



RADIO FREQUENCY SYSTEMS

NORTH AMERICA BROADCAST SOLUTIONS

Edition 1 / 4.2019



SLOTTED ARRAY ANTENNAS

RFSTAR™ UHF SLOTTED ARRAY ANTENNAS

SAA Series

The RFStar™ UHF slotted array antennas provide a simple and reliable option for single or dual channel fixed polarization applications. They are fully enclosed in a radome for high performance and reliability. They are available in horizontal, elliptical and circular polarizations. Three types of vertical patterns are available, with varying degrees of null fill. Various azimuth radiation patterns are also available.



* Additional models are available in the RFS portfolio with other numbers of layers – consult the RFS Antenna Analysis and Selection Tool for the complete offering.

- Low wind load
- Horizontal, Elliptical and Circular polarizations
- Wide range of azimuth and elevation patterns and null fill options
- Single channel or Dual channel options available for adjacent channel allocations
- Top mounted and side mounted options available
- Rugged design with enclosed radome for high performance and reliability
- Manufactured in the USA – local staff ready to support your deployments

Model Number	SAA-18G	SAA-18J	SAA-18E	SAA-24G	SAA-24J	SAA-24E	SAA-30G	SAA-30J	SAA-30E
Frequency Range, MHz	470-698								
Number of Layers*	18			24			30		
Elevation Gain, times	17.3	18.4	17.3	22.2	24.7	22.8	28.5	30.4	27.4
Elevation Gain, dBd	12.4	12.7	12.4	13.5	13.9	13.6	14.6	14.8	14.4
Electrical Specifications									
Polarization	Horizontal, Elliptical, Circular								
Number of Channels	Single channel (Dual option)								
VSWR	<1.08:1, (typically < 1.04:1)								
Impedance, Ohms	50 or 75								
Input power max., kW	Up to 86 (depends on pattern, number of bays and input connector size) – Consult the RFS Antenna Analysis and Selection Tool								
Mechanical Specifications									
Input connectors, in	7-3/16, 6-1/8 or 4-1/16								
Mounting	Side or Top mounting								
Color	Aviation Orange or White radome (other colors available on request)								
Pressurization – operational, psi (kPa)	1.4-3.6 (10-25)								
Pressurization – test, psi (kPa)	15 (100)								
Diameter, in (mm) – Top Mounted	21.2 (538)								
Diameter, in (mm) – Side Mounted	15.4 (391)								
	18 Bay		24 Bay		30 Bay				
	Channel 14	Channel 36	Channel 14	Channel 36	Channel 14	Channel 36			
**Height, ft (m)	Top Mounted	41.8 (12.7)	33.2 (10.1)	54.1 (16.5)	42.9 (13.1)	66.5 (20.3)	52.6 (16.0)		
	Side Mounted	43.8 (13.4)	34.8 (10.6)	56.2 (17.1)	44.5 (13.6)	68.5 (20.9)	54.2 (16.5)		
COR from base of antenna, ft (m)	Top Mounted	20.9 (6.4)	16.6 (5.1)	27.1 (8.2)	21.4 (6.5)	33.2 (10.1)	26.3 (8.0)		
	Side Mounted	21.9 (6.7)	17.4 (5.3)	28.1 (8.6)	22.2 (6.8)	34.3(10.4)	27.1 (8.3)		
Weight, lb (kg)	Top Mounted	3695 (1677)	3030 (1375)	7531 (3417)	6059 (2749)	12372 (5614)	7325 (3324)		
	Side Mounted	971 (441)	808 (367)	1195 (542)	983 (446)	1420 (644)	1159 (526)		
Effective area CaAc, ft² (m²)	Top Mounted	44.2 (4.1)	35.2 (3.3)	57.3 (5.3)	45.4 (4.2)	70.4 (6.5)	55.7 (5.2)		
	Side Mounted	33.7 (3.1)	26.8 (2.5)	43.2 (4.0)	34.3 (3.2)	52.8 (4.9)	41.7 (3.9)		

** Does Not Include Lightning Arrestor

BROADBAND AUXILIARY ANTENNAS

WIDEBAND SLOT ANTENNAS

SBB and SBB-EP Series

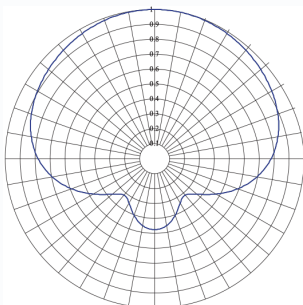
These broadband antennas can be utilized by single or multiple broadcasters for interim or auxiliary usage. They are ideally suited when a high performance antenna is needed, that allows for frequency agility between current and future channel operation. The elliptically polarized SBB-EP enables a very stable elliptical polarization performance with almost constant vertical to horizontal ERP ratio over the full UHF band.

- Full broadband performance 470-698 MHz for future and current channel allocations
- Corrosion resistant construction with cylindrical fiberglass radome
- Extremely low wind loading
- High maximum power rating. Reduced power models available on request
- Supplied with brackets for side mounting
- Very stable elliptical polarization V/H ERP ratio (EP Models)
- Fast delivery due to modular construction

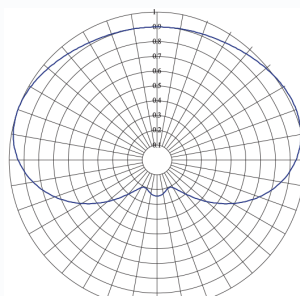


Model Number	SBB-8	SBB-16	SBB-24	SBB-32	SBB-EP-8	SBB-EP-16	SBB-EP-24
Frequency Range, MHz	470-698						
Number of slots	8	16	24	32	8	16	24
Polarization	Horizontal				Right Hand Elliptical		
C170 Pattern							
Azimuth Pattern directivity Hpol (times) (dB)	1.7 (2.3)						
Peak gain Hpol (times) (dBd)	14.7 (11.7)	25.3 (14.0)	38.6 (15.9)	51 (17.1)	16 (12.05)	27 (14.3)	39 (15.9)
Polarization ratio (Vpol ERP/Hpol ERP)	N/A				30%		
S180 Pattern							
Azimuth Pattern directivity Hpol (times) (dB)	1.8 (2.55)						
Peak gain Hpol (times) (dBd)	15.5 (11.9)	26.7 (14.27)	36 (15.6)	54.0 (17.3)	15.5 (11.9)	26.7 (14.27)	36 (15.6)
Elevation Gain, dBd	9.4	11.7	13.6	14.8			
Polarization ratio (Vpol ERP/Hpol ERP)					25%		
Standard Beam Tilt, degrees*	1.5	1.0	0.75	0.75	1.5	1.0	0.75
Effective Area CaAc, ft ² (m ²)	10.8 (1.0)	21.6 (2.0)	32.4 (3.0)	44 (4.0)	10.8 (1.0)	21.6 (2.0)	32.4 (3.0)
Input power Max., kW	20	40	60	60 or 78	19 or 34	40 or 68	60 or 103
Input Connectors, in (EIA)	3-1/8"	6-1/8"	6-1/8"	6-1/8" or 7-3/16"	4-1/16"	6-1/8"	6-1/8" or 8-3/16"
Diameter, in (mm)	15 (381)						
Impedance, Ohms	50			50 or 75	50		50 or 75
VSWR (1.1 on channel)	< 1.15:1	<1.10:1			1.15:1	<1.10:1	
Mounting	Antenna provided with 25" standoff brackets for mounting on poles or tower legs from 4.0" to 6.625" OD						
Antenna height, ft (m)	14.1 (4.3)	28.5 (8.7)	43 (13.1)	58 (17.7)	14.1 (4.3)	28.5 (8.7)	43 (13.1)
Weight, lb (kg)	408 (185)	1036 (470)	1675 (760)	2689 (1220)	551 (250)	1367 (620)	2095 (950)
Radome Color	White - other colors available on request						
Pressurization - Operational, psi (kPa)	1.4-3.6 (10-25)						
Pressurization - Test, psi (kPa)	15 (100)						

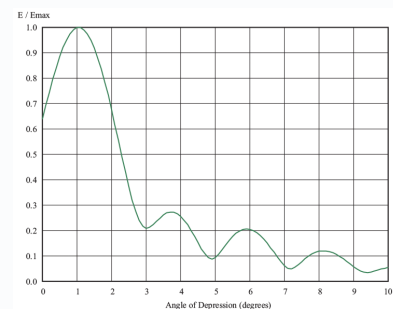
* Other values available upon request



Horizontal Radiation Pattern Skull 180



Horizontal Radiation Pattern Cardioid 170



Elevation Radiation Pattern typical 24 slots

BROADBAND INTERIM ANTENNAS

BROADBAND UHF ANTENNAS

RD Series

These broadband UHF antennas are lightweight in design, yet rugged in approach. They fulfill the critical requirement of using a single UHF antenna for multi-channel DTV broadcasting. Utilizing slot cavity geometry, the antennas are capable of broadband, low VSWR transmission for up to 20 channels. This capability makes it possible for stations to utilize a single antenna for DTV channel allocations and relocation assignments that fall within 20 channels of each other. Cavities are segmented into three overlapping channel groups: CH14-CH31, CH19-CH38 and CH32-CH52

- Multi-channel Operation; Broadband/Low VSWR
- Power Rating up to 120 kW Average
- Light Weight/Low Wind Load
- Single or Dual Input
- Multi-pattern capacity
- Top or Side Mount
- Beam tilt from 0.5 to 1.5 (0.75 Typical)
- Configured in 4, 8, 12, 16, 20, 24, 28 and 32 bays
- Select BU Series for single channel version



Model Number	RD8-470578	RD8-500620	RD8-578704
Frequency Range, MHz	470.0 - 578.0	500.0 - 620.0	578.0 - 704.0
Number of Elements / Bays	8		
Nominal Gain (Mid-band), dBd	A 12.2; B 13.9; G/H 14.7; OM 12.2; SK 13.3		

Model Number	RD16-470578	RD16-500620	RD16-578704
Frequency Range, MHz	470.0 - 578.0	500.0 - 620.0	578.0 - 704.0
Number of Elements / Bays	16		
Nominal Gain (Mid-band), dBd	A 14.7; B 16.4; G/H 17.3; OM 14.8; SK 15.9		

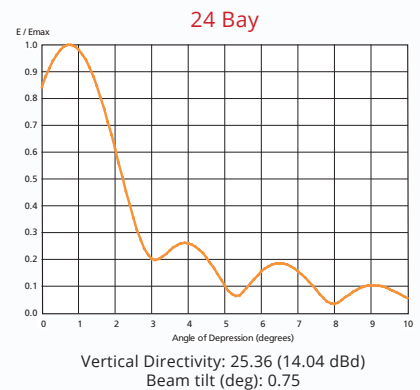
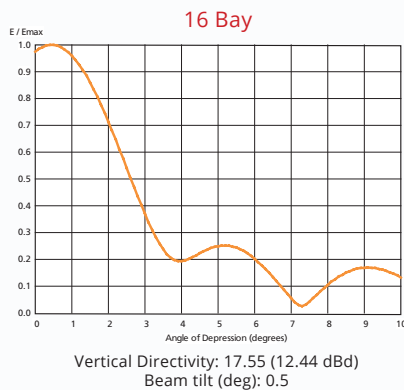
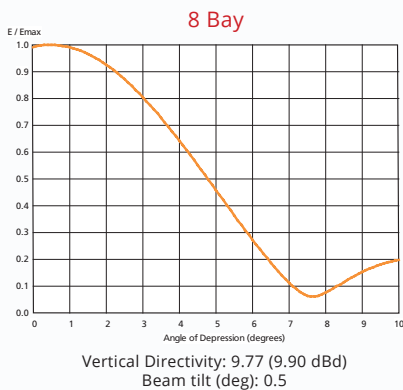
Model Number	RD24-470578	RD24-500620	RD24-578704
Frequency Range, MHz	470.0 - 578.0	500.0 - 620.0	578.0 - 704.0
Number of Elements / Bays	24		
Nominal Gain (Mid-band), dBd	A 16.3; B 18.0; G/H 18.8; OM 16.3; SK 17.4		

SIDE MOUNT CONFIGURATION

RD Series

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

TYPICAL VERTICAL RADIATION PATTERNS



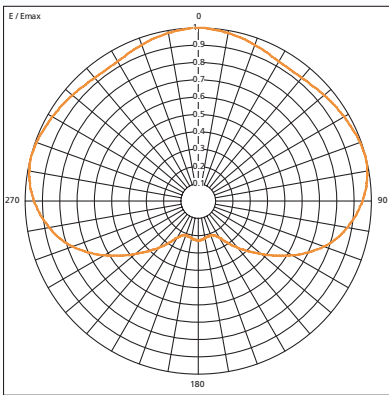
BROADBAND INTERIM **ANTENNAS**

RD SERIES TYPICAL AVERAGE POWER RATINGS

Antenna 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

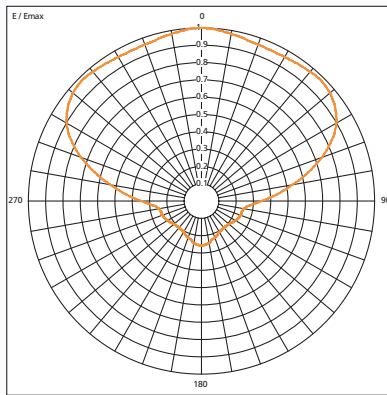
TYPICAL HORIZONTAL RADIATION PATTERNS

A Pattern Antenna



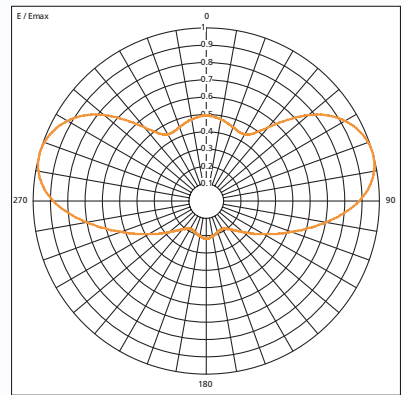
Azimuth Pattern Gain 1.7 (2.3 dB)
Pattern Coverage of 220°

B Pattern Antenna



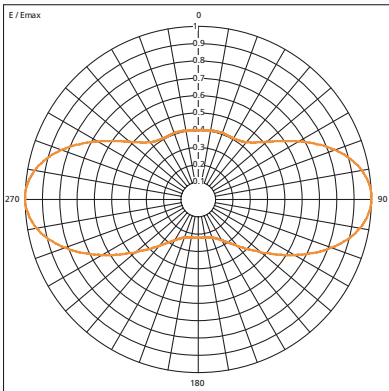
Azimuth Pattern Gain 2.5 (4.0 dB)
Pattern Coverage of 140°

G Pattern Antenna



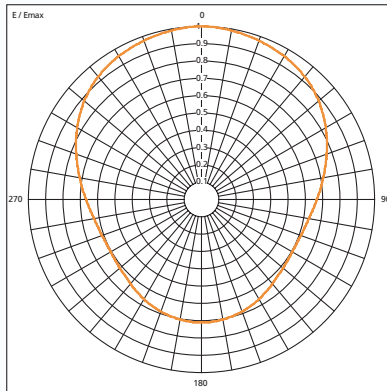
Azimuth Pattern Gain 3.0 (4.8 dB)
Sectorial Pattern Coverage

H Pattern Antenna



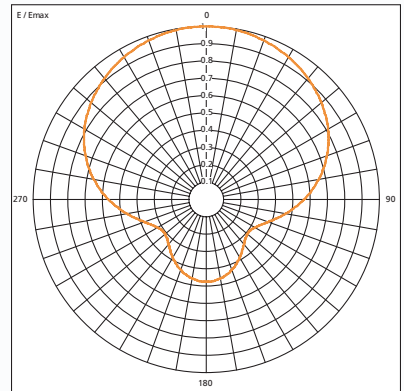
Azimuth Pattern Gain 3.0 (4.8 dB)
Sectorial Pattern Coverage

Side Mount OM Pattern Antenna



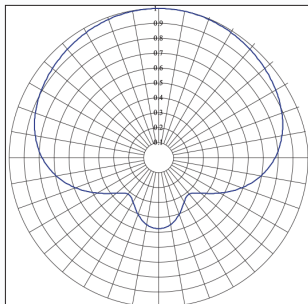
Azimuth Pattern Gain 1.7 (2.3 dB)
Pattern Coverage of 360°

Side Mount SK Pattern Antenna



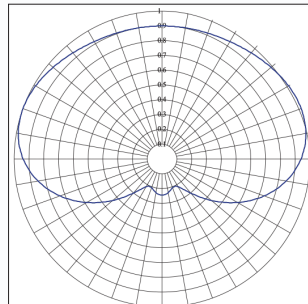
Azimuth Pattern Gain 2.2 (3.4 dB)
Sectorial Pattern Coverage

Side Mount S-180 Pattern



Horizontal Radiation Pattern Skull 180

Side Mount C-170 Pattern



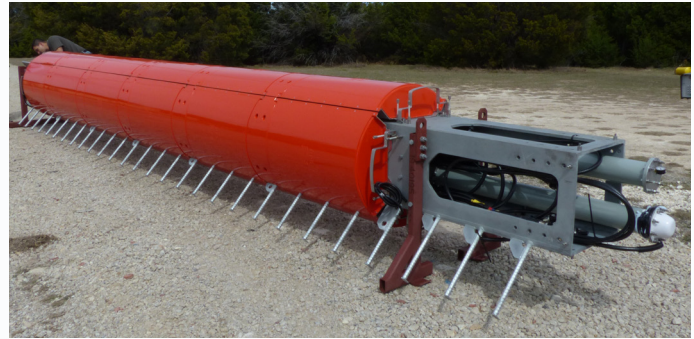
Horizontal Radiation Pattern Cardioid 170

BROADBAND PANEL ANTENNAS

TV PANEL ARRAY (UHF) ANTENNAS

PEP and PEPL Series

RFS' PEP Lite array has similar wind load characteristics to traditional pylon arrays but is both frequency-agile (covering the full UHF array) and polarization-agile, allowing two channels to operate in the array with different polarization ratios. These polarization ratios can also be changed in the future with no change required to the antenna system. These antennas are also suited to MIMO and MISO operation. Both standard and hurricane rated options are available.



- Fully engineered for Digital TV, Mobile TV, MIMO and MISO applications
- Corrosion resistant construction with cylindrical fiberglass radome
- Single/Independent inputs allowing utmost polarisation and pattern flexibility
- Horizontal / Vertical, Circular or Elliptical polarization
- Extremely low wind loading
- Standard and hurricane rated options
- High power rating

Model Series	PEP Series	PEP Lite Series
Frequency Range, MHz	470.0 - 700.0	
Polarization	Horizontal / Vertical / Circular / Elliptical	
Number of Channels	Multi-channel	
VSWR	< 1.1:1	
Input Connector	Dual 6-1/8" / Dual 7-3/16" / Dual 8-3/16"	Dual 6-1/8" EIA / Dual 7-3/16" / Single 8-3/16"
Power Rating, kW	60kW per input / 80kW per input / 120kW per input	
Pressurization Operational, kPa (psi)	10-25 (1.4-3.6)	
Pressurization Test, kPa (psi)	100 (15)	
Color	Red / White radome standard, others available upon request	

Model Number	PEP60E	PEP70E	PEP80E	PEPL48D	PEPL56D	PEPL64D
Number of bays (levels)	12	14	16	12	14	16
Panels per bay	5	5	5	4	4	4
Peak numerical gain Hpol (times)	39.4	45.2	51.9	39.4	45.2	51.9
RMS gain Hpol (dBd)	14.9	15.5	16.1	14.9	15.5	16.1
RMS Numerical gain Hpol (times)	30.5	35.1	40.3	30.5	35.1	40.3
Weight (kg)	6688	7283	8273	5,498	6,400	7,305
Weight (lbs)	14744	16056	18239	12,121	14,112	16,105
Antenna height (m)	14.9	17.2	19.5	14.5	16.8	19.1
Antenna height (ft)	48' 11"	56' 5"	64'	47' 7"	55' 2"	62' 8"
Effective area with infill panels (m ²)	14.6	17.2	19.9	8.5	9.7	11
Effective area with infill panels (ft ²)	157	185	215	91	105	118

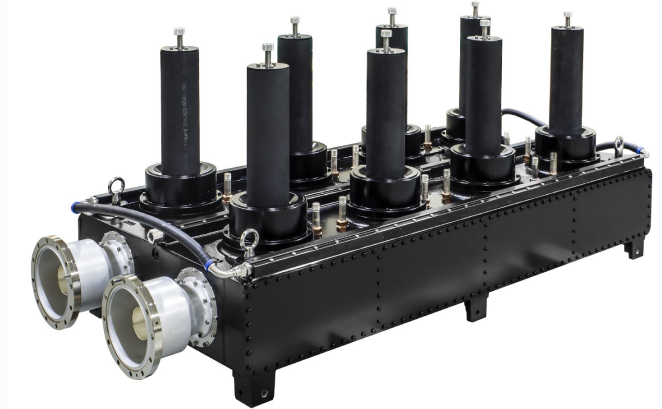
RF MASK FILTERS

PEAKPOWER+™ FILTERS AND COMBINERS

Contact RFS for specific models, up to 60 kW, 120 kW in CIF

The PeakPower+ line of filters and combiners is specifically aimed at safely sustaining the very high peak power of digital television, and represents a major breakthrough in coaxial filter technology. By removing the peak power handling limitations imposed on DTV transmitter filter & combiner systems, they allow broadcast operators to safely run their systems without fear of interruptions. Their compact design saves space, while allowing coaxial connectivity instead of imposing large waveguide needs.

- Handle very high power levels for ATSC 1.0 or ATSC 3.0: up to 60 kW for a single filter, or 120 kW in a Constant Impedance Filter system
- Convection air cooled, forced air cooled or liquid cooled options
- Easily (re)tunable using RFS Broadcast Computer Aided Tuning software
- Allow safe transmission of digital television (DTV) signals – safer handling of system by personnel
- Remove peak power handling limitation – temperature drift compensated
- More transmitters can be combined safely on a single site – safe operation without risk of filter voltage breakdown



BAND IV/V TV WAVEGUIDE FILTERS

12PXXXWE Series

RFS Waveguide UHF filters are now 4th generation products designed for global combining and filtering applications associated with DTV and analog television transmissions.

- Special design for channel 14 operation next to Land Mobile
- Designed for vertical mounting to minimize footprint
- Adjustable 6 to 8MHz bandwidth for global applications
- Designed for high peak voltage DTV signals
- Advanced design and manufacturing techniques for optimum performance
- Customised out-of-band emissions filtering
- No field tuning required.



Model Number	12PXXXWE – IDEAL FOR CHANNEL 14 APPLICATIONS
Frequency Range, MHz	470 - 860
Impedance, ohms	50
Filter Type	12 Pole
Out-of-Band Emissions Mask	FCCsect 53 698-746MHz
Channel Bandwidths, MHz	6
Input Power Rating, kW	10 @ 719MHz
Insertion Loss @fc, dB	< 0.4
Filter Selectivity wrt fc, dB	< 1.7 @ fc ± 2.71MHz; > 35 @ fc ± 3MHz; > 52 @ fc ± 3.1MHz; > 57 @ fc ± 4MHz & ± 9MHz
VSWR Average Across Carriers	< 1.1
Group Delay Variation, ns	< 2400ns ± 2.71MHz
Width, Depth, Height, cm (in)	56, 56, 190 (22, 22, 75)
Weight, kg (lb)	100 (220) @ 719MHz

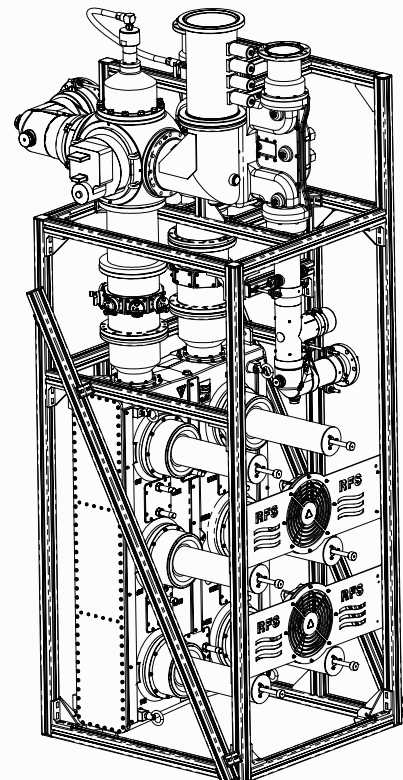
RF SYSTEMS

FOR HIGH AND LOW POWER VHF AND UHF TRANSMITTERS

ATSC 1.0/3.0 VHF/UHF bandpass filters with switching, monitoring and test load are convenient self-contained floor mounted RF Systems designed for mask filtering of digital signals prior to transmission.

- Bandpass and constant impedance filter configurations
- 6-pole and 8-pole models allow for a range of applications
- Field tunable filters using BCAT™ eliminates uncertainty when future channels are unknown
- Superior return loss over +/-3MHz (ATSC)
- Convection air cooled, or forced air or liquid cooled versions for higher power handling
- Lowest insertion losses
- Small footprint for power rating (compact designs)
- RF directional probes for transmitter monitoring
- High power versions: rated to 25, 50, 60, 120 kW – 6-1/8" and 8-3/16" U-link or motorized switching
- Low power versions: rated to 0.6, 1.3, 3, 6, 11, 13 kW – 1-5/8" or 3-1/8" U-link or motorized switching

Contact RFS for more information on RF Systems



RF COMBINER SYSTEMS

UHF TELEVISION COMBINERS

CA and CW Series

These series of constant impedance UHF combiner modules are designed for multichannel DTV applications. These balanced UHF TV combiners are ideal when optimum performance specifications are required. They are very compact for their ratings, as well as temperature stable and suitable for a wide range of applications. Each balanced combiner module consists of two 3dB couplers, separated by bandpass filters, whether they be coaxial or waveguide depends upon the series, where CA is coaxial, and CW waveguide. The narrowband input corresponds to the bandpass resonant frequency, whereas the wideband input can be any other channels in the applicable UHF band. Modules are connected together to provide a multichannel combiner. The order (number of poles) of the filters will determine the channel spacing required for given channels, and also the mask, if any that may be provided.

- Compact design, small footprint
- Modular design with integrated frames
- Rack mountable (wall and ceiling mount for smaller systems)
- Wideband, high performance couplers for plug and play style expandability and flexibility
- Highest power rating for size/class
- Lowest loss for size/class in all sizes
- Temperature stabilized



Model Number	CA4PPXX160E	CA6PPXX160E	CA6PPXX201E	CA8PPXX271E	CA8PPXX325E
Product Type	Band IV/V UHF TV Balanced Combiner				
Frequency Range, MHz	470.0 - 862.0				
Minimum Channel Spacing	Semi-Adjacent	Adjacent			
Narrowband Input Power (maximum), kW	25	7	26	49	110
Output Power (maximum), kW	50	35	80	68	320
Impedance (unbalanced), ohms	50				
Number of Poles	4	6		8	
Filter Type	Cross coupled				
Number of Cross Couplings	2				
Passband, MHz	6 MHz, ATSC 1.0 or ATSC 3.0				

Model Number	CW3P	CW4P	CW6PX	CW7PX	CW8PX
Product Type	Band IV/V (UHF) TV Waveguide Directional Combiner				
Frequency Range, MHz	470.0-756.0 / 548.0-862.0				
Minimum Channel Spacing	3	2	Adjacent		
Narrowband Input Power (maximum), kW	21-100		14-70		
Input / Output Power Comments	Input and output power ratings are dependent on system used				
Output Power (maximum), kW	240.0 Ave				
Impedance (unbalanced), ohms	50				
Filter Type	Directional waveguide		Directional cross coupled waveguide		
Narrowband Input Connector	Up to 6-1/8" EIA (Input and output connectors can be varied - Contact RFS)				
Operating Temperature Range, °C (°F)	to 40.0 (32.0 to 104.0)				
Weight, kg (lb)	100.0 (220.0)	120.0 (264.0)	170.0 (375.0)	195.0 (429.0)	220.0 (485.0)

RF CABLES

HELIFLEX® AIR-DIELECTRIC COAXIAL CABLE

HCA Series

RFS transmission line products are made from premium materials and offer low attenuation and high power rating to ensure superior performance of your transmission system or network. Pair with our connectors, trimming tools, lifting stockings and grounding kits to simplify installation for a total RFS solution. RFS's leadership in the industry has never been in contention. Since 1900, our people have developed transmission line products for every conceivable RF purpose. Founded in Hannover, Germany, RFS is the original manufacturer of electric cable and famed for the insulation technique patented by Louis Hackethal in 1901. Our corrugated coaxial cable, developed in the 1950s, broke new ground for broadcast.



- Highest power, lowest loss for products of equivalent size from any competitor
- Each cable run is tested. The jacket shows sequential marking for length, product code and production tracer code.
- Superior performing terminations
- Custom lengths and interfaces
- Full range of accessories

Model Number	HCA158-50J	HCA214-50J	HCA300-50J	HCA400-50J	HCA495-50J	HCA550-50J	HCA618-50J	HCA800-50J
Size	1-5/8"	2-1/4"	3"	4"	5"	5-1/2"	6-1/8"	8"
Fire Performance	Halogene Free							
Return Loss (VSWR)	Standard							
Jacket Option	Black							
Temperature & Power	Standard							
Inner Conductor Material	Corrugated Copper Tube							
Dielectric Material	Helical Polyethylene Spacer							
Outer Conductor Material	Corrugated Copper							
Jacket Material	Polyethylene, PE							
Recommended / Maximum Clamp Spacing, m (ft)	0.8/1.2 (2.75/4.0)	0.8/1.0 (2.75/3.25)	0.8/1.2 (2.75/4.0)		1.0/2.0 (3.3/6.6)	1.0 / 2.0 (3.3 / 6.6)		
Impedance, Ohm	50 +/- 0.5							
Maximum Frequency, GHz	3	2.3	1.63	1.66	1	0.86		0.65
Velocity, percent	95		96		97	96	97	
Peak Power Rating, kW	270	425	640	940	1560	2250	2890	4000
RF Peak Voltage, Volts	5200	6500	8000	9700	12500	15000	17000	20000
Jacket Spark, Volt RMS	8000							
Max. Return Loss, dB (VSWR)	Typical 20.8dB (1.2 VSWR) or better within the operation bands of most global frequency ranges. Premium also available. Contact factory for options in your specific frequency band.							
Install. Temperature, °C(°F)	-40.0 to 60.0 (-40.0 to 140.0)							
Storage Temperature, °C (°F)	-70.0 to 85.0 (-94.0 to 185.0)							
Operation Temperature, °C(°F)	-50.0 to 85.0 (-58.0 to 185.0)							
Phase Stabilized	Phase stabilized and phase matched cables and assemblies are available upon request.							
Flame Retardant Jacket Specs	Meets the requirements according to: IEC60754-1, IEC60754-2							
Applications	UHF, VHF, Broadcast; intended for outdoor usage		TV, Broadcast					

RF CONNECTORS

HELIFLEX® CONNECTOR SERIES

HCA Series

RFS' line of high performance HELIFLEX coaxial cable connectors are characterized by excellent gas tightness and extremely low losses. HELIFLEX connectors can be installed with basic hand tools, but the use of dedicated installation tools further facilitates ease of assembly and improves performance. RFS connectors are fully tested for mechanical and electrical compliance specifications. HELIFLEX premium connectors have excellent electrical values and provide outstanding performance for the most demanding applications. The RFS connector design provides maximum sealing integrity and gas tightness.



- Lightweight
- Excellent gas tightness – overpressure for increased voltage handling is maintained throughout the system
- Robust mechanical design, superior and consistent performance guarantees outstanding system characteristics
- Extremely low reflection factor, outstanding low reflection factor improves overall system performance and margin and reduces mismatch losses
- Totally waterproof according to IP 66 / 68 assuring safe, long term operation in the harshest of environments

Model Number	78EIA-HCA78-009KT	158EIA-HCA158-009KT	318EIA-HCA295-009KT	318EIA-HCA400-009KT
Flange Type	7/8"EIA	1-5/8"EIA	3-1/8"EIA	3-1/8"EIA
Gender	Male			
Cable Type	HCA78	HCA158	HCA295	HCA400
Impedance (ohms)	50			
VSWR	0 - 1GHz 1.02 1-2.3GHz 1.03 2.3 - 3.0GHz 1.06	0 - 1GHz 1.02 1-2.7GHz 1.06	0 - 860MHz 1.02 860-1500MHz 1.05	0 - 860MHz 1.02 860-1500MHz 1.05
Average Power (kW) @ 665MHz *	2.5	5.6	13.8	18.6
Working Voltage @ sea level (kV) *	2.5	4.7	7.6	9.5

Model Number	412IEC-HCA495-009KT	618EIA-HCA550-009KT	618EIA-HCA618-009KT
Flange Type	4-1/2"IEC	6-1/8"EIA	6-1/8"EIA
Gender	Male		
Cable Type	HCA495	HCA550	HCA618
Impedance (ohms)	50		
VSWR	0 - 860MHz 1.02 860-1000MHz 1.04	0 - 860MHz 1.02	0 - 860MHz 1.02
Average Power (kW) @ 665MHz *	31.6	50	65
Working Voltage @ sea level (kV) *	12.6	15	17

* Power and voltage ratings are determined by both the connector and cable to be attached to.

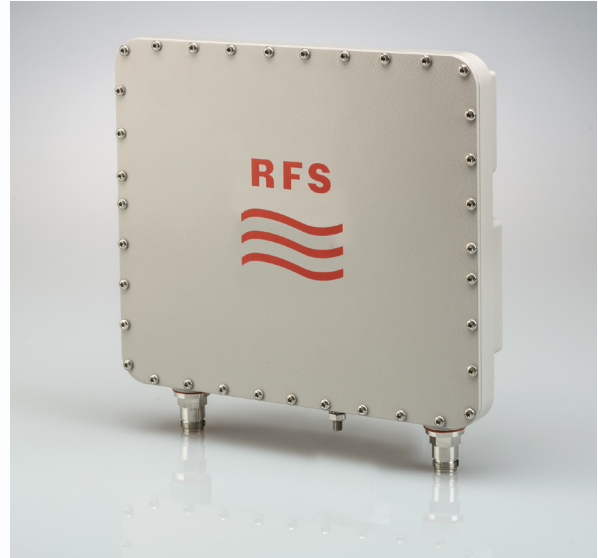
BAS INTERFERENCE FILTER

BROADCAST AUXILIARY MICROWAVE SERVICE (BAMS) MITIGATION FILTER

FIM2155A40SN-1C

This Interference Mitigation Filter is placed in a BAS system to protect it from adjacent 2.1 GHz emissions. It rejects AWS-1 A,B, and C Blocks, while passing all broadcast channels 1 through 10. Typical downlink insertion loss is just 0.3 dB. It is easy to install and meets IP67 requirements for ingress protection.

- Low insertion loss - minimizes impact on BAS signal strength
- Rugged fully enclosed aluminum enclosure - withstand long term effect of harsh environment
- Easy installation; rack mount and/or pole/wall mount with included hardware
- Rack mount: 2U 19 inch



Technical Specification	Unit	
Frequency Range	MHz	Channel 1-7: 2025 - 2109.5 and Channel 8-10: 2448 - 2502
Insertion Loss	dB	Channel 1-7: 0.3 dB typical. (2.0 dB max), Channels 8-10 0.25 dB max
Return Loss	dB	22 dB typical, 18 dB min
Stopband Rejection, min.	dB	40
Continuous Average Power	W	200
Peak Envelope Power	kW	1000
Rejection Band	MHz	2110.5 - 2200
Impedance	Ohms	50
DC/AISG Pass		Not Supported
Connectors - Input		N-Female
Connectors - Output		N-Female
Height	mm (in)	62 (2.47)
Width	mm (in)	247 (9.76)
Depth	mm (in)	216 (8.50)
Mounting		Rack, Pole, and Wall Mount Options Available
Housing		Aluminum
Weight	kg (lb)	5 (11)
Temperature Range	°C (°F)	-40 to 65 (-40 to 149)
Humidity	%	May-95
MTBF	hrs	>=500,000
Lightning Protection		IEC61000-4-5 Level 4 / IEC61312-4 (10kA), 8/20mS pulse
Ingress Protection (Mated)		IP67
RoHS		Compliant

VARIABLE POLARIZATION TECHNOLOGY

BACKGROUND

The North American model for broadcasting had traditionally been one in which individual stations own their own tower, transmitter and antenna. A recent trend has been the use of shared sites and shared antennas, allowing broadcasters to reduce infrastructure and operational costs.

Another recent trend has been the move away from horizontally polarized antennas to elliptically polarized antennas, to improve both coverage and in-building penetration. Additional benefits arise when elliptically polarized antennas are used with ATSC3.0. When replacing an antenna due to the current FCC re-pack, many stations are adopting “future proof” elliptically polarized replacement antennas in preparation for ATSC3.0.

VARIABLE POLARIZATION TECHNOLOGY

When defining an elliptically polarized antenna, it is necessary to decide the amount of effective radiated power (ERP) to radiate in the vertical polarization component relative to the ERP radiated in the horizontal component of polarization. For example, a broadcaster may elect to transmit 1000kW in the horizontal component and 500kW in the vertical. Another broadcaster may elect to radiate 1000kW in the horizontal and 200kW in the vertical. A third broadcaster may elect to have no radiation in the vertical component (Horizontal only polarization). In a shared antenna, this would cause a dilemma, since traditional antennas have the ratio of vertical to horizontal polarization hard wired into the antenna design and must therefore be the same for all broadcasters sharing the antenna.

To overcome this problem and to leverage technology to enjoy the greatest benefit for both today and tomorrow, RFS uses a technology known as “Variable Polarization Technology” (VPT). The same technology is sometimes referred to as “Adaptive Polarization Technology (APT)”, “Dynamic Polarization” or “Adjustable Elliptical Polarization” in the broadcast industry.

US patent US8494465 granted by the USPO in the name of Nokia (which is the ultimate parent company of RFS) covers all of the implementations mentioned above and further described below. A number of RFS Variable Polarization Technology shared antenna systems have now been deployed globally. Probably the highest

profile VPT systems being the ones deployed at the 1 World Trade Center in Manhattan.

HOW IS VPT ACHIEVED?

Variable Polarization Technology utilizes dual input antenna systems in which the polarization ratio can be changed by either changing the relative phase of the signals applied to each input, or the relative amplitude of the signals applied to each input, depending on the antenna topology selected. The adjustable phase method is most commonly adopted.

In a multi-user VPT system dual channel combiners are incorporated into the system. Each broadcaster can set the relative phase between the inputs at either the channel combiner inputs, or at the low level outputs of the transmitter exciters prior to the high power PA's. Figures 1 and 2 illustrate two of the methods described in patent US8494465.

CONCLUSION

Today the broadcasting environment is extremely competitive. Not only is there competition between peers but competition with other delivery methods (cable, satellite, cellular networks). The latest broadcasting standards will support the delivery of high definition signals to fixed receivers as well as robust delivery to portable receivers - enabling new business models. This can be a game changer for the broadcaster, particularly if coupled with a flexible and future proof antenna system platform that can capitalize on the advanced standards. The patented Variable Polarization Technology provides this future proof technology today. With so many unknowns in the market, why not upgrade your system today with one that is truly future proof - one that allows for future changes in polarization ratios as the business models change.

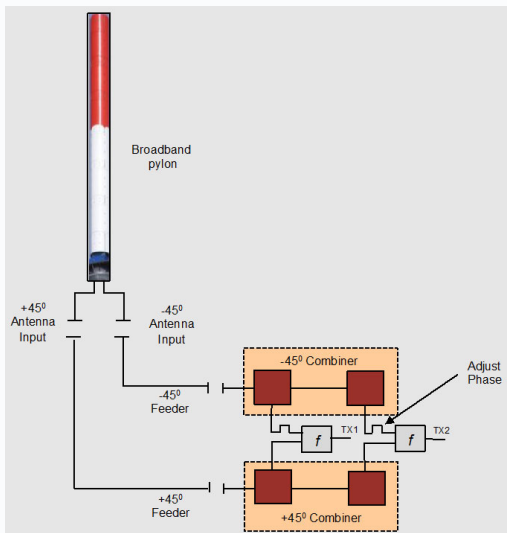
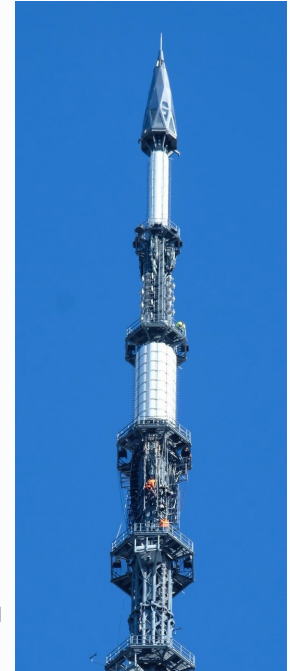


Figure 1: A two channel VPT system with phase adjustment at the channel combiner.

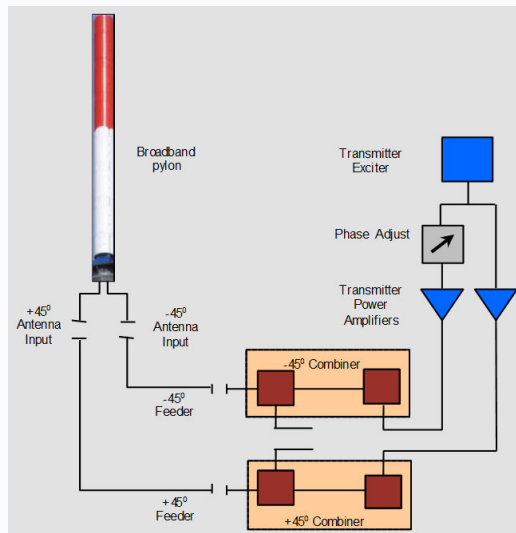
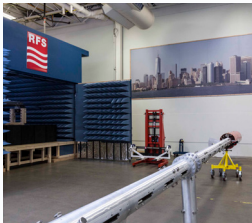


Figure 2: A two channel VPT system with phase adjustment at the transmitter.

SUPPORTING BROADCASTERS

THE SPECTRUM REPACK

RFS is committed to developing cutting-edge, cost-effective broadcast solutions designed to outlast other systems while never compromising on performance. We anticipate the evolving technology needs of our partners creating greater connectivity within the markets we serve and representing one simple force – the design, manufacture and deployment of RF technology, systems and services.



RFS has advanced RF simulation and modeling to the point where antennas can be fully built using design simulation software so that the manufactured product will not require any additional tuning.



Pioneering significant advancements for RF broadcast antennas, filters and combiners has greatly reduced lead time, increasing the factory's capacity to produce more antennas in a shorter time.



RFS' USA-based state-of-the-art manufacturing facility with more than 350,000 sq. ft. is located in Meriden, CT. It contains near and far field test ranges and abundant covered storage areas.



From design to manufacture, ISO 9001 and ISO 14001 certification standards and LEAN manufacturing methods encompass all aspects of RFS' business worldwide.

ON TOP OF THE WORLD

RFS has spent several years working closely with The Durst Organization, Myat and individual broadcasters on UHF and VHF antenna installations for One WTC – the tallest building in the Western Hemisphere – which will deliver terrestrial television services to the entire NYC coverage area. The new infrastructure atop the iconic venue incorporates RFS' Variable Polarization Technology (VPT), providing broadcasters with the flexibility to define their own polarization ratio. The official start of relocation of live broadcasting to One World Trade Center (One WTC) in New York City began on 23 June 2017. WNJU CH36 is the first television channel to transition broadcast operations to the new future-proof antenna deployment at One WTC, which is comprised of RFS' UHF PEP40E antenna, combiner and RF switch frame.

**READY FOR
THE REPACK**



In 2016, RFS expanded its U.S. broadcast manufacturing operations, allowing the company to better support broadcasters as they prepare for the U.S. spectrum repacking program. RFS offers a full suite of broadcast products that are frequency

agile, polarization agile and future proof, including its SBB series of wideband slot antennas and PEP Lite antennas. They provide low wind-load and allow operation on any channel within the full UHF band. RFS' new RFStar™ UHF slotted array antennas

provide a simple, reliable option for single or dual channel fixed polarization applications. Worried about missing a repack deadline? RFS has the RF products, technical expertise and increased capacity to support you every step of the way.

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