0428	-40.3	0.0237	-35.7	0.0197	-31.1	0.0173
-44.8	0.0422	-40.2	0.0231	-35.6	0.0177	-31.0	0.0154
-44.7	0.0414	-40.1	0.0224	-35.5	0.0155	-30.9	0.0136
-44.6	0.0404	-40.0	0.0216	-35.4	0.0133	-30.8	0.0120
-44.5	0.0394	-39.9	0.0207	-35.3	0.0110	-30.7	0.0106
-44.4	0.0382	-39.8	0.0197	-35.2	0.0087	-30.6	0.0097
-44.3	0.0368	-39.7	0.0187	-35.1	0.0064	-30.5	0.0092
-44.2	0.0354	-39.6	0.0176	-35.0	0.0045	-30.4	0.0091
-44.1	0.0338	-39.5	0.0166	-34.9	0.0035	-30.3	0.0095
-44.0	0.0321	-39.4	0.0156	-34.8	0.0044	-30.2	0.0101
-43.9	0.0303	-39.3	0.0147	-34.7	0.0063	-30.1	0.0109
-43.8	0.0284	-39.2	0.0139	-34.6	0.0087	-30.0	0.0118
-43.7	0.0264	-39.1	0.0134	-34.5	0.0112	-29.9	0.0126
-43.6	0.0243	-39.0	0.0131	-34.4	0.0137	-29.8	0.0133
-43.5	0.0222	-38.9	0.0131	-34.3	0.0162	-29.7	0.0139
-43.4	0.0199	-38.8	0.0135	-34.2	0.0186	-29.6	0.0143
-43.3	0.0177	-38.7	0.0141	-34.1	0.0210	-29.5	0.0145
-43.2	0.0154	-38.6	0.0150	-34.0	0.0233	-29.4	0.0146
-43.1	0.0131	-38.5	0.0161	-33.9	0.0254	-29.3	0.0143
-43.0	0.0107	-38.4	0.0174	-33.8	0.0275	-29.2	0.0139
-42.9	0.0084	-38.3	0.0188	-33.7	0.0294	-29.1	0.0132
-42.8	0.0060	-38.2	0.0202	-33.6	0.0311	-29.0	0.0122
-42.7	0.0037	-38.1	0.0216	-33.5	0.0327	-28.9	0.0110

-28.8	0.0095	-24.2	0.0635	-19.6	0.0061	-15.0	0.0177
-28.7	0.0078	-24.1	0.0596	-19.5	0.0090	-14.9	0.0175
-28.6	0.0058	-24.0	0.0556	-19.4	0.0133	-14.8	0.0168
-28.5	0.0035	-23.9	0.0515	-19.3	0.0180	-14.7	0.0155
-28.4	0.0011	-23.8	0.0474	-19.2	0.0227	-14.6	0.0138
-28.3	0.0016	-23.7	0.0434	-19.1	0.0273	-14.5	0.0114
-28.2	0.0046	-23.6	0.0396	-19.0	0.0317	-14.4	0.0085
-28.1	0.0077	-23.5	0.0361	-18.9	0.0360	-14.3	0.0050
-28.0	0.0110	-23.4	0.0330	-18.8	0.0401	-14.2	0.0009
-27.9	0.0145	-23.3	0.0306	-18.7	0.0438	-14.1	0.0038
-27.8	0.0181	-23.2	0.0289	-18.6	0.0473	-14.0	0.0090
-27.7	0.0219	-23.1	0.0283	-18.5	0.0505	-13.9	0.0148
-27.6	0.0258	-23.0	0.0286	-18.4	0.0532	-13.8	0.0211
-27.5	0.0297	-22.9	0.0297	-18.3	0.0557	-13.7	0.0280
-27.4	0.0337	-22.8	0.0316	-18.2	0.0577	-13.6	0.0353
-27.3	0.0378	-22.7	0.0341	-18.1	0.0593	-13.5	0.0430
-27.2	0.0419	-22.6	0.0368	-18.0	0.0605	-13.4	0.0511
-27.1	0.0459	-22.5	0.0397	-17.9	0.0613	-13.3	0.0596
-27.0	0.0499	-22.4	0.0426	-17.8	0.0616	-13.2	0.0683
-26.9	0.0539	-22.3	0.0454	-17.7	0.0615	-13.1	0.0773
-26.8	0.0577	-22.2	0.0481	-17.6	0.0610	-13.0	0.0864
-26.7	0.0615	-22.1	0.0505	-17.5	0.0601	-12.9	0.0957
-26.6	0.0650	-22.0	0.0527	-17.4	0.0588	-12.8	0.1050
-26.5	0.0684	-21.9	0.0546	-17.3	0.0572	-12.7	0.1144
-26.4	0.0717	-21.8	0.0562	-17.2	0.0551	-12.6	0.1236
-26.3	0.0747	-21.7	0.0573	-17.1	0.0528	-12.5	0.1327
-26.2	0.0774	-21.6	0.0581	-17.0	0.0501	-12.4	0.1415
-26.1	0.0799	-21.5	0.0585	-16.9	0.0472	-12.3	0.1501
-26.0	0.0821	-21.4	0.0585	-16.8	0.0440	-12.2	0.1583
-25.9	0.0840	-21.3	0.0581	-16.7	0.0407	-12.1	0.1661
-25.8	0.0855	-21.2	0.0572	-16.6	0.0372	-12.0	0.1734
-25.7	0.0868	-21.1	0.0560	-16.5	0.0336	-11.9	0.1802
-25.6	0.0877	-21.0	0.0543	-16.4	0.0300	-11.8	0.1863
-25.5	0.0882	-20.9	0.0523	-16.3	0.0265	-11.7	0.1918
-25.4	0.0884	-20.8	0.0498	-16.2	0.0231	-11.6	0.1965
-25.3	0.0882	-20.7	0.0470	-16.1	0.0200	-11.5	0.2005
-25.2	0.0877	-20.6	0.0438	-16.0	0.0172	-11.4	0.2036
-25.1	0.0867	-20.5	0.0404	-15.9	0.0151	-11.3	0.2059
-25.0	0.0855	-20.4	0.0366	-15.8	0.0137	-11.2	0.2073
-24.9	0.0838	-20.3	0.0326	-15.7	0.0131	-11.1	0.2078
-24.8	0.0818	-20.2	0.0283	-15.6	0.0133	-11.0	0.2073
-24.7	0.0795	-20.1	0.0238	-15.5	0.0140	-10.9	0.2059
-24.6	0.0768	-20.0	0.0193	-15.4	0.0150	-10.8	0.2035
-24.5	0.0739	-19.9	0.0147	-15.3	0.0160	-10.7	0.2002
-24.4	0.0706	-19.8	0.0103	-15.2	0.0169	-10.6	0.1959
-24.3	0.0672	-19.7	0.0068	-15.1	0.0175	-10.5	0.1907

-10.4	0.1846	-5.8	0.0236	-1.2	0.3610	3.4	0.4457
-10.3	0.1777	-5.7	0.0217	-1.1	0.4011	3.5	0.4087
-10.2	0.1700	-5.6	0.0336	-1.0	0.4416	3.6	0.3723
-10.1	0.1616	-5.5	0.0507	-0.9	0.4822	3.7	0.3369
-10.0	0.1525	-5.4	0.0695	-0.8	0.5227	3.8	0.3026
-9.9	0.1430	-5.3	0.0890	-0.7	0.5628	3.9	0.2699
-9.8	0.1330	-5.2	0.1088	-0.6	0.6022	4.0	0.2392
-9.7	0.1228	-5.1	0.1285	-0.5	0.6408	4.1	0.2110
-9.6	0.1126	-5.0	0.1480	-0.4	0.6783	4.2	0.1858
-9.5	0.1027	-4.9	0.1671	-0.3	0.7146	4.3	0.1645
-9.4	0.0934	-4.8	0.1856	-0.2	0.7493	4.4	0.1478
-9.3	0.0851	-4.7	0.2034	-0.1	0.7824	4.5	0.1365
-9.2	0.0784	-4.6	0.2203	0.0	0.8136	4.6	0.1310
-9.1	0.0739	-4.5	0.2361	0.1	0.8429	4.7	0.1308
-9.0	0.0721	-4.4	0.2508	0.2	0.8700	4.8	0.1350
-8.9	0.0732	-4.3	0.2641	0.3	0.8948	4.9	0.1422
-8.8	0.0770	-4.2	0.2760	0.4	0.9173	5.0	0.1511
-8.7	0.0829	-4.1	0.2864	0.5	0.9372	5.1	0.1607
-8.6	0.0904	-4.0	0.2950	0.6	0.9545	5.2	0.1702
-8.5	0.0989	-3.9	0.3019	0.7	0.9691	5.3	0.1791
-8.4	0.1079	-3.8	0.3068	0.8	0.9810	5.4	0.1870
-8.3	0.1170	-3.7	0.3098	0.9	0.9900	5.5	0.1936
-8.2	0.1259	-3.6	0.3108	1.0	0.9962	5.6	0.1987
-8.1	0.1343	-3.5	0.3096	1.1	0.9995	5.7	0.2024
-8.0	0.1422	-3.4	0.3064	1.2	1.0000	5.8	0.2045
-7.9	0.1492	-3.3	0.3010	1.3	0.9976	5.9	0.2050
-7.8	0.1554	-3.2	0.2935	1.4	0.9923	6.0	0.2039
-7.7	0.1605	-3.1	0.2839	1.5	0.9843	6.1	0.2013
-7.6	0.1645	-3.0	0.2722	1.6	0.9735	6.2	0.1972
-7.5	0.1673	-2.9	0.2587	1.7	0.9600	6.3	0.1916
-7.4	0.1689	-2.8	0.2433	1.8	0.9439	6.4	0.1847
-7.3	0.1691	-2.7	0.2264	1.9	0.9254	6.5	0.1765
-7.2	0.1680	-2.6	0.2084	2.0	0.9044	6.6	0.1672
-7.1	0.1655	-2.5	0.1897	2.1	0.8812	6.7	0.1568
-7.0	0.1615	-2.4	0.1712	2.2	0.8558	6.8	0.1454
-6.9	0.1562	-2.3	0.1541	2.3	0.8284	6.9	0.1333
-6.8	0.1495	-2.2	0.1403	2.4	0.7992	7.0	0.1204
-6.7	0.1414	-2.1	0.1322	2.5	0.7683	7.1	0.1069
-6.6	0.1320	-2.0	0.1322	2.6	0.7359	7.2	0.0930
-6.5	0.1213	-1.9	0.1415	2.7	0.7022	7.3	0.0788
-6.4	0.1093	-1.8	0.1594	2.8	0.6673	7.4	0.0644
-6.3	0.0962	-1.7	0.1843	2.9	0.6315	7.5	0.0502
-6.2	0.0821	-1.6	0.2142	3.0	0.5950	7.6	0.0364
-6.1	0.0671	-1.5	0.2478	3.1	0.5579	7.7	0.0239
-6.0	0.0516	-1.4	0.2839	3.2	0.5205	7.8	0.0160
-5.9	0.0363	-1.3	0.3218	3.3	0.4830	7.9	0.0188

8.0	0.0289	12.6	0.0533	17.2	0.0787	21.8	0.0061
8.1	0.0407	12.7	0.0542	17.3	0.0744	21.9	0.0061
8.2	0.0526	12.8	0.0544	17.4	0.0698	22.0	0.0090
8.3	0.0642	12.9	0.0540	17.5	0.0650	22.1	0.0130
8.4	0.0751	13.0	0.0529	17.6	0.0601	22.2	0.0173
8.5	0.0853	13.1	0.0512	17.7	0.0552	22.3	0.0215
8.6	0.0947	13.2	0.0489	17.8	0.0503	22.4	0.0256
8.7	0.1033	13.3	0.0460	17.9	0.0456	22.5	0.0296
8.8	0.1109	13.4	0.0425	18.0	0.0413	22.6	0.0333
8.9	0.1175	13.5	0.0384	18.1	0.0375	22.7	0.0368
9.0	0.1231	13.6	0.0339	18.2	0.0344	22.8	0.0401
9.1	0.1277	13.7	0.0289	18.3	0.0322	22.9	0.0430
9.2	0.1312	13.8	0.0235	18.4	0.0312	23.0	0.0457
9.3	0.1338	13.9	0.0177	18.5	0.0312	23.1	0.0480
9.4	0.1353	14.0	0.0116	18.6	0.0324	23.2	0.0500
9.5	0.1358	14.1	0.0052	18.7	0.0344	23.3	0.0517
9.6	0.1354	14.2	0.0013	18.8	0.0369	23.4	0.0530
9.7	0.1340	14.3	0.0081	18.9	0.0398	23.5	0.0540
9.8	0.1318	14.4	0.0149	19.0	0.0428	23.6	0.0546
9.9	0.1287	14.5	0.0218	19.1	0.0458	23.7	0.0549
10.0	0.1248	14.6	0.0287	19.2	0.0487	23.8	0.0548
10.1	0.1201	14.7	0.0355	19.3	0.0514	23.9	0.0544
10.2	0.1148	14.8	0.0422	19.4	0.0538	24.0	0.0537
10.3	0.1089	14.9	0.0487	19.5	0.0559	24.1	0.0527
10.4	0.1025	15.0	0.0550	19.6	0.0576	24.2	0.0513
10.5	0.0956	15.1	0.0610	19.7	0.0590	24.3	0.0497
10.6	0.0884	15.2	0.0667	19.8	0.0599	24.4	0.0478
10.7	0.0810	15.3	0.0721	19.9	0.0604	24.5	0.0457
10.8	0.0734	15.4	0.0771	20.0	0.0605	24.6	0.0434
10.9	0.0658	15.5	0.0816	20.1	0.0601	24.7	0.0409
11.0	0.0583	15.6	0.0856	20.2	0.0593	24.8	0.0383
11.1	0.0510	15.7	0.0892	20.3	0.0581	24.9	0.0355
11.2	0.0443	15.8	0.0922	20.4	0.0565	25.0	0.0326
11.3	0.0383	15.9	0.0948	20.5	0.0545	25.1	0.0297
11.4	0.0334	16.0	0.0967	20.6	0.0521	25.2	0.0268
11.5	0.0301	16.1	0.0981	20.7	0.0493	25.3	0.0239
11.6	0.0287	16.2	0.0990	20.8	0.0462	25.4	0.0211
11.7	0.0292	16.3	0.0993	20.9	0.0428	25.5	0.0185
11.8	0.0311	16.4	0.0990	21.0	0.0391	25.6	0.0162
11.9	0.0341	16.5	0.0982	21.1	0.0352	25.7	0.0143
12.0	0.0375	16.6	0.0968	21.2	0.0310	25.8	0.0130
12.1	0.0410	16.7	0.0949	21.3	0.0267	25.9	0.0123
12.2	0.0443	16.8	0.0925	21.4	0.0223	26.0	0.0123
12.3	0.0473	16.9	0.0897	21.5	0.0178	26.1	0.0128
12.4	0.0498	17.0	0.0864	21.6	0.0134	26.2	0.0138
12.5	0.0519	17.1	0.0827	21.7	0.0092	26.3	0.0150

26.4	0.0163	31.0	0.0660	35.6	0.0343	40.2	0.0193
26.5	0.0175	31.1	0.0659	35.7	0.0335	40.3	0.0183
26.6	0.0187	31.2	0.0655	35.8	0.0325	40.4	0.0173
26.7	0.0196	31.3	0.0648	35.9	0.0313	40.5	0.0163
26.8	0.0204	31.4	0.0638	36.0	0.0300	40.6	0.0152
26.9	0.0210	31.5	0.0626	36.1	0.0285	40.7	0.0141
27.0	0.0213	31.6	0.0612	36.2	0.0269	40.8	0.0130
27.1	0.0213	31.7	0.0596	36.3	0.0252	40.9	0.0119
27.2	0.0211	31.8	0.0577	36.4	0.0234	41.0	0.0107
27.3	0.0206	31.9	0.0556	36.5	0.0214	41.1	0.0096
27.4	0.0199	32.0	0.0534	36.6	0.0194	41.2	0.0085
27.5	0.0188	32.1	0.0510	36.7	0.0173	41.3	0.0075
27.6	0.0175	32.2	0.0484	36.8	0.0152	41.4	0.0065
27.7	0.0160	32.3	0.0458	36.9	0.0131	41.5	0.0055
27.8	0.0141	32.4	0.0430	37.0	0.0109	41.6	0.0047
27.9	0.0121	32.5	0.0402	37.1	0.0087	41.7	0.0038
28.0	0.0098	32.6	0.0374	37.2	0.0066	41.8	0.0031
28.1	0.0073	32.7	0.0345	37.3	0.0047	41.9	0.0025
28.2	0.0046	32.8	0.0318	37.4	0.0033	42.0	0.0019
28.3	0.0018	32.9	0.0291	37.5	0.0031	42.1	0.0015
28.4	0.0012	33.0	0.0266	37.6	0.0041	42.2	0.0011
28.5	0.0044	33.1	0.0243	37.7	0.0058	42.3	0.0008
28.6	0.0077	33.2	0.0223	37.8	0.0076	42.4	0.0005
28.7	0.0110	33.3	0.0208	37.9	0.0094	42.5	0.0001
28.8	0.0145	33.4	0.0198	38.0	0.0111	42.6	0.0002
28.9	0.0180	33.5	0.0193	38.1	0.0128	42.7	0.0007
29.0	0.0215	33.6	0.0193	38.2	0.0144	42.8	0.0012
29.1	0.0250	33.7	0.0198	38.3	0.0158	42.9	0.0019
29.2	0.0285	33.8	0.0208	38.4	0.0172	43.0	0.0027
29.3	0.0320	33.9	0.0220	38.5	0.0184	43.1	0.0036
29.4	0.0354	34.0	0.0235	38.6	0.0195	43.2	0.0046
29.5	0.0387	34.1	0.0250	38.7	0.0205	43.3	0.0058
29.6	0.0419	34.2	0.0266	38.8	0.0213	43.4	0.0071
29.7	0.0449	34.3	0.0281	38.9	0.0220	43.5	0.0085
29.8	0.0479	34.4	0.0295	39.0	0.0226	43.6	0.0101
29.9	0.0506	34.5	0.0309	39.1	0.0230	43.7	0.0118
30.0	0.0532	34.6	0.0321	39.2	0.0233	43.8	0.0136
30.1	0.0556	34.7	0.0332	39.3	0.0234	43.9	0.0154
30.2	0.0577	34.8	0.0340	39.4	0.0234	44.0	0.0174
30.3	0.0596	34.9	0.0347	39.5	0.0233	44.1	0.0195
30.4	0.0613	35.0	0.0353	39.6	0.0230	44.2	0.0217
30.5	0.0628	35.1	0.0356	39.7	0.0227	44.3	0.0240
30.6	0.0640	35.2	0.0357	39.8	0.0222	44.4	0.0263
30.7	0.0649	35.3	0.0357	39.9	0.0216	44.5	0.0287
30.8	0.0655	35.4	0.0354	40.0	0.0209	44.6	0.0312
30.9	0.0659	35.5	0.0350	40.1	0.0201	44.7	0.0336

44.8	0.0362	49.4	0.0609	54.0	0.0129	58.6	0.0042
44.9	0.0387	49.5	0.0587	54.1	0.0126	58.7	0.0048
45.0	0.0413	49.6	0.0565	54.2	0.0122	58.8	0.0055
45.1	0.0439	49.7	0.0541	54.3	0.0118	58.9	0.0061
45.2	0.0464	49.8	0.0518	54.4	0.0114	59.0	0.0068
45.3	0.0490	49.9	0.0494	54.5	0.0109	59.1	0.0075
45.4	0.0515	50.0	0.0471	54.6	0.0104	59.2	0.0082
45.5	0.0540	50.1	0.0447	54.7	0.0099	59.3	0.0089
45.6	0.0565	50.2	0.0423	54.8	0.0093	59.4	0.0097
45.7	0.0588	50.3	0.0399	54.9	0.0087	59.5	0.0104
45.8	0.0612	50.4	0.0376	55.0	0.0082	59.6	0.0112
45.9	0.0634	50.5	0.0352	55.1	0.0076	59.7	0.0119
46.0	0.0656	50.6	0.0329	55.2	0.0070	59.8	0.0126
46.1	0.0677	50.7	0.0307	55.3	0.0064	59.9	0.0134
46.2	0.0696	50.8	0.0285	55.4	0.0058	60.0	0.0141
46.3	0.0715	50.9	0.0264	55.5	0.0052	60.1	0.0148
46.4	0.0733	51.0	0.0244	55.6	0.0046	60.2	0.0155
46.5	0.0749	51.1	0.0225	55.7	0.0041	60.3	0.0162
46.6	0.0764	51.2	0.0207	55.8	0.0035	60.4	0.0169
46.7	0.0778	51.3	0.0190	55.9	0.0030	60.5	0.0175
46.8	0.0790	51.4	0.0174	56.0	0.0025	60.6	0.0181
46.9	0.0801	51.5	0.0160	56.1	0.0021	60.7	0.0187
47.0	0.0811	51.6	0.0148	56.2	0.0016	60.8	0.0193
47.1	0.0819	51.7	0.0137	56.3	0.0012	60.9	0.0198
47.2	0.0825	51.8	0.0129	56.4	0.0009	61.0	0.0203
47.3	0.0830	51.9	0.0123	56.5	0.0006	61.1	0.0208
47.4	0.0834	52.0	0.0118	56.6	0.0003	61.2	0.0212
47.5	0.0836	52.1	0.0116	56.7	0.0000	61.3	0.0216
47.6	0.0836	52.2	0.0115	56.8	0.0002	61.4	0.0219
47.7	0.0835	52.3	0.0115	56.9	0.0003	61.5	0.0222
47.8	0.0832	52.4	0.0117	57.0	0.0004	61.6	0.0225
47.9	0.0828	52.5	0.0119	57.1	0.0005	61.7	0.0227
48.0	0.0822	52.6	0.0122	57.2	0.0005	61.8	0.0228
48.1	0.0815	52.7	0.0125	57.3	0.0005	61.9	0.0230
48.2	0.0806	52.8	0.0128	57.4	0.0005	62.0	0.0230
48.3	0.0796	52.9	0.0131	57.5	0.0004	62.1	0.0231
48.4	0.0785	53.0	0.0133	57.6	0.0004	62.2	0.0230
48.5	0.0772	53.1	0.0135	57.7	0.0005	62.3	0.0230
48.6	0.0758	53.2	0.0137	57.8	0.0007	62.4	0.0229
48.7	0.0743	53.3	0.0138	57.9	0.0010	62.5	0.0227
48.8	0.0727	53.4	0.0138	58.0	0.0013	62.6	0.0225
48.9	0.0709	53.5	0.0138	58.1	0.0017	62.7	0.0222
49.0	0.0691	53.6	0.0137	58.2	0.0021	62.8	0.0220
49.1	0.0672	53.7	0.0136	58.3	0.0026	62.9	0.0216
49.2	0.0652	53.8	0.0134	58.4	0.0031	63.0	0.0212
49.3	0.0631	53.9	0.0132	58.5	0.0037	63.1	0.0208

63.2	0.0204	67.8	0.0178	72.4	0.0192	77.0	0.0561
63.3	0.0199	67.9	0.0180	72.5	0.0205	77.1	0.0561
63.4	0.0193	68.0	0.0180	72.6	0.0218	77.2	0.0561
63.5	0.0188	68.1	0.0180	72.7	0.0231	77.3	0.0560
63.6	0.0182	68.2	0.0180	72.8	0.0244	77.4	0.0559
63.7	0.0176	68.3	0.0179	72.9	0.0257	77.5	0.0558
63.8	0.0170	68.4	0.0178	73.0	0.0270	77.6	0.0557
63.9	0.0163	68.5	0.0176	73.1	0.0282	77.7	0.0555
64.0	0.0156	68.6	0.0174	73.2	0.0295	77.8	0.0553
64.1	0.0150	68.7	0.0171	73.3	0.0307	77.9	0.0550
64.2	0.0143	68.8	0.0168	73.4	0.0319	78.0	0.0547
64.3	0.0136	68.9	0.0164	73.5	0.0331	78.1	0.0544
64.4	0.0129	69.0	0.0160	73.6	0.0343	78.2	0.0541
64.5	0.0123	69.1	0.0155	73.7	0.0355	78.3	0.0537
64.6	0.0117	69.2	0.0150	73.8	0.0366	78.4	0.0533
64.7	0.0111	69.3	0.0145	73.9	0.0377	78.5	0.0529
64.8	0.0105	69.4	0.0138	74.0	0.0388	78.6	0.0525
64.9	0.0100	69.5	0.0132	74.1	0.0398	78.7	0.0520
65.0	0.0096	69.6	0.0125	74.2	0.0409	78.8	0.0515
65.1	0.0093	69.7	0.0118	74.3	0.0419	78.9	0.0510
65.2	0.0090	69.8	0.0110	74.4	0.0429	79.0	0.0504
65.3	0.0089	69.9	0.0101	74.5	0.0438	79.1	0.0498
65.4	0.0088	70.0	0.0093	74.6	0.0447	79.2	0.0492
65.5	0.0089	70.1	0.0084	74.7	0.0456	79.3	0.0486
65.6	0.0090	70.2	0.0074	74.8	0.0464	79.4	0.0480
65.7	0.0093	70.3	0.0065	74.9	0.0473	79.5	0.0473
65.8	0.0096	70.4	0.0055	75.0	0.0480	79.6	0.0466
65.9	0.0100	70.5	0.0044	75.1	0.0488	79.7	0.0459
66.0	0.0104	70.6	0.0034	75.2	0.0495	79.8	0.0452
66.1	0.0109	70.7	0.0023	75.3	0.0502	79.9	0.0445
66.2	0.0114	70.8	0.0011	75.4	0.0508	80.0	0.0438
66.3	0.0120	70.9	0.0000	75.5	0.0514	80.1	0.0430
66.4	0.0125	71.0	0.0012	75.6	0.0520	80.2	0.0422
66.5	0.0130	71.1	0.0024	75.7	0.0525	80.3	0.0414
66.6	0.0135	71.2	0.0036	75.8	0.0530	80.4	0.0406
66.7	0.0141	71.3	0.0048	75.9	0.0535	80.5	0.0398
66.8	0.0146	71.4	0.0061	76.0	0.0539	80.6	0.0390
66.9	0.0150	71.5	0.0074	76.1	0.0543	80.7	0.0381
67.0	0.0155	71.6	0.0086	76.2	0.0546	80.8	0.0373
67.1	0.0159	71.7	0.0099	76.3	0.0549	80.9	0.0364
67.2	0.0163	71.8	0.0112	76.4	0.0552	81.0	0.0356
67.3	0.0167	71.9	0.0126	76.5	0.0554	81.1	0.0347
67.4	0.0170	72.0	0.0139	76.6	0.0556	81.2	0.0338
67.5	0.0173	72.1	0.0152	76.7	0.0558	81.3	0.0329
67.6	0.0175	72.2	0.0165	76.8	0.0559	81.4	0.0320
67.7	0.0177	72.3	0.0178	76.9	0.0560	81.5	0.0312

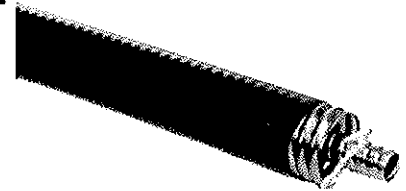
81.6	0.0303	86.2	0.0079
81.7	0.0293	86.3	0.0086
81.8	0.0284	86.4	0.0092
81.9	0.0275	86.5	0.0098
82.0	0.0266	86.6	0.0105
82.1	0.0257	86.7	0.0111
82.2	0.0248	86.8	0.0117
82.3	0.0239	86.9	0.0122
82.4	0.0230	87.0	0.0128
82.5	0.0220	87.1	0.0134
82.6	0.0211	87.2	0.0139
82.7	0.0202	87.3	0.0145
82.8	0.0193	87.4	0.0150
82.9	0.0184	87.5	0.0155
83.0	0.0175	87.6	0.0161
83.1	0.0166	87.7	0.0166
83.2	0.0157	87.8	0.0171
83.3	0.0148	87.9	0.0175
83.4	0.0139	88.0	0.0180
83.5	0.0130	88.1	0.0185
83.6	0.0122	88.2	0.0189
83.7	0.0113	88.3	0.0194
83.8	0.0104	88.4	0.0198
83.9	0.0096	88.5	0.0202
84.0	0.0087	88.6	0.0206
84.1	0.0079	88.7	0.0210
84.2	0.0070	88.8	0.0214
84.3	0.0062	88.9	0.0218
84.4	0.0054	89.0	0.0222
84.5	0.0046	89.1	0.0225
84.6	0.0037	89.2	0.0229
84.7	0.0029	89.3	0.0232
84.8	0.0022	89.4	0.0235
84.9	0.0014	89.5	0.0239
85.0	0.0006	89.6	0.0242
85.1	0.0002	89.7	0.0245
85.2	0.0009	89.8	0.0248
85.3	0.0017	89.9	0.0250
85.4	0.0024		
85.5	0.0031		
85.6	0.0038		
85.7	0.0045		
85.8	0.0052		
85.9	0.0059		
86.0	0.0066		
86.1	0.0073		



3" HELIFLEX® Air-Dielectric Coaxial Cable

Product Description

HELIFLEX® 3" low loss air dielectric cable
 Application: TV, Broadcast



3" HELIFLEX® Air Dielectric Coaxial Cable

Features/Benefits

- Low Attenuation**
The low attenuation of HELIFLEX® coaxial cable results in highly efficient signal transfer in your RF system.
- Complete Shielding**
The solid outer conductor of HELIFLEX® coaxial cable creates a continuous RFI/EMI shield that minimizes system interference.
- Low VSWR**
Special low VSWR versions of HELIFLEX® coaxial cables contribute to low system noise.
- Outstanding Intermodulation Performance**
HELIFLEX® coaxial cable's solid inner and outer conductors virtually eliminate intermods. Intermodulation performance is also confirmed with state-of-the-art equipment at the RFS factory.
- High Power Rating**
Due to their low attenuation, outstanding heat transfer properties and temperature stabilized dielectric materials, HELIFLEX® cable provides safe long term operating life at high transmit power levels.
- Wide Range of Application**
Typical areas of application are: feedlines for broadcast and terrestrial microwave antennas, wireless cellular, PCS and ESMR base stations, cabling of antenna arrays, and radio equipment interconnects.

Frequency [MHz]	Attenuation		Power [kW]
	[dB/100m]	[dB/100ft]	
0.5	0.0280	0.0085	596
1.0	0.0397	0.0121	421
1.5	0.0487	0.0148	343
2.0	0.0563	0.0172	297
10	0.127	0.0388	132
20	0.181	0.0552	92.3
30	0.223	0.0680	74.9
50	0.291	0.0886	57.4
88	0.391	0.1119	42.8
100	0.418	0.127	40.
108	0.436	0.133	38.4
150	0.519	0.158	32.2
174	0.561	0.171	29.8
200	0.605	0.184	27.7
300	0.754	0.230	22.2
400	0.883	0.269	19.0
450	0.943	0.287	17.8
500	1.0	0.305	16.8
512	1.01	0.309	16.6
600	1.11	0.338	15.2
700	1.21	0.366	13.9
800	1.30	0.396	13.0
824	1.33	0.404	12.7
894	1.39	0.424	12.1
900	1.40	0.425	12.1
925	1.42	0.432	11.9
960	1.45	0.441	11.6
1000	1.48	0.452	11.4
1250	1.69	0.515	10.0
1500	1.88	0.573	9.04
1700	2.03	0.618	8.39

Attenuation at 20°C (68°F) cable temperature
 Mean power rating at 40°C (104°F) ambient temperature

Technical Features

Structure

Inner conductor:	Corrugated Copper Tube	[mm (in)]	29.3 (1.15)
Dielectric:	Helical Polyethylene Spacer	[mm (in)]	63.5 (2.5)
Outer conductor:	Corrugated Copper	[mm (in)]	72.4 (2.85)
Jacket:	Polyethylene, PE	[mm (in)]	76.0 (2.992)

Mechanical Properties

Weight, approximately	[kg/m (lb/ft)]	2.6 (1.78)
Minimum bending radius, single bending	[mm (in)]	270 (11)
Minimum bending radius, repeated bending	[mm (in)]	760 (30)
Bending moment	[Nm (lb-ft)]	
Max. tensile force	[N (lb)]	1800 (405)
Recommended / maximum clamp spacing	[m (ft)]	0.8 / 1.2 (2.75 / 4.0)

Electrical Properties

Characteristic impedance	[Ω]	50 +/- 0.5
Relative propagation velocity	[%]	96
Capacitance	[pF/m (pF/ft)]	66.6 (20.3)
Inductance	[μH/m (μH/ft)]	0.167 (0.051)
Max. operating frequency	[GHz]	1.63
Jacket spark test RMS	[V]	8000
Peak power rating	[kW]	640
RF Peak voltage rating	[V]	8000
DC-resistance inner conductor	{Ω/km (Ω/1000ft)}	0.39 (0.12)
DC-resistance outer conductor	{Ω/km (Ω/1000ft)}	0.16 (0.05)

Recommended Temperature Range

Storage temperature	[°C (°F)]	-70 to +85 (-94 to +185)
Installation temperature	[°C (°F)]	-40 to +60 (-40 to +140)
Operation temperature	[°C (°F)]	-50 to +85 (-58 to +185)

Other Characteristics

Fire Performance: Halogene Free

VSWR Performance: Standard [dB (VSWR)]

Typical 20.8dB (1.2:1 VSWR) or better within the operation bands of most global frequency ranges. Premium also available. Contact factory for options in your specific frequency band.

Other Options: Phase stabilized and phase matched cables and assemblies are available upon request.

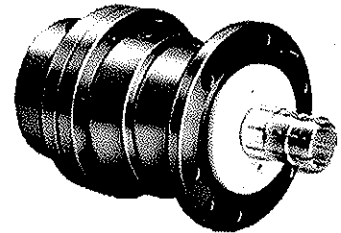
All information contained in the present datasheet is subject to confirmation at time of ordering



3-1/8" EIA Connector for 3" Coaxial Cable, Gas Pass O-ring sealing, Brass/Silver

Product Description

Radio Frequency Systems' line of high performance coaxial cable connectors are designed specifically to provide the highest quality connector-cable interface while simplifying and speeding up the attachment of connectors to HELIFLEX® coaxial cables. RFS connectors are fully tested for mechanical and electrical compliance specifications. They are available in all popular cable sizes in a variety of mating interfaces. To join two cables with EIA connectors, two identical socket connectors are installed on either end of the cables to be joined, and a coupling element is used to make the connection of the center conductor. The coupling element must be ordered separately with the exception of the S-Line male versions that have a captivated coupling element. Connectors are available in sizes matching the nominal cable size. EIA connectors provide optimal power handling for the complete transmission line system.



Connector 3-1/8" EIA

Features/Benefits

- **Solderless**

Captivated spring finger contacts permit quick, easy and precise solderless installation utilizing only basic hand tools. Avoids the high impedance risk associated with soldering.

- **Self Flaring**

Self flaring design reduces installation time and thus, saves on labor costs.

- **Corrosion-Proof Silver Plated Contacts**

Featured even on standard connectors. Provide improved contact resistance and lower intermodulation.

- **Outstanding Electrical Performance**

Metal to Metal contact between cable and connector - no plastic parts used. Secure connection highly resistant to pull-off or twist-off provides long-term mechanical integrity. Resistant to intermodulation after temperature cycling.

- **Easy to Install**

No special tools needed. Only basic hand tools required. No additional costs to the installer.

Technical Specifications

Transmission Line Type	Coaxial Cable
Cable Size	3"
Cable Type	Air Dielectric
Mating Interface	3-1/8" EIA
Connector Type	Gas Pass
Sealing Method	O-ring
Gender	None
Plating Outer/Inner	Brass/Silver
Length, mm (in)	201 (7.9)
Outer Diameter, mm (in)	131 (5.2)
Weight, kg (lb)	4.60 (10.15)
Inner Contact Attachment	Threaded
Outer Contact Attachment	Tab Flare

Notes**Other Documentation**

All information contained in the present datasheet is subject to confirmation at time of ordering

Mechanical Data

Weights based on the High Power Model (LP & MP will be lighter).

Typical CaAc values without Ice Loading at 0° on Boresight or 0° on Azimuth Pattern.

RD4 Bay

Channel Grouping	Height	Weight	CaAc
14-24	8.2 ft	173 lbs	7.0 sq ft
17-36	7.3 ft	156 lbs	6.1 sq ft
32-52	6.4 ft	138 lbs	4.5 sq ft
46-69	5.6 ft	126 lbs	3.9 sq ft

RD8 Bay

Channel Grouping	Height	Weight	CaAc
14-24	16.3 ft	519 lbs	14.1 sq ft
17-36	14.4 ft	484 lbs	12.3 sq ft
32-52	12.6 ft	449 lbs	9.0 sq ft
46-69	11.1 ft	426 lbs	7.8 sq ft

RD12 Bay

Channel Grouping	Height	Weight	CaAc
14-24	24.2 ft	726 lbs	21.1 sq ft
17-36	21.1 ft	674 lbs	18.4 sq ft
32-52	18.8 ft	621 lbs	13.4 sq ft
46-69	16.5 ft	586 lbs	11.8 sq ft

RD16 Bay

Channel Grouping	Height	Weight	CaAc
14-24	32.5 ft	972 lbs	28.2 sq ft
17-36	28.5 ft	902 lbs	24.5 sq ft
32-52	25.0 ft	832 lbs	17.9 sq ft
46-69	22.0 ft	785 lbs	15.7 sq ft

RD24 Bay

Channel Grouping	Height	Weight	CaAc
14-24	48.6 ft	1647 lbs	42.2 sq ft
17-36	42.7 ft	1542 lbs	36.8 sq ft
32-52	37.5 ft	1436 lbs	26.9 sq ft
46-69	32.9 ft	1367 lbs	23.5 sq ft

RD32 Bay

Channel Grouping	Height	Weight	CaAc
14-24	64.5 ft	2208 lbs	56.3 sq ft
17-36	56.9 ft	2068 lbs	49.0 sq ft
32-52	49.9 ft	1927 lbs	35.8 sq ft
46-69	43.8 ft	1834 lbs	31.4 sq ft

Technical Bulletin

No. 100-01RDSK

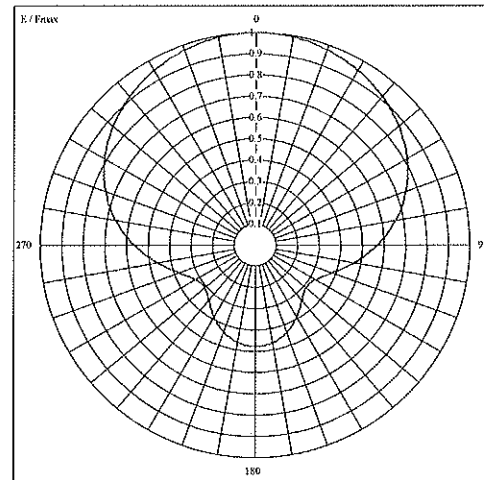
Product Release for the RD Side Mount (SK) Pattern Antenna

This Engineering Technical Bulletin provides electrical and mechanical information for the RD (SK) Pattern Antenna.

Electrical Data

Operational Bandwidth Characteristics

Channel Groupings	(SK) Pattern Bandwidths	VSWR Maximum
14-24	11 Channels	1.10:1
17-36	20 Channels	1.10:1
32-52	20 Channels	1.10:1
46-69	20 Channels	1.10:1



Azimuth Pattern Gain 2.2(3.4 dB)
Sectorial Pattern Coverage

Expected Pattern Variation for the RD Series
Is typically less than $\pm 8\%$ for a 120 MHz bandwidth

Typical Gain Figures:

Antenna Type	Gain Above Dipole (dBd)	Power Gain
4 Bay	10.6	11.5
8 Bay	13.3	21.4
12 Bay	14.7	29.5
16 Bay	15.9	38.9
24 Bay	17.4	55.0
32 Bay	18.6	72.4

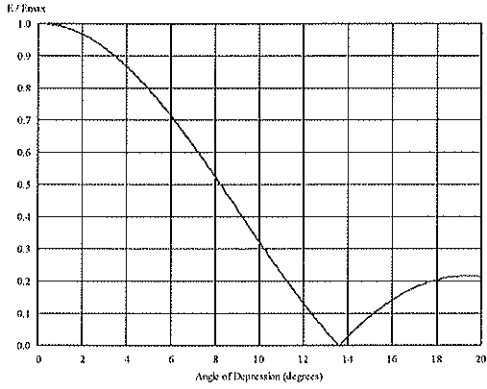
Typical DTV (Ave) Power Ratings:

Ant. Type	Low Power		Medium Power		High Power	
	Max Input Power	Connector Size	Max Input Power	Connector Size	Max Input Power	Connector Size
4 Bay	2 kW	1 5/8" EIA	4 kW	1 5/8" EIA	10 kW	3 1/8" EIA
8 Bay	4 kW	1 5/8" EIA	8 kW	3 1/8" EIA	20 kW	4 1/16"
12 Bay	6 kW	3 1/8" EIA	12 kW	3 1/8" EIA	30 kW	6 1/8" EIA
16 Bay	8 kW	3 1/8" EIA	16 kW	3 1/8" EIA	40 kW	6 1/8" EIA
24 Bay	12 kW	3 1/8" EIA	24 kW	6 1/8" EIA	60 kW	6 1/8" EIA
32 Bay	16 kW	3 1/8" EIA	32 kW	6 1/8" EIA	60 kW	6 1/8" EIA

Note: For NTSC power ratings use 1.414 times DTV power ratings.

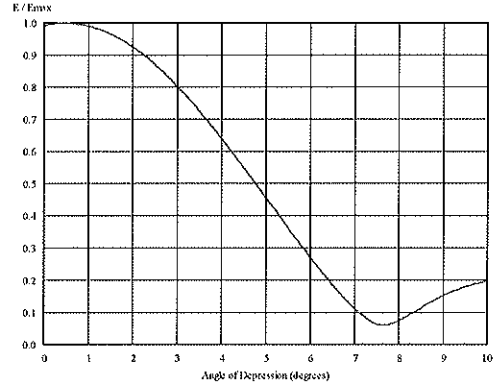
Typical Vertical Patterns:

Vertical Directivity: 5.21 (7.16 dBd)
 Beam tilt (deg) : 0



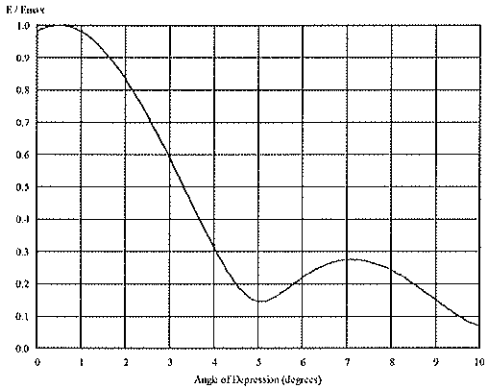
4 Bay

Vertical Directivity: 9.77 (9.90 dBd)
 Beam tilt (deg) : 0.5



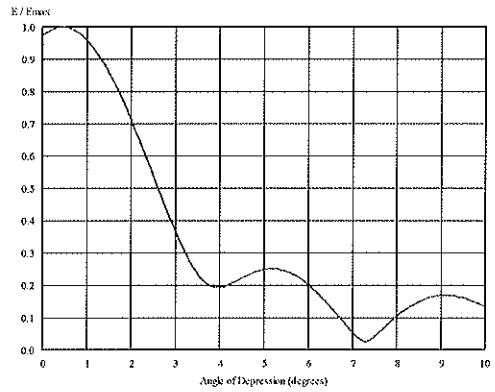
8 Bay

Vertical Directivity: 13.38 (11.27 dBd)
 Beam tilt (deg) : 0.5



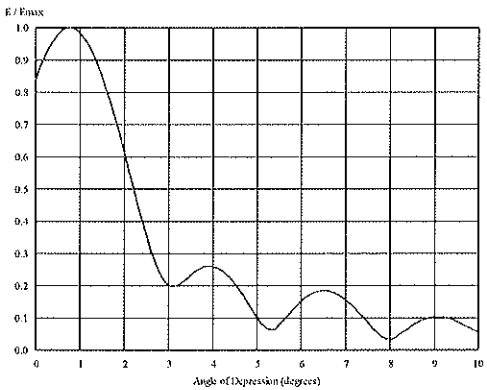
12 Bay

Vertical Directivity: 17.55 (12.44 dBd)
 Beam tilt (deg) : 0.5



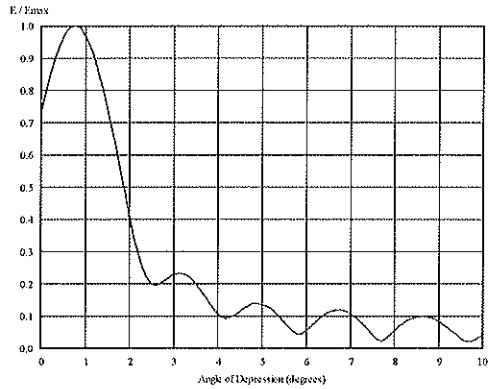
16 Bay

Vertical Directivity: 25.36 (14.04 dBd)
 Beam tilt (deg) : 0.75



24 Bay

Vertical Directivity: 32.90 (15.17 dBd)
 Beam tilt (deg) : 0.75



32 Bay

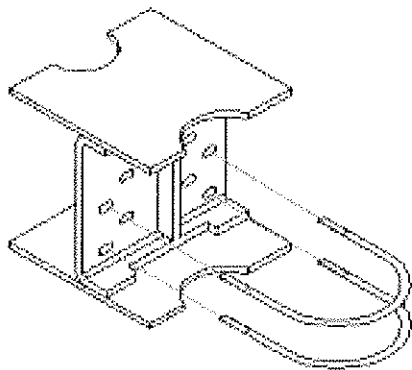
Typical Beam tilts of 0° to 3° are available in 0.25° increments, with 0° Beam tilt on the 4 Bay model and 0.5° on the 8, 12 and 16 Bay models and 0.75° on the 24 and 32 Bay models as standard.

Typical Null Fills of 0% to 30% are also available in 5% increments. Standard Null Fills are indicated in the pattern graphs.

Features of this RD Series:

The RD series is typically supplied in 8 Bay modules except in the 4 Bay configuration. The RD series is equipped with support stanchions and a 3 1/2" IPS support pipe, however the RD Series is also offered without the support pipe for weight reduction if required. The 3 1/2" IPS pipe weighs approximately 9.5 lbs per foot.

Other features with the RD series, it's ease of installation to a variety of tower mounting requirements, for instance the RD antenna can be face or leg mounted. Leg mount and face mount versions can be installed with the use of pipe to pipe adaptors (P/n C-4100-X) and customer supplied steel work.

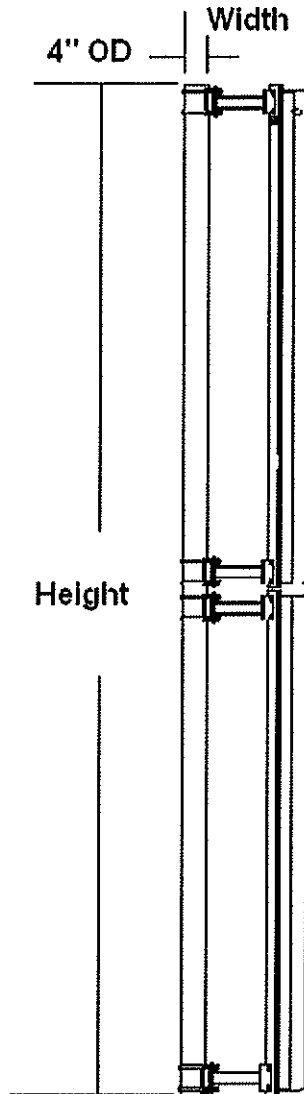


Pipe to Pipe Adaptor

Pipe to pipe adaptors available from 2" to 12 3/4" OD pipe sizes for the 3 1/2" IPS support pipe. Typical Spacing is 60 inches.

Side – Mount Configuration:

8 Bay Module



Channel Groupings	Height	Width
14-24	16.3 ft	27 3/4 in
17-36	14.4 ft	27 3/4 in
32-52	12.6 ft	27 1/4 in
46-69	11.1 ft	27 1/4 in