Dielectric®

Radio Antennas and Broadcast Components

Engineering Excellence since 1942

Products contained in this catalog may be covered by one or more of the following patents:

6,917,264; 6,887,093; 6,882,224; 6,870,443; 6,867,743; 6,816,040; 6,703,984; 6,703,911; 6,677,916; 6,650,300; 6,650,209; 6,617,940; 6,538,529; 6,373,444; 6,320,555; 5,999,145; 5,861,858; 5,455,548; 5,418,545; 5,401,173; 5,167,510; 4,988,961; 4,951,013; 4,899,165; 4,723,307; 4,654,962; 4,602,227; 7,084,822; 7,081,860; 7,061,441; 7,034,545; 7,012,574; 6,972,731; 6,972,648; 6,961,027; 6,914,579; 6,441,796; 7,102,589;

Additonal patents are pending.

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*HD Radio™ is a trademark of iBiquity Digital Corporation.

Specifications are subject to change without notice.

Leading the broadcast industry since 1942

Dielectric is a world leader in the engineering, design, and manufacture of complete broadcast systems for TV, FM, HF and MF. Our strength is in the development of custom solutions that fit our customer's unique requirements.

Single source of responsibility for your FM system

We manufacture a full complement of products, including a variety of proprietary offerings, from the transmitter output to the tower top including antennas, filter/combiner systems, and switches. Products unique to the Dielectric product line include digiTLine™, EHTLine™, and HDR Series antennas. Our service offerings include system monitoring, tower mapping, modifications and complete installation and maintenance services. If needed, we have the resources to respond to your emergency situation.

Digital Radio

More digital television broadcasters have chosen Dielectric brand products than all other manufacturers combined. We are applying our expertise in digital television technology to the unique needs of the FM broadcaster. We continue to develop innovative solutions for FM broadcasters as they transition to digital.

Whether your needs are for a digital, analog or combined antenna, filter, combiner, or complete system including installation and monitoring services, Dielectric would like the opportunity to offer you solutions engineered to meet your specific needs.

All Dielectric FM antenna and filter products are compatible with passing the HD signal.

Guaranteed quality and reliability

Dielectric is so confident in our products' performance that we offer the best warranty in the business, covering everything from the transmitter output through the switches, filters, combiner, transmission line, and antenna.

Unique RF products for better broadcast quality

We offer combiner systems that have better frequency response, lower insertion loss, and lower group delay variation than that of other manufacturers. For the broadcaster, this means a clearer signal now and digital capabilities later. Dielectric also manufactures advanced antennas with variable bay spacing for better control of elevation and azimuth patterns.

HDR Series Interleaved FM Array[1]

- Interleaved analog/HD Radio array for simultaneous transmission of both signals
- Efficient — no additional analog or digital system losses requiring higher TPO
- Ability to interleave within existing antenna

- High isolation requiring minimal supplemental filtering
- Transmitter operating cost reduced through efficient design
- Consistent azimuth and elevation patterns for both analog and digital
- Separate inputs allow redundancy for emergency operations
- Flexibility in radiator type and feed system design
- Common aperture — only 5'-7' (1.52 - 2.13m) of additional tower space required
- Designed for -10dB IBOC signals
- Uses 33% less energy than common amplification

When considering cost, efficiency, and coverage concerns as well as tower space availability, many FM broadcasters will choose to interleave their digital antenna with either a new or existing analog antenna. Dielectric HDR Series antenna solutions provide extensive flexibility while maintaining high isolation between the digital and analog system.

Two complete circularly polarized antenna arrays are interleaved at half wavelength intervals on a supporting structure. Each antenna array is typically comprised of the same number of elements, and is fed by a separate transmission line connected to the appropriate transmitter. By interleaving the digital left hand-polarized bays with the analog right hand polarized bays, coupling between the antenna systems is greatly reduced. No circulator required!

Since both antennas will have the same tower geometry adjacent to them, the azimuth and elevation patterns of both systems will be the same and will meet FCC and predicted pattern requirements.

The HDR Series arrays are very cost effective. The cost of the antenna, second run of low power transmission line and low power circulator is substantially less than the system cost of a 10 dB coupler and a transmitter large enough to compensate for additional system losses. *Also, the associated operating costs are substantially reduced (as much as 10% for analog and as much as 90% for digital) due to the efficiency of the HDR Series array.*

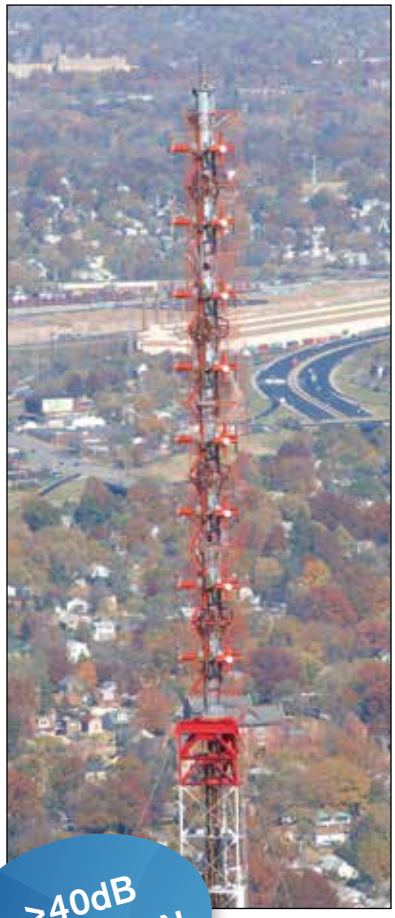
The HDR Series antenna is available in HDR-H, HDR-C and HDR-M versions depending on specific requirements.

The Dielectric concept is flexible. Interleaving can be applied to any of Dielectric's side mounted circularly polarized antenna elements combined with any mixture of feed designs.

[1]Patents: 6,972,731; 6,914,579; 7,102,589

HDFMVee

- Full 20 MHz bandwidth
- Power ratings up to 10 class C stations
- Stainless steel element for excellent reliability
- Designed for -10dB IBOC signals
- Antenna isolation >40dB for analog and IBOC
- Single or dual EIA inputs
- Element radome standard
- Low downward radiation
- Omni-directional free space pattern performance
- Ideal for space combining analog and digital signals



The HDFMVee antenna offers ideal characteristics to FM stations desiring the advantages of top mounting and combined station operation. This antenna is designed for digital, analog, or both types of service. When operating in dual mode (IBOC/analog) this antenna is designed for space combining with superior antenna isolation.

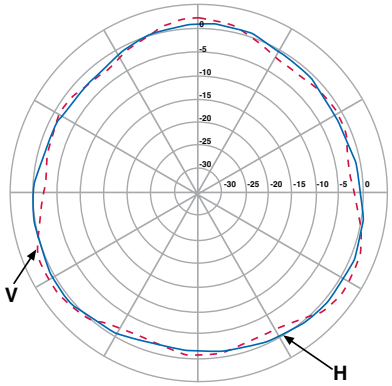
Multi-station FM operation where two or more stations share the same antenna has increased in popularity due to the inherent cost savings that can be realized. Multi-station operation with excellent pattern circularity can be achieved with the wide bandwidth characteristics the HDFMVee antenna offers. These characteristics are achieved through the use of broadband radiating elements in conjunction with high power element hybrids.

The unique design of the HDFMVee antenna offers precise control of the elevation pattern, which is critical in mobile receiver reception. Beam tilt and null fill may be provided by means of standard phase and power distribution techniques.

The HDFMVee antenna is designed for high power operation enabling station flexibility in transmission system design. Our conservative power rating ensures adequate design headroom for long-term reliability. The Dielectric HDFMVee antenna can be configured with one or two input ports for analog and digital. This feature allows the top and bottom four bays of a typical eight bay antenna to be fed by two independent transmission lines. Should standby operation be necessary, one half of the eight bay antenna may be used at reduced power.

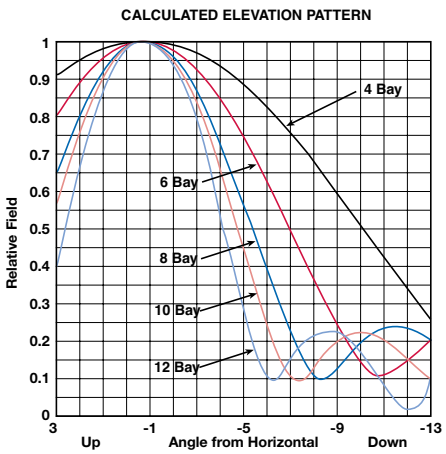
The Dielectric HDFMVee antenna will meet the specific requirements of FM broadcasters worldwide. Your Dielectric representative can provide you with additional information for your review and consideration.

Measured Relative Field

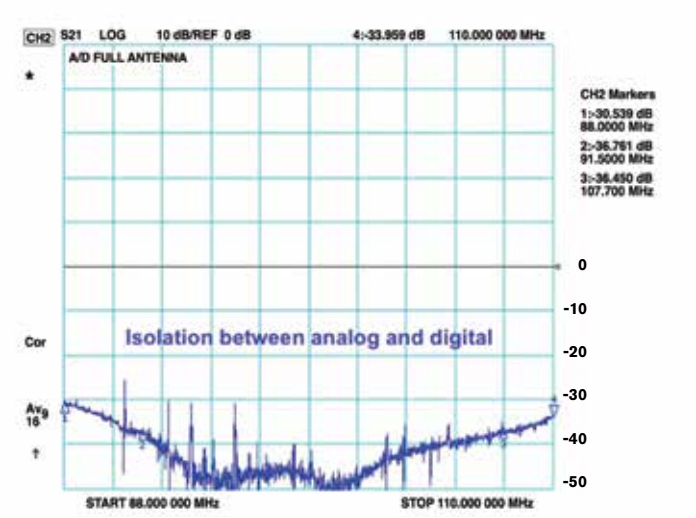


FMVee-03FM

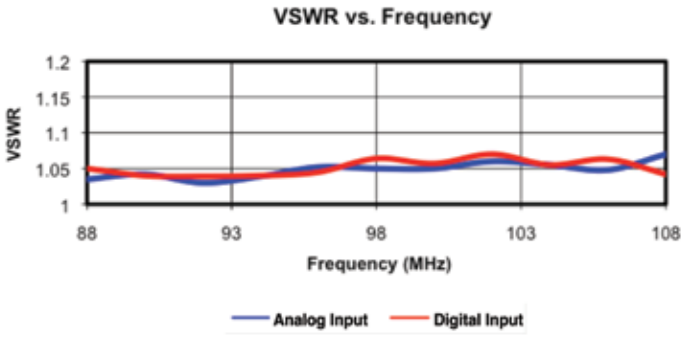
CALCULATED ELEVATION PATTERN



HDFMVee



Field measured isolation >30dB without the use of a circulator



Electrical Specifications

Antenna Type	# of bays	Gain Polarization[1] Power Gain	dB	Power Rating kW[3]
HDFMVee-03-2FM/6U-1	2	0.90	-0.46	125
HDFMVee-03-4FM/12U-1	4	1.80	2.56	135
HDFMVee-03-6FM/18U-1	6	2.70	4.31	185
HDFMVee-03-8FM/24U-1	8	3.70	5.68	185
HDFMVee-03-10FM/30U-1	10	4.60	6.63	185
HDFMVee-03-12FM/36U-1	12	5.60	7.48	250

Notes:

1. RMS gain data is given relative to dipole. Values given are for each polarization and nominal for mid band and include standard harness configurations. Gain will vary depending on feed system, frequency, null fill and beam tilt.
2. Null fill 10% is standard for 4 bays or greater. Beam tilt .75 degrees assumed. Other values of tilt and fill are available upon request.
3. Power ratings are nominal @ 40˚C (104˚F) and assume pressurization with dry air or nitrogen to 5 psi minimum. Power ratings may vary dependent on specific feed system design, and local conditions.
4. Higher power ratings and dual inputs are available on request.
5. Antenna components and feed harnesses are optimized for FM channels of interest.
6. Typical circularity ±1.5dB

Mechanical Specifications

Antenna Type	# of bays	Weight lbs (kg)	Windload lbs (kg)	Projected Area ft² (m²)
HDFMVee-03-2FM/6U-1	2	6,500 (2,958)	4,600 (2,093)	92 (8.5)
HDFMVee-03-4FM/12U-1	4	12,500 (5,688)	9,200 (4,186)	184 (17.1)
HDFMVee-03-6FM/18U-1	6	19,000 (8,645)	13,800 (6,279)	276 (25.6)
HDFMVee-03-8FM/24U-1	8	26,000 (11,830)	18,400 (8,372)	368 (34.2)
HDFMVee-03-10FM/30U-1	10	— Contact factory —		
HDFMVee-03-12FM/36U-1	12	— Contact factory —		

Notes:

1. FMVee antennas must be pressurized with dry air or nitrogen.
2. Loads provided assume 50/33 PSF, no ice.
3. Length includes standard 4 ft. (1.22m) lightning rods.
4. Windloads will vary depending on design wind speed and conditions at installation location.
5. Area calculated expressed in terms of equivalent flats (RS-222-C-standard).
6. Windload force calculated based on 50 pounds per square foot (50psf) on flats (RS-222-C-standard).
7. To convert area to equivalent rounds, multiply area by 1.5.
8. To convert area to Aerodynamic area (CaAa - linear or CaAc - discrete) based on EIA-222-F standard, multiply area by 1.8.
9. Contact your Dielectric sales manager for information on special cases.

HDFDM

- Very low aerodynamic area
- Ideal for candelabra applications
- High power ratings
- In dual mode, IBOC injected by high level combining or common amplification
- Galvanized steel, brass and copper construction for excellent reliability
- Low downward radiation
- Near perfect omni-directional pattern performance
- 10 MHz bandwidth
- Designed for -10dB IBOC signals

The HDFDM is legendary for its reliability and proven performance. The HDFDM antenna offers ideal characteristics to FM stations desiring the advantages of top mounting and combined station operation and is designed for digital, analog, or both types of service.

The Dielectric HDFDM radiator consists of a patented truncated helix dipole radiator fed in phase and mounted three around on a structural pole mast. The vertical stubs on each element cancel the effect of the vertical pole support structure and help shape the element patterns for a near perfect omnidirectional azimuth pattern. Each layer of dipoles is specifically tuned and patterns are optimized in conjunction with the supporting pole.

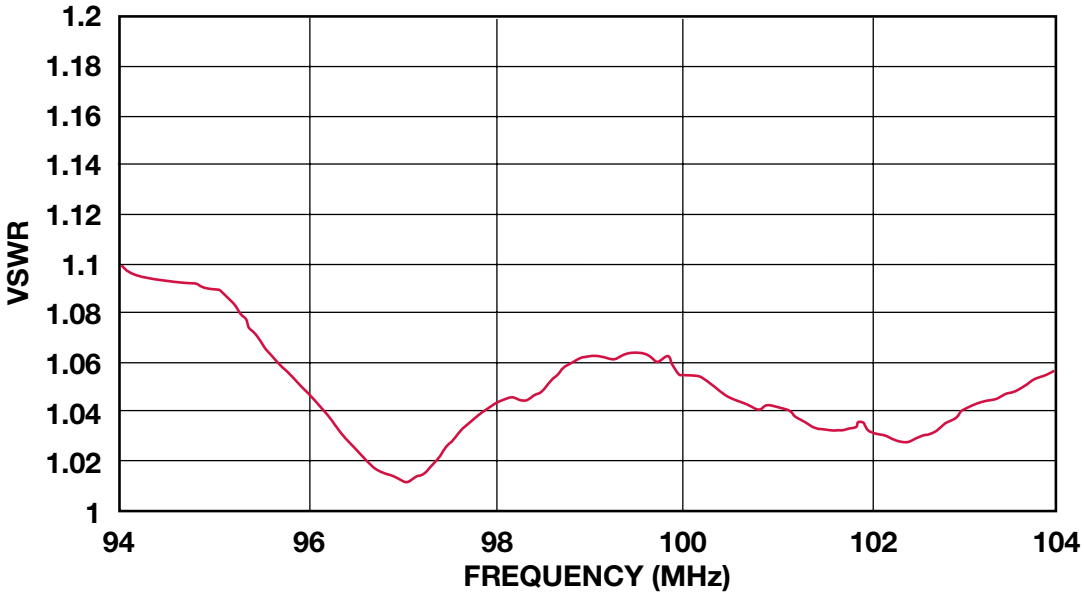
The HDFDM dipole element is supported off a mounting pole, which also serves as a mounting for the balun assembly. This results in an aerodynamic design that significantly reduces weight and windload requirements of the supporting structure. This often represents substantial savings in support structure cost compared with panel style designs. The HDFDM also has very low radar cross-sectional area, which makes it the antenna of choice for candelabra installations because it has a minimal effect on other antennas mounted on adjacent corners of the tower at the same height.

Multi-station FM operation where two or more stations share the same antenna has increased in popularity due to the inherent cost savings that can be realized. Multi-station operation with excellent pattern circularity can be achieved with the wide bandwidth characteristics the HDFDM antenna offers. These characteristics are achieved through the use of broadband radiating elements. The HDFDM is recommended for applications of up to 10 MHz in bandwidth. For greater bandwith requirements refer to Dielectric's HDFMVee and HDCBR antennas or consult Dielectric with your specific needs.

For omnidirectional operation, the shape of the HDFDM's azimuth pattern will vary from omni by as little as +/-1.5 dB for top mount configurations putting it a step ahead of panel type antennas. The unique design of the HDFDM antenna offers precise control of the elevation pattern, which is critical in mobile receiver reception. Beam tilt and null fill may be provided by means of standard phase and power distribution techniques. Consult Dielectric for specific applications.

The HDFDM antenna is designed for high power operation enabling station flexibility in transmission system design. Our conservative power rating ensures adequate design headroom for long-term reliability. The Dielectric HDFDM antenna can be configured with one or two input ports. This feature allows the top and bottom portions of a typical five or seven bay antenna to be fed by two independent transmission lines. Should standby operation be necessary, one half of the antenna may be used at reduced power.

HDFDM



Electrical Specifications

Antenna Type	Gain Polarization spacing[1] Power Gain*	dB	Power Rating kW[3]
HDFDM-5A	2.20	3.42	70
HDFDM-7A	3.00	4.77	70

Notes:
Please contact an Dielectric representative for high power ratings.

HDFDM

FM panel antennas are generally utilized in a number of specific situations:
- To achieve better azimuth patterns on larger towers than typical side-mounted element arrays can provide.
- High power and/or very directional applications
- Multi-station or shared facilities.

All antennas are designed specific to the particular needs of the station(s) and to tower limitations. Dielectric will assist the station or consultant in choosing the proper design and configuration to achieve project goals.

All panel antennas contain elements that are DC grounded for lightning protection.

Mechanical Specifications

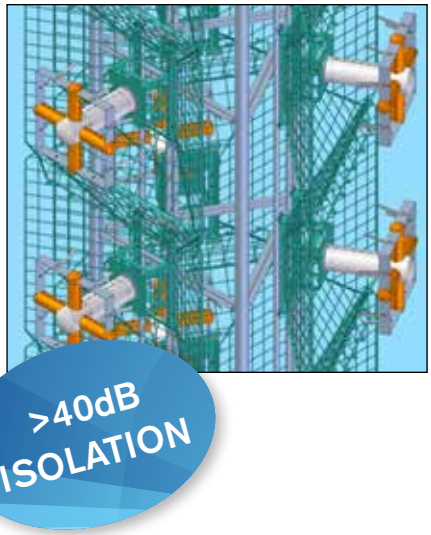
Antenna Type	# of bays	Weight lbs (kg)	Windload lbs (kg)	Projected Area ft² (m²)
HDFDM-5A	5	6,200 (2,812)	3,000 (1,360)	60 (5.57)
HDFDM-7A	7	11,400 (5,171)	4,150 (1,882)	83 (7.71)

Notes:
1. RMS gain data is given relative to dipole. Values given are for each polarization and nominal for mid band and include standard harness configurations. Gain will vary depending on feed system, frequency, null fill and beam tilt.
2. Null fill is standard for 5 bays or greater.
3. Power ratings are nominal @40˚C (104˚F) ambient and assume pressurization with dry air or nitrogen to 5 psi minimum. Power ratings may vary dependent on specific feed system design, and local conditions.
4. Higher power ratings and dual inputs are available on request.
5. Antenna components and feed harnesses are optimized for FM channels of interest.
6. Area calculated expressed in terms of equivalent flats (RS-222-C-standard).
7. Windload force calculated based on 50 pounds per square foot (50psf) on flats (RS-222-C-standard).
8. To convert area to equivalent rounds, multiply area by 1.5.
9. To convert area to Aerodynamic area (CaAa - linear or CaAc - discrete) based on EIA-222-F standard, multiply area by 1.8.

** Other gain values are available. Please contact factory.*

HDCBR

- Ideal for multi-station operation
- Full 20 MHz bandwidth
- High power handling
- Very low VSWR
- Single or dual EIA inputs
- Designed for -10dB IBOC signals
- Minimal windloading
- Superb azimuth circularity and elevation pattern control to ensure uniform coverage
- Custom azimuth patterns available
- Superior antenna isolation
- Ideal for space combining analog and IBOC signals



The HDCBR (Cavity Backed Radiator) antenna. It offers ideal characteristics to FM stations desiring the advantages of combined station operation or to stations requiring special directional coverage. The antenna is designed for digital, analog, or both types of service.

The Dielectric HDCBR consists of a crossed dipole radiator fed in phase quadrature and mounted within a square cavity. Rotating RF energy is produced when the cavity is excited by the dipole elements. Cavity size is principally determined by beamwidth requirements. A beamwidth of 90 degrees is required for a 4-around array and 120 degrees is required for a 3-around array (measured at the half-voltage coordinates).

Grid Cavity

The cavity used in the Dielectric circularly polarized FM antenna is a welded steel galvanized grid. The cavity grid is supported from a center mounting plate, which also serves as a mounting for the dipole assembly and for attachment of the unit to the supporting structure. The use of grid cavities and aerodynamic design significantly reduces weight and windload requirements of the supporting structure. This often represents substantial savings in support structure cost compared with other panel style antenna designs.

For omnidirectional operation, the shape of the standard azimuth pattern will vary from omni by less than ±2.0 dB for optimized tower configurations. Stations employing directional arrays will find one of the several patterns available to be ideally suited to their specific needs.

The Dielectric HDCBR antenna is designed for high power operation enabling station flexibility in transmission system design. Our conservative power rating ensures adequate design headroom for long term reliability. The Dielectric HDCBR antenna can be configured with one or two input ports. This feature allows the top and bottom portions of a typical antenna to be fed by two independent transmission lines. Should standby operation be necessary, one half of the system may be used at reduced power.

Multi-station Operation

Multi-station FM operation where two or more stations share the same antenna has increased in popularity due to the inherent cost savings which can be realized. Multi-station operation can be achieved only with the wide bandwidth characteristics the Dielectric CBR antenna offers.

These characteristics are achieved through the use of a broadband radiating element in conjunction with high power hybrid junctions.

Dielectric also offers the associated combining equipment necessary for multi-station operation. Dielectric's experience with multiplexer installations ensures proper combiner operation to optimize the system operation.

HDCBR

Azimuth Circularity

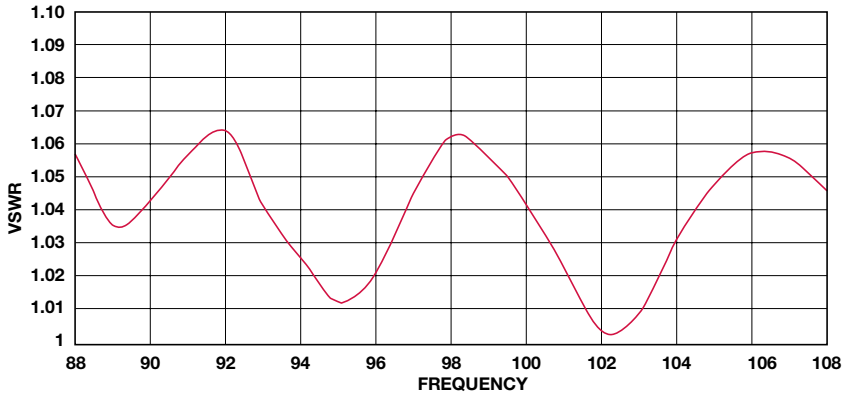
For omnidirectional operation, the shape of the standard azimuth pattern will vary from omni by less than ±2.0 dB for three-sided tower configurations. With a four-around antenna array, the typical circularity will be comparable.

Stations employing directional arrays will find one of the several patterns available to be ideally suited to their specific needs.

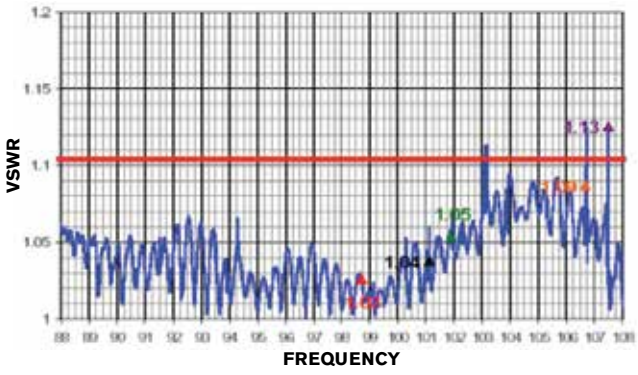
High Power Capabilities

The Dielectric CBR antenna is designed for high power operation enabling station flexibility in transmission system design. Our conservative power rating ensures adequate design headroom for long term reliability.

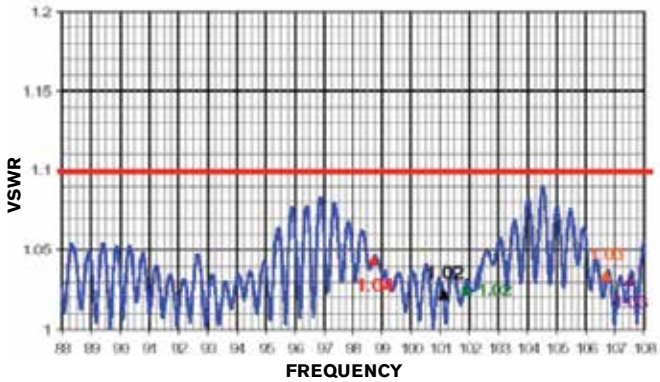
The Dielectric CBR antenna can be configured with one or two input ports. This feature allows the top and bottom six bays of a typical twelve bay antenna to be fed by two independent transmission lines. Should standby operation be necessary, one half of the system may be used at reduced power.



Right Hand CP



Left Hand CP



Typical VSWR responses including 1100' of transmission line

FMVee

- Full 20 MHz bandwidth
- Power ratings up to 10 class C stations
- Stainless steel element for excellent reliability
- Designed for -10dB IBOC signals
- Single or dual EIA inputs
- ABS feed point radome standard
- Low downward radiation
- Near omni-directional pattern performance
- RH circular polarization standard
- Low windload, flanged, top mount design
- Lightning resistant – grounded radiating elements
- Ideal for commom amplification or high level combining

The FMVee (arrowhead dipole) antenna offers ideal characteristics to FM stations desiring the advantages of top mounting and combined station operation.

The Dielectric FMVee radiator consists of a crossed dipole radiator fed in phase quadrature and mounted three around on a structural pipe mast. Rotating RF energy is produced when the element is fed in phase quadrature by an integral element hybrid divider. The wings between each element shape the element patterns and also help isolate adjacent elements.

The element used in the Dielectric FMVee circularly polarized antenna is a welded stainless steel grid. The element is supported off a mounting pole, which also serves as a mounting for the balun assembly. The aerodynamic elements and screens significantly reduce weight and windload requirements of the supporting structure. This often represents substantial savings in support structure cost compared with panel style designs.

Multi-station FM operation where two or more stations share the same antenna has increased in popularity due to the inherent cost savings that can be realized. Multi-station operation with excellent pattern circularity can be achieved with the wide bandwidth characteristics the FMVee antenna offers. These characteristics are achieved through the use of broadband radiating elements in conjunction with high power element hybrids.

Dielectric also offers the associated combining equipment necessary for multi-station operation. Dielectric's experience with multiplexer installations ensures proper combiner operation to optimize the system performance.

For omnidirectional operation, the shape of the standard azimuth pattern will vary from omni by less than +/-2 dB for top mount configurations.

The unique design of the FMVee antenna offers precise control of the elevation pattern, which is critical in auto receiver reception. Vertical pattern contouring to introduce beam tilt and null fill may be provided by means of standard phase and power distribution techniques.

The FMVee antenna is designed for high power operation enabling station flexibility in transmission system design. Our conservative power rating ensures adequate design headroom for long-term reliability. The Dielectric FMVee antenna can be configured with one or two input ports. This feature allows the top and bottom four bays of a typical eight bay antenna to be fed by two independent transmission lines. Should standby operation be necessary, one half of the eight-bay antenna may be used at reduced power.

FMVee

The Dielectric antenna test range is one of the few facilities in existence capable of complete antenna testing. The test range transmit and receive transmitters sit on the crest of two hills behind the Dielectric factory. This unique geographical setting offers ideal conditions for testing approaching the “free space” situation of an installed antenna. Here the computer generated azimuth and elevation patterns of a Dielectric antenna can be proven out with highly accurate and sophisticated test equipment – translating the theory of calculated patterns into the reality of actual antenna performance.

The Dielectric FMVee antenna will meet the exacting requirements of FM broadcasters. Your Dielectric representative can provide you with additional information for your review and consideration.

Electrical Specifications

Model	# of bays	RMS Gain Ea. Pol. (ratio)	RMS Gain Ea. Pol. (ratio)	Input	Max. Avg. Power (kW)	Max. Peak Windload (kW)	Rad. Center Above Tower Top (ft) (m)
FMVee-O3-2FM/6U-1	2	.90	-.46	6-50	125	2700	8.83 (2.65)
FMVee-O3-4FM/12U-1	4	1.8	2.56	6-50	135	3300	17.50 (5.25)
FMVee -O3-6FM/18U-1	6	2.7	4.31	6-50 EHT	185	3900	26.16 (7.84)
FMVee O3-8FM/24U-1	8	3.7	5.68	6-50 EHT	185	3900	34.83 (10.45)
FMVee -O3-10FM/30U-1	10	4.6	6.63	6-50 EHT	185	3900	43.50 (13.05)
FMVee -O3-12FM/36U-1	12	5.6	7.48	6-50 EHT Dual	250	6000	52.16 (15.64)

Notes:

1. RMS gain data is given relative to dipole. Values given are for each polarization, nominal for mid band and include standard harness configurations. Gain will vary depending on feed system, frequency, null fill and beam tilt.
2. Null fill 10% is standard for 4 bays or greater. Beam tilt .75 degrees assumed. Other values of tilt and fill are available upon request.
3. Power ratings are nominal @ 40˚C (104˚F) and assume pressurization with dry air or nitrogen to 5 psi minimum. Power ratings may vary dependent on specific feed system design, and local conditions.
4. Higher power ratings and dual inputs are available on request.
5. Antenna components and feed harnesses are optimized for FM channels of interest.

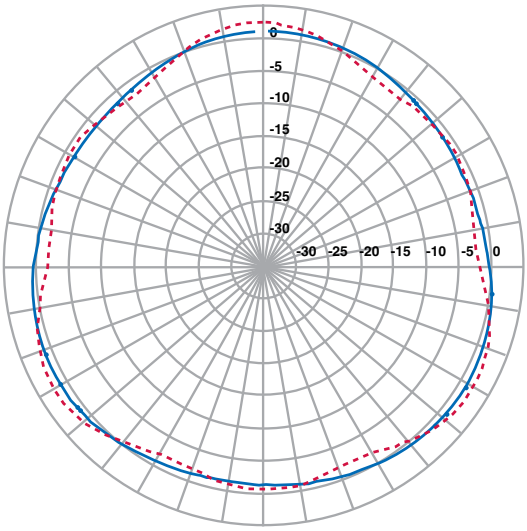
FMVee

Mechanical Specifications

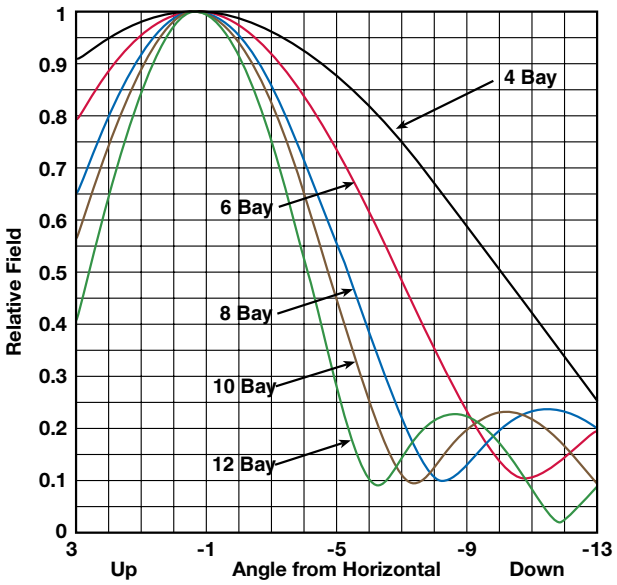
Model	Length ft (m)	CfAc ft²	Ma ft (m)	Weight lbs (kg)
FMVee-O3-2FM/6U-1	21.66 (6.49)	92	8.83 (2.65)	6,500 (2,925)
FMVee-O3-4FM/12U-1	39.00 (11.70)	184	17.50 (5.25)	12,500 (5,625)
FMVee -O3-6FM/18U-1	56.33 (16.90)	276	26.16 (7.85)	19,000 (8,550)
FMVee O3-8FM/24U-1	73.66 (22.09)	368	34.83 (10.45)	26,000 (11,700)
FMVee -O3-10FM/30U-1	Contact factory			
FMVee -O3-12FM/36U-1	Contact factory			

Notes:

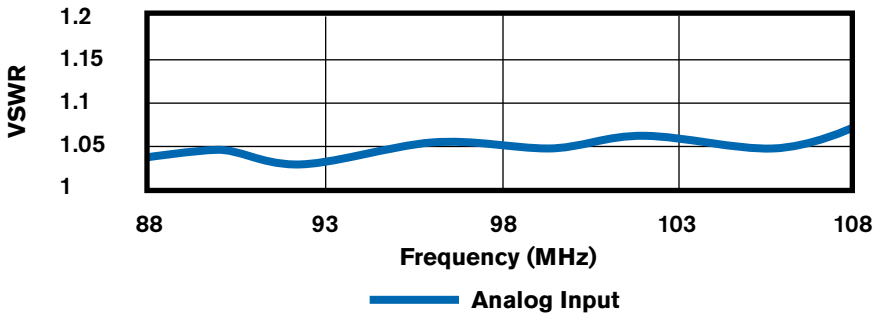
1. FMVee antennas must be pressurized with dry air or nitrogen.
2. Loads provided assume TIA/EIA-222-F, 80 mph basic wind speed, 1,200 ft (360m) tower, 42.6 psf. No ice.
3. Length includes standard 4 ft (1.2m) lightning rods.
4. Windloads will vary depending on design wind speed & conditions at installation location.
5. Contact your Dielectric sales manager for information on special cases.



CALCULATED ELEVATION PATTERN



VSWR vs. Frequency



CBR

- Ideal for multi-station operation
- Designed for common amplification or high level combining
- High power handling
- Very low VSWR
- Minimal windloading
- Superb horizontal circularity and vertical pattern control to ensure uniform coverage
- Available in one, two, three or four around configurations
- Full assembly and testing available at our full capability antenna test range to ensure top performance.
- Designed for -10dB IBOC signals

The CBR (Cavity Backed Radiator) antenna offers ideal characteristics to FM stations desiring the advantages of combined station operation or to stations requiring special directional coverage.

The Dielectric Cavity Backed Radiator consists of a crossed dipole radiator fed in phase quadrature and mounted within a circular cavity. Rotating RF energy is produced when the cavity is excited by the dipole elements. The signal emanating from the cavity is right-hand circular. The field rotates clockWise as viewed in the direction of propagation. Cavity size is principally determined by beamwidth requirements. A beamwidth of 90 degrees is required for a 4-around array and 120 degrees is required for a 3-around array (measured at the half-voltage coordinates). When operating in dual mode (IBOC/analog) this antenna is designed for common amplification or high level combining.

Grid Cavity

The cavity used in the Dielectric circularly polarized FM antenna is a welded steel galvanized grid. The cavity grid is supported from a center mounting plate, which also serves as a mounting for the dipole assembly and for attachment of the unit to the supporting structure. The use of grid cavities and aerodynamic design significantly reduces weight and windload requirements of the supporting structure. This often represents substantial savings in support structure cost compared with other panel style antenna designs.

Multi-station Operation

Multi-station FM operation where two or more stations share the same antenna has increased in popularity due to the inherent cost savings which can be realized. Multi-station operation can be achieved only with the wide bandwidth characteristics the Dielectric CBR antenna offers.

These characteristics are achieved through the use of a broadband radiating element in conjunction with high power hybrid junctions.

Dielectric also offers the associated combining equipment necessary for multi-station operation. Dielectric's experience with multiplexer installations ensures proper combiner operation to optimize the system operation.

Azimuth Circularity

For omnidirectional operation, the shape of the standard azimuth pattern will vary from omni by less than ±2.0 dB for three-sided tower configurations. With a four-around antenna array, the typical circularity will be comparable.

Stations employing directional arrays will find one of the several patterns available to be ideally suited to their specific needs.

CBR

Elevation Pattern

The unique design of the CBR antenna offers precise control of the elevation pattern which is critical in auto receiver reception. Vertical pattern contouring to introduce beam tilt and null fill may be provided by means of standard phase and power distribution techniques.

High Power Capabilities

The Dielectric CBR antenna is designed for high power operation enabling station flexibility in transmission system design. Our conservative power rating ensures adequate design headroom for long term reliability.

The Dielectric CBR antenna can be configured with one or two input ports. This feature allows the top and bottom six bays of a typical twelve bay antenna to be fed by two independent transmission lines. Should standby operation be necessary, one half of the system may be used at reduced power.

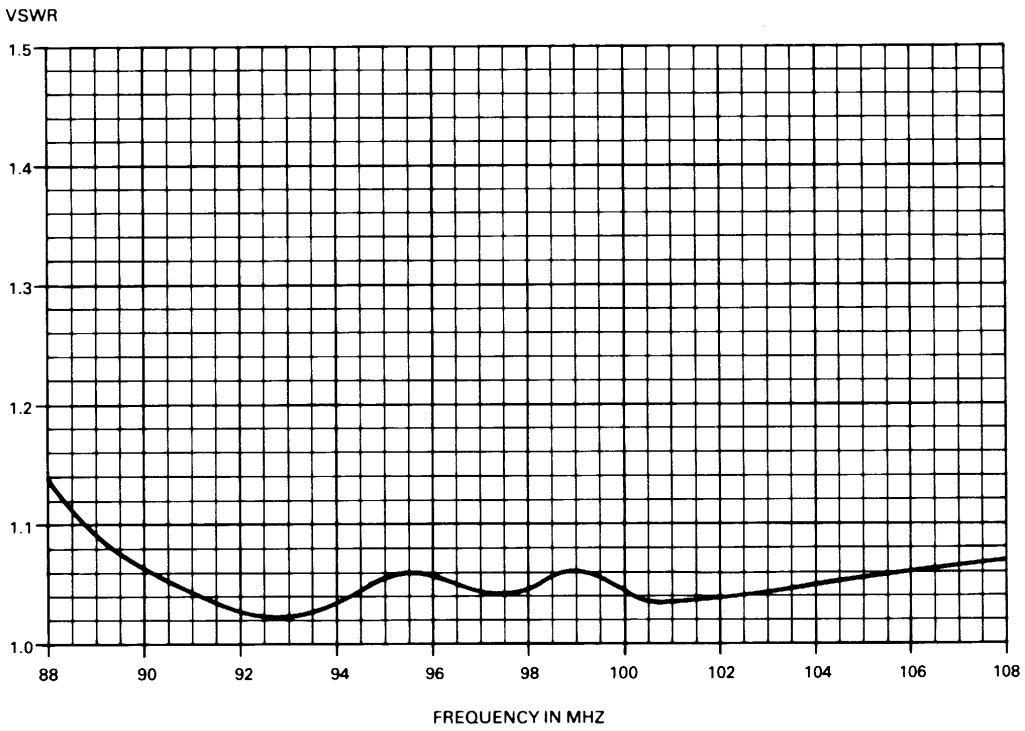
Full Range Testing

The Dielectric antenna test range is one of the few facilities in existence capable of complete antenna testing. Two test transmitters are located adjacent to the range. This unique geographical setting offers ideal conditions for testing approaching the “free space” situation of an installed antenna.

Here the computer plotted azimuth and elevation patterns of a Dielectric antenna can be proven out with highly accurate and sophisticated test equipment – translating the theory of calculated patterns into the reality of actual antenna performance.

Meeting Precise Requirements

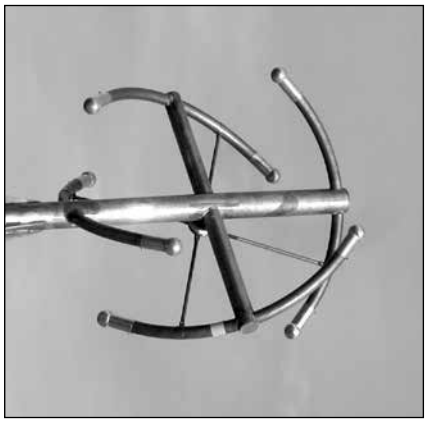
The Dielectric CBR antenna can meet the exacting requirements of FM broadcasters. Your Dielectric representative can provide you with additional information for your review and consideration.



Measured VSWR Characteristics of Multiplexed CBR at antenna input port

DCR-Q

- 16 MHz bandwidth
- Single bay power rating of 35kW
- Array input power up to 200 kW
- Variable bay spacing
- Branch feed for multi-station operation
- Circularly polarized
- Brass construction
- Low ice sensitivity
- Low weight and windload
- Designed for -10dB IBOC signals



The DCR-Q was born out of a request to develop a side-mount antenna to support 9 FM stations. Its quadrapole design is an evolution of the popular Dielectric DCR-M antenna. The DCR-Q meets the need of high power broadcasters desiring the azimuth pattern performance of a side-mounted antenna along with the broadband performance and high power handling of a panel. This highly engineered antenna has been specifically developed for multichannel combined applications. We recommend that you consult Dielectric when considering this antenna. Pattern studies are recommended to take full advantage of the azimuth pattern offered by this antenna design.

Multi-Station Operation

The wideband characteristics and high power capacity of the DCR-Q make this antenna an ideal alternative to panel antennas. A variety of custom options are available.

General Specifications:

Pattern Circularity in Free Space:	± 1 dB
Element Diameter:	45" (114.3cm)

Construction

The Dielectric DCR-Q element is designed with rugged heavy wall brass tubing. The power dividers and bay feeders are copper and brass construction all designed for long life and reliability. The DCR-Q is a side firing helix design consisting of four dipole elements providing true circular polarization.

Ice stability

Due to the broadband nature of the DCR-Q element, it is inherently stable. Deicers are recommended for applications where heavy icing conditions are anticipated.

Weight and windload

The relative low weight and windload of this antenna makes it ideal for towers that could not otherwise support a master FM panel antenna or for applications where the cost of reinforcing a tower is prohibitive.

Low RF cross section

The low profile of the antenna also makes it an ideal candidate for candelabra applications. When mounted on a small support structure, it has minimal impact on other antennas at the same height.

Beam tilt and null fill

Beam tilt and/or null fill are normally included in arrays of eight bays or more, however, they may also be utilized on smaller arrays. Contact Dielectric and we'll design an antenna to meet your specific needs.

DCR-Q

Electrical Specifications

Antenna Type	# of bays	Gain Polarization Power Gain	Gain Polarization dB	Power Rating kW[3]
DCR-Q1	1	0.43	-3.67	35
DCR-Q2	2	0.93	-0.32	70
DCR-Q4	4	1.79	2.53	140
DCR-Q6	6	2.50	3.98	200
DCR-Q8	8	3.30	5.18	200
DCR-Q10	10	4.20	6.23	200
DCR-Q12	12	5.00	6.99	200

Notes:

1. RMS gain data is given relative to dipole. Values are for each polarization and nominal for midband and include standard harness configurations. Actual gain will vary depending on feed system, frequency, null fill and bean tilt.
2. Average power ratings are nominal @ 40°C ambient. Assumes constant pressurization with dry air or nitrogen. Ratings may vary based on specific feed system design and local conditions.
3. Higher power ratings and custom feed systems may be available on request.
4. Antenna components and feed harnesses are optimized for FM channels of interest.

Mechanical Specifications

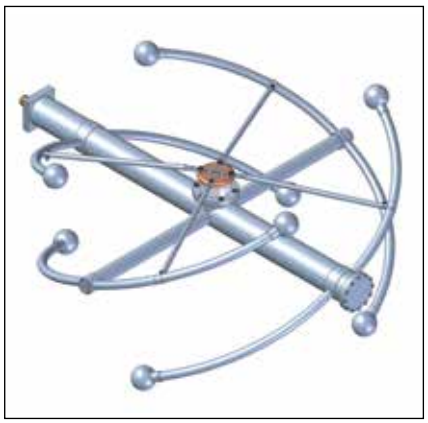
Antenna Type	# of bays	Weight lbs (kg)	Windload lbs (kg)	Projected Area ft² (m²)
DCR-Q1	1	220 (100)	226 (103)	4.5 (0.4)
DCR-Q2	2	440 (200)	452 (205)	9.0 (0.8)
DCR-Q4	4	880 (400)	903 (411)	18.1 (1.7)
DCR-Q6	6	1,320 (601)	1,355 (617)	27.1 (2.5)
DCR-Q8	8	1,760 (801)	1,808 (823)	36.2 (3.4)
DCR-Q10	10	2,200 (1,001)	2,260 (1,028)	45.2 (4.2)
DCR-Q12	12	2,640 (1,201)	2,710 (1,233)	54.2 (5.0)

Notes:

1. Weights include bays and standard extension brackets for mounting. Excludes feed system and custom mounts. For antennas that included pattern studies, contact factory for additional information.
2. Projected area includes bays and standard extension brackets. Excludes feed system and custom mounts.
3. Ice shields are strongly recommended for areas subject to tower icing. Dielectric is not responsible for antenna damage caused by impact from falling ice.
4. Area calculated expressed in terms of equivalent flats (RS-222-C-standard).
5. Windload force calculated based on 50 pounds per square foot (50psf) on flats (RS-222-C-standard).
6. To convert area to equivalent rounds, multiply area by 1.5.
7. To convert area to Aerodynamic area (CaAa - linear or CaAc - discrete) based on EIA-222-F standard, multiply area by 1.8.

DCR-S / HDR-S

- DCR-M: Right Hand Circularly Polarized
- HDR-M: Left Hand Circularly Polarized
- DCR-M/HDR-M IBOC compatible
- Interleaved provides -40dB of isolation
- Stainless steel elements
- Ideal for Class B and C stations
- 28 kW for a single bay
- Fine matcher included
- Radomes or integral deicers optional
- VSWR field adjustable
- High power bays for multiplexing high power signals
- High peak power ratings



General Specifications

Polarization:	Circular
Pattern Circularity in Free Space:	± 1 dB
VSWR (max.) at Input, w/o field trim:	
Top Mounted	1.2:1
Side Mounted	1.5:1
VSWR (max.) at Input, w/field trim, Top or Side Mounted	
(+/-200 KHz):	1.05:1
(+/-400 KHz):	1.10:1
Input:	3-1/8" EIA
Bay Dimensions (without Radome):	
Diameter	36" (915mm)
Height	29" (737mm)
Bay Dimensions (with Radome):	
Diameter	44" (1118mm)
Height	34" (864mm)

The DCR-S/HDR-S has been used extensively for high power broadband applications. The “S” series antennas are circularly polarized with a power rating of 28 kW for a single bay and is available in stacked arrays of up to 16 bays with an input rating to 120 kW. For situations where ice formation is common, the arrays can be equipped with optional electrical deicers or radomes. The antenna is DC grounded and does not require shorting stubs. Each array is supplied with an input fine matcher for field optimization. For reduced down-ward radiation, the use of a custom feed design allows for shorter spacings in a series fed configuration.

High Power Input Capability

The DCR-S and HDR-S were designed to handle high input power ideally suited for multiplexing. The “S” series antenna is available with optional 4-1/16“ feed system having a power input rating (for five or more bays) of 70 kW. Arrays with 6-1/8” inputs are also available.

Multi-Station Operation

The wide bandwith and the high power input capability of the “S” series antenna permits optional multi-station operation.

Beam Tilt and Null Fill

Beam tilt and/or null fill are available options. These options are ordinarily specified for arrays of 8 bays or more. Even numbered arrays of six sections and fewer may include one or both options and typically are designed as a center-fed array. The “S” series antenna is available in directional arrays which are custom-built to the needs of the station.

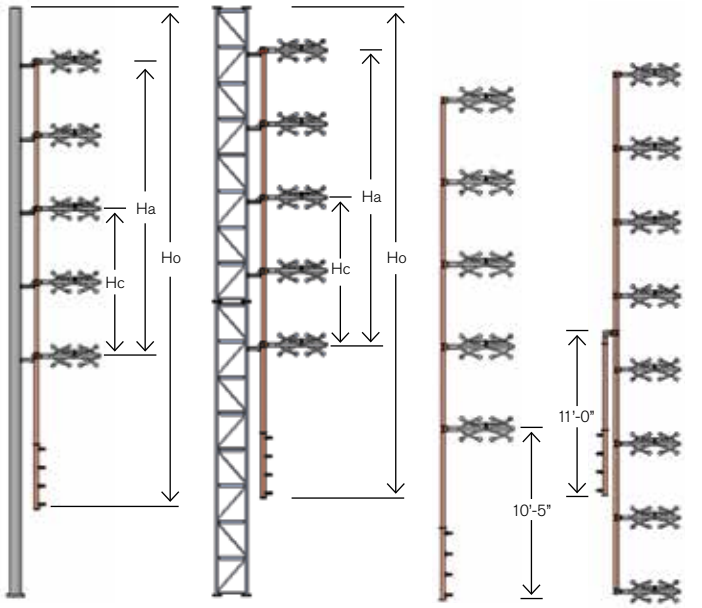
Quadrapole Design

The four-dipole-per-element design offers the advantage of more symmetrical azimuth pattern performance and H/V ratio than dual dipole designs, providing more rubust coverage.

Low downward radiation options available — contact factory.

DCR-S / HDR-S

Mounting Dimensions



Pole Mounting | **Side Mounting** | **End-Fed 1-7 Sections** | **Center-Fed**

Ha = Antenna aperture length
Hc = Antenna center of radiation
Ho = Antenna overall length needed for mounting
Ha = 984/f x [s(x-1)]
Hc = Ha/2
Ho end-fed = Ha + 5'top + 10' - 5"bottom
Ho center-fed = Ha + 5'top + 5'bottom

All dimensions in feet
f = frequency in megahertz (MHz)
s = bay spacing in fraction of wavelengths
example: ½ wavelength = .5
x = number of antenna bays

Note: Antennas ordered w/beam tilt and/or null fill are supplied with center feed and require and even number of bays

Deicer Specifications:
Power (nominal per bay): 1200 W
Voltage: may be wired for 208 V or 240 V service, single or three phase.

Optional: Ice sensor and deicer controller

Mechanical Specifications

Antenna Type DCR-S or HDR-S	# of Bays	Without Radomes				With Radomes				With Deicers			
		Weight lbs (kg)		CaAc ft² (m²)		Weight lbs (kg)		CaAc ft² (m²)		Weight lbs (kg)		CaAc ft² (m²)	
		λ Spaced	½ λ Spaced	λ Spaced	½ λ Spaced	λ Spaced	½ λ Spaced	λ Spaced	½ λ Spaced	λ Spaced	½ λ Spaced	λ Spaced	½ λ Spaced
DCR-S1 HDR-S1	1	198 (90)		7.2 (.7)		335(152)		11.2 (1.0)		197 (89)		7.7 (.7)	
DCR-S2 HDR-S2	2	322 (146)	307 (139)	14.1 (1.3)	12.6 (1.2)	607 (275)	592 (269)	22.1 (2.1)	20.6 (1.9)	332 (151)	317 (144)	15.1 (1.4)	13.6 (1.3)
DCR-S3 HDR-S3	3	451 (205)	421 (191)	21 (2.0)	18 (1.7)	879 (394)	849 (385)	33.0 (3.1)	30.0 (2.8)	466 (211)	436 (198)	22.5 (2.1)	19.5 (1.8)
DCR-S4 HDR-S4	4	581 (264)	536 (243)	27.9 (2.6)	23.4 (2.2)	1151 (522)	1106 (502)	43.9 (4.1)	39.4 (3.7)	601 (273)	556 (252)	29.9 (2.8)	25.4 (2.4)
DCR-S5 HDR-S5	5	710 (322)	650 (295)	34.8 (3.2)	28.8 (2.7)	1423 (645)	1363 (618)	54.9 (5.1)	48.9 (4.5)	735 (333)	675 (306)	37.3 (3.5)	31.3 (2.9)
DCR-S6 HDR-S6	6	840 (381)	765 (347)	41.7 (3.9)	34.2 (3.2)	1695 (769)	1620 (733)	65.8 (6.1)	58.3 (5.4)	870 (395)	795 (361)	44.7 (4.2)	37.2 (3.5)
DCR-S7 HDR-S7	7	969 (440)	879 (399)	48.5 (4.5)	39.5 (3.7)	1967 (892)	1877 (851)	76.6 (7.1)	67.6 (6.3)	1004 (455)	914 (415)	52 (4.8)	43 (4.0)
DCR-S8 HDR-S8	8	1142 (518)	1037(470)	55.7 (5.2)	45.2 (4.2)	2239 (1016)	2134 (968)	87.8 (8.2)	77.3 (7.2)	1182 (536)	1033 (468)	59.7 (5.5)	49.2 (4.6)
DCR-S10 HDR-S10	10	1401 (635)	1266 (574)	69.5 (6.5)	56 (5.2)	2753 (1249)	2618 (1188)	110.0 (10.2)	96.5 (9.0)	1451 (658)	1286 (583)	74.5 (6.9)	61 (5.7)
DCR-S12 HDR-S12	12	1660 (753)	1495 (678)	83.3 (7.7)	66.8 (6.2)	3267 (1481)	3102 (1407)	131.0 (12.2)	115.0 (10.6)	1720 (780)	1555 (705)	89.3 (8.3)	72.8 (6.8)

Notes:
1. CaAc and weight includes bays and standard extension brackets for mounting. Excludes custom mounts. For antennas that include pattern studies, contact factory for additional information.
2. Dimensions are for antennas at 98.0 MHz and can vary ± 10% across the band.
3. Ice shields are strongly recommended for areas subject to icing conditions. Dielectric is not responsible for antenna damage caused by impact from falling ice.
4. Calculated area (CaAc) expressed in TIA/EIA-222-F standard.
5. Specs. are for a single DCR-S antenna array or HDR-S antenna array, not both.

DCR-S / HDR-S

Electrical Specifications

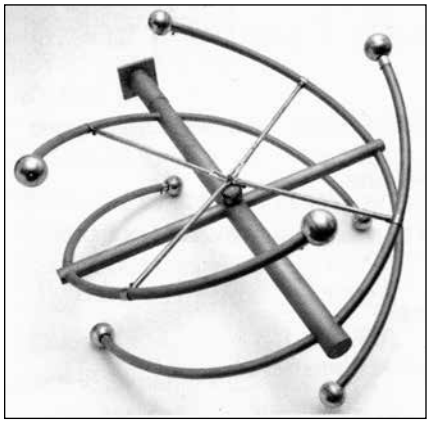
Antenna Type DCR-S or HDR-S	Gain Polarization spacing[1]				Power Rating kW[3]
	λ Spacing		½ λ Spacing		
	Power Gain	dB	Power Gain	dB	
DCR-S1 HDR-S1	0.46	-3.37			28
DCR-S2 HDR-S2	1.0	0	0.7	-1.55	40
DCR-S3 HDR-S3	1.5	1.76	1.0	0	40
DCR-S4 HDR-S4	2.1	3.22	1.3	1.14	40
DCR-S5 HDR-S5	2.7	4.31	1.6	1.76	40
DCR-S6 HDR-S6	3.2	5.05	1.8	2.55	40
DCR-S7 HDR-S7	3.8	5.80	2.1	3.22	40
DCR-S8 HDR-S8	4.3	6.34	2.3	3.62	40
DCR-S10 HDR-S10	5.5	7.40	2.9	4.62	40
DCR-S12 HDR-S12	6.6	8.2	3.5	5.44	40

Notes:

1. RMS gain data is given relative to dipole. Values are for midband and include standard harness configurations. Actual gain will vary depending on feed system, frequency, null fill, and beam tilt.
2. Average power ratings are nominal @ 40˚C (104˚F) ambient. Assumes constant pressurization with dry air or nitrogen. Ratings may vary based on specific feed system design and local conditions.
3. Higher power ratings and custom feed systems may be available on request.
4. Antenna components and feed harnesses are optimized for FM channels of interest
5. Specifications. are for a single DCR-S antenna array or HDR-S antenna array, not both.

DCR-MFE "Funky Elbow"

- Variable spacing
- Broad bandwidth capability
- Array input power 100kW or more
- Series fed for multi-station operation
- Circularly polarized
- Stainless steel construction
- Low ice sensitivity
- Fine matcher included
- Match bay spacing to existing tower for more consistent pattern results
- Radomes/deicers available



General Specifications

Pattern Circularity in Free Space:	± 1 dB
VSWR (max.) at Input, Up to 8 MHz:	1.15:1 typical, call for quote on specific application
Input:	3-1/8" 50 ohm Standard, larger sizes available
Section Dimensions:	
Diameter	36" (915mm)
Height	29" (737mm)

The DCR-MFE antenna is center fed, meeting the needs of high power, high bandwidth and short spaced bay requirements.

Variable Bay Spacing

Through the use of a series feed system, proper RF phase to each bay is maintained, even at reduced bay spacings. This allows for bay spacings between 1/2 and full wavelength. The reduction in bay spacing can have multiple benefits including: 1) A significant reduction in the amount of "downward" radiation. 2) Broader elevation beam. 3) More constant patterns.

It must be noted that reducing the bay spacing for a given number of bays also reduces the gain. An 8 bay with full wavelength spacing has a gain of 4.3x. The elevation pattern of an 8 bay half wavelength with a gain of 2.4x resembles the elevation pattern of a 4 bay full wavelength in terms of beam width and gain. A variety of bay spacing is available; contact factory for details.

High Power Input Capability

The DCR-M is designed with input line sizes up to 6-1/8" EIA. This allows for array input power levels in excess of 100kW.

Beam Tilt and Null Fill

Beam tilt and/or null fill are options typically offered in arrays of eight bays or more, however they may also be utilized on smaller arrays.

Directional Arrays

The DCR-MFE antenna is available in directional arrays which are custom-built to the needs of the specific station.

Multi-Station Operation

The high power handling and wideband characteristics of the DCR-MFE make this antenna an excellent alternative to high cost panel antennas.

To aid in selecting the elevation pattern most suitable to your application, please visit our website and download Dielectric's Antenna Planning software.

DCR-MFE "Funky Elbow"

Deicer Specifications:

Power (nominal, per bay): 1200 W
Voltage: May be wired for 208V or 240V service, single- or three-phase

Optional:

Ice sensor and deicer controller.

Electrical Specifications

Antenna Type	Gain Polarization spacing[1] ¾ λ Spacing Power Gain	¾ λ Spacing dB	⅞ λ Spacing Power Gain	⅞ λ Spacing dB	Power Rating kW[3]
DCR-MFE4	1.80	2.55	2.1	3.22	40
DCR-MFE6	2.70	4.31	3.1	4.91	40
DCR-MFE8	3.60	5.56	4.1	6.12	40
DCR-MFE10	4.50	6.53	5.1	7.08	40
DCR-MFE12	5.40	7.32	6.1	7.85	40

Notes:

1. RMS gain data is given relative to dipole. Values are for each polarizatiion and nominal for midband and include standard harness configurations. Actual gain will vary depending on feed system, frequency, null fill, and beam tilt.
2. Average power ratings are nominal @ 40˚C ambient. Assumes constant pressurization with dry air or nitrogen. Ratings may vary based on specific feed system design and local conditions.
3. Higher power ratings and custom feed systems may be available on request.
4. Antenna components and feed harnesses are optimized for FM channels of interest.

Mechanical Specifications

Antenna Type DCR-M or HDR-M	# of Bays	Without Radomes Weight lbs (kg) ¾ λ Spaced	⅞ λ Spaced	CaAc ft² (m²) ¾ λ Spaced	⅞ λ Spaced	With Radomes Weight lbs (kg) ¾ λ Spaced	⅞ λ Spaced	CaAc ft² (m²) ¾ λ Spaced	⅞ λ Spaced	With Deicers Weight lbs (kg) ¾ λ Spaced	⅞ λ Spaced	CaAc ft² (m²) ¾ λ Spaced	⅞ λ Spaced
DCR-M2 HDR-M2	2	277 (126)	280 (127)	12.1 (1.1)	12.5 (1.2)	562 (255)	565 (257)	21.3 (2.0)	21.7 (2.0)	287 (130)	290 (132)	13.1 (1.2)	13.5 (1.3)
DCR-M3 HDR-M3	3	384 (175)	391 (178)	17.6 (1.6)	18.4 (1.7)	812 (369)	819 (372)	31.4 (2.9)	32.2 (3.0)	399 (181)	406 (184)	19.1 (1.8)	19.9 (1.9)
DCR-M4 HDR-M4	4	492 (224)	502 (228)	23.1 (2.1)	24.3 (2.3)	1062 (483)	1072 (487)	41.5 (3.9)	42.7 (4.0)	512 (233)	522 (237)	25.1 (2.3)	26.3 (2.4)
DCR-M5 HDR-M5	5	600 (273)	613 (279)	28.6 (2.7)	30.2 (2.8)	1412 (642)	1426 (648)	51.7 (4.8)	53.3 (5.0)	624 (283)	638 (290)	31.1 (2.9)	32.7 (3.0)
DCR-M6 HDR-M6	6	707 (321)	724 (329)	34.2 (3.2)	36.2 (3.4)	1562 (710)	1579 (718)	61.9 (5.7)	63.9 (5.9)	737 (335)	754 (343)	37.2 (3.5)	39.2 (3.6)
DCR-M7 HDR-M7	7	814 (370)	835 (380)	39.6 (3.7)	42.0 (3.9)	1812 (823)	1833 (833)	71.9 (6.7)	74.3 (6.9)	849 (386)	870 (395)	43.1 (4.0)	45.5 (4.2)
DCR-M8 HDR-M8	8	965 (439)	989 (450)	45.4 (4.2)	48.2 (4.5)	2062 (937)	2086 (948)	82.3 (7.6)	85.1 (7.9)	1005 (457)	1029 (468)	49.4 (4.6)	52.2 (4.8)
DCR-M10 HDR-M10	10	1180 (536)	1211 (550)	56.4 (5.2)	60.0 (5.6)	2532 (1151)	2563 (1165)	102.9 (9.6)	106.5 (9.9)	1230 (559)	1260 (573)	61.4 (5.7)	65.0 (6.0)
DCR-M12 HDR-M12	12	1395 (634)	1433 (651)	67.4 (6.3)	71.8 (6.7)	3002 (1364)	3040 (1382)	122.3 (11.4)	126.7 (11.8)	1455 (661)	1493 (679)	73.4 (6.8)	77.8 (7.2)

Notes:

1. Weights include bays and standard extension brackets for mounting. Excludes feed system and custom mounts. For antennas that included pattern studies, contact factory for additional information.
2. Projected area includes bays and standard extension brackets. Excludes feed system and custom mounts.
3. Dimensions are for antennas at 98.0 MHz and can vary ±10% across the band.
4. Ice shields are strongly recommended for areas subject to tower icing. Dielectric is not responsible for antenna damage caused by impact from falling ice.
5. Area calculated expressed in terms of equivalent flats (RS-222-C-standard).
6. Windload force calculated based on 50 pounds per square foot (50psf) on flats (RS-222-C-standard).
7. To convert area to equivalent rounds, multiply area by 1.5.
8. To convert area to Aerodynamic area (CaAa - linear or CaAc - discrete) based on EIA-222-F standard, multiply area by 1.8.

DCR-M / HDR-M

- DCR-M: Right Hand Circularly Polarized
- HDR-M: Left Hand Circularly Polarized
- DCR-M/HDR-M IBOC compatible
- Interleaved provides -40dB of isolation
- Stainless steel elements
- Ideal for Class B and C stations
- 18 kW for a single bay
- Fine matcher included
- Radomes or integral deicers optional
- VSWR field adjustable

The DCR-M/HDR-M has been used extensively for high power broadband applications. The "M" series antennas are circularly polarized with a power rating of 18 kW for a single bay and is available in stacked arrays of up to 16 bays with an input rating to 40 kW. For situations where ice formation is common, the arrays can be equipped with optional electrical deicers or radomes. The antenna is DC grounded and does not require shorting stubs. Each array is supplied with an input fine matcher for field optimization. For reduced down-ward radiation, the use of a custom feed design allows for shorter spacings in a series fed configuration.

High Power Input Capability

The "M" series antenna is available with optional 4-1/16" feed system having a power input rating (for five or more bays) of 70 kW. Arrays w/ 6-1/8" inputs are also available.

Multi-Station Operation

The wide bandwith of high power input capability of the "M" series antenna permits optional multi-station operation.

Beam Tilt and Null Fill

Beam tilt and/or null fill are available options. These options are ordinarily specified for arrays of 8 bays or more. Even numbered arrays of six sections and fewer may include one or both options and typically are designed as a center-fed array. The "M" series antenna is available in directional arrays which are custom-built to the needs of the station.

Quadrapole Design

The four-dipole-per-element design offers the advantage of more symmetrical azimuth pattern performance and H/V ratio than dual dipole designs, providing more rubust coverage.

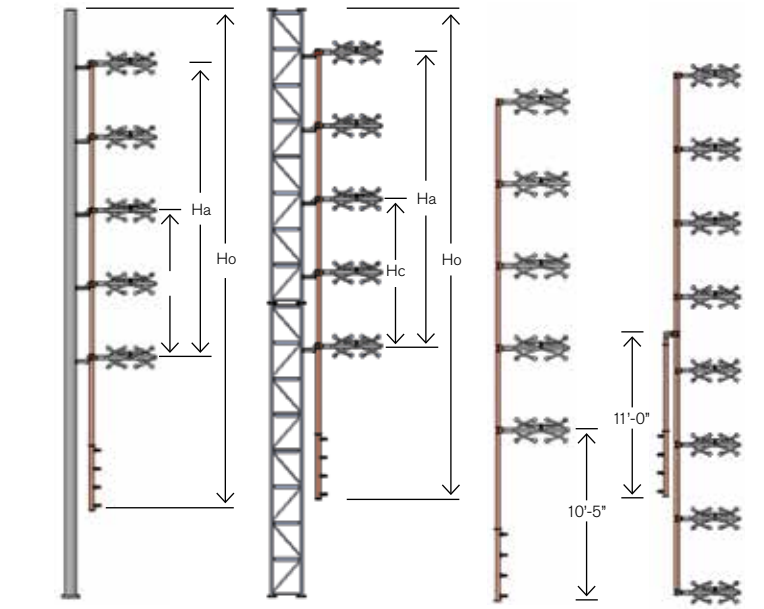
Low downward radiation options available — contact factory.

General Specifications

Polarization:	Circular
Pattern Circularity in Free Space:	± 1 dB
VSWR (max.) at Input, w/o field trim:	
Top Mounted	1.2:1
Side Mounted	1.5:1
VSWR (max.) at Input, w/field trim, Top or Side Mounted	
(±200 KHz):	1.05:1
(±400 KHz):	1.10:1
Input:	3-1/8" EIA
Bay Dimensions (without Radome):	
Diameter	36" (915mm)
Height	29" (737mm)
Bay Dimensions (with Radome):	
Diameter	44" (1118mm)
Height	34" (864mm)

DCR-M / HDR-M

Mounting Dimensions



Pole Mounting **Side Mounting** **End-Fed 1-7 Sections** **Center-Fed**

Ha = Antenna aperture length
Hc = Antenna center of radiation
Ho = Antenna overall length needed for mounting
Ha = 984/f x [s(x-1)]
Hc = Ha/2
Ho = Ha + 5'+ 10' - 5"
Ho = Ha + 5'+ 5'

All dimensions in feet
f = frequency in megahertz (MHz)
s = bay spacing in fraction of wavelengths
example: ½ wavelength = .5
x = number of antenna bays

Note: Antennas ordered w/beam tilt and/or null fill are supplied with center feed and require an even number of bays
Power (nominal per bay): 1200 W

Voltage: may be wired for 208 V or 240 V service, single or three phase.

Optional: Ice sensor and deicer controller

Mechanical Specifications

Antenna Type DCR-C or HDR-C	# of Bays	Without Radomes				With Radomes				With Deicers			
		Weight lbs (kg)		CaAc ft² (m²)		Weight lbs (kg)		CaAc ft² (m²)		Weight lbs (kg)		CaAc ft² (m²)	
		λ Spaced	½ λ Spaced	λ Spaced	½ λ Spaced	λ Spaced	½ λ Spaced	λ Spaced	½ λ Spaced	λ Spaced	½ λ Spaced	λ Spaced	½ λ Spaced
DCR-M1 HDR-M1	1	160 (73)		6.6 (0.6)		303 (137)		11.2 (1.0)		165 (75)		7.1 (0.7)	
DCR-M2 HDR-M2	2	258 (117)	243 (110)	12.9 (1.2)	11.4 (1.1)	543 (246)	528 (239)	22.1 (2.1)	20.6 (1.9)	268 (122)	253 (115)	13.9 (1.3)	12.4 (1.2)
DCR-M3 HDR-M3	3	355 (161)	325 (147)	19.2 (1.8)	16.2 (1.5)	783 (355)	753 (342)	33.0 (3.1)	30.0 (2.8)	370 (168)	340 (154)	20.7 (1.9)	17.7 (1.6)
DCR-M4 HDR-M4	4	453 (205)	408 (185)	25.5 (2.4)	21.0 (2.0)	1023 (464)	978 (444)	43.9 (4.1)	39.4 (3.7)	473 (215)	428 (194)	27.5 (2.6)	23.0 (2.1)
DCR-M5 HDR-M5	5	550 (250)	490 (222)	31.8 (3.0)	25.8 (2.4)	1263 (573)	1203 (546)	54.9 (5.1)	48.9 (4.5)	575 (261)	515 (234)	34.3 (3.2)	28.3 (2.6)
DCR-M6 HDR-M6	6	648 (294)	573 (260)	38.1 (3.5)	30.6 (2.8)	1503 (682)	1428 (648)	65.8 (6.1)	58.3 (5.4)	678 (308)	603 (274)	41.1 (3.8)	33.6 (3.1)
DCR-M7 HDR-M7	7	745 (338)	655 (297)	44.3 (4.1)	35.3 (3.3)	1743 (791)	1653 (750)	76.6 (7.1)	67.6 (6.3)	780 (354)	690 (313)	47.8 (4.4)	38.8 (3.6)
DCR-M8 HDR-M8	8	886 (402)	781 (354)	50.9 (4.7)	40.4 (3.8)	1983 (899)	1878 (852)	87.8 (8.2)	77.3 (7.2)	926 (420)	821 (372)	54.9 (5.1)	44.4 (4.1)
DCR-M10 HDR-M10	10	1081 (490)	946 (429)	63.5 (5.9)	50.0 (4.6)	2433 (1104)	2298 (1042)	110.0 (10.2)	96.5 (9.0)	1131 (513)	966 (438)	68.5 (6.4)	55.0 (5.1)
DCR-M12 HDR-M12	12	1276 (579)	1111 (504)	76.1 (7.1)	59.6 (5.5)	2883 (1308)	2718 (1233)	131.0 (12.2)	115.0 (10.6)	1336 (606)	1171 (531)	82.1 (7.6)	65.6 (6.1)

Notes:

1. CaAc and weight includes bays and standard extension brackets for mounting. Excludes custom mounts. For antennas that include pattern studies, contact factory for additional information.
2. Dimensions are for antennas at 98.0 MHz and can vary ± 10% across the band.
3. Ice shields are strongly recommended for areas subject to icing conditions. Dielectric is not responsible for antenna damage caused by impact from falling ice.
4. Calculated area (CaAc) expressed in TIA/EIA-222-F standard.
5. Specs. are for a single DCR-M antenna array or HDR-M antenna array, not both.

DCR-M / HDR-M

Electrical Specifications

Antenna Type DCR-M or HDR-M	Gain Polarization spacing[1]				Power Rating kW[3]
	λ Spacing		½ λ Spacing		
	Power Gain	dB	Power Gain	dB	
DCR-M1 HDR-M1	0.46	-3.37			18
DCR-M2 HDR-M2	1.0	0	0.7	-1.55	36
DCR-M3 HDR-M3	1.5	1.76	1.0	0	40
DCR-M4 HDR-M4	2.1	3.22	1.3	1.14	40
DCR-M5 HDR-M5	2.7	4.31	1.6	1.76	40
DCR-M6 HDR-M6	3.2	5.05	1.8	2.55	40
DCR-M7 HDR-M7	3.8	5.80	2.1	3.22	40
DCR-M8 HDR-M8	4.3	6.34	2.3	3.62	40
DCR-M10 HDR-M10	5.5	7.40	2.9	4.62	40
DCR-M12 HDR-M12	6.6	8.2	3.5	5.44	40

Notes:

1. RMS gain data is given relative to dipole. Values are for midband and include standard harness configurations. Actual gain will vay depending on feed system, frequency, null fill, and beam tilt.
2. Average power ratings are nominal @ 40°C ambient. Assumes constant pressurization with dry air or nitrogen. Ratings may vary based on specific feed system design and local conditions.
3. Higher power ratings and custom feed systems may be available on request.
4. Antenna components and feed harnesses are optimized for FM channels of interest
5. Specs. are for a single DCR-M antenna array or HDR-M antenna array, not both.

DCR-MT Series Quadrapole Antenna

- 18 kW Per Bay
- Omnidirectional within 1 dB
- Circularly polarized
- Stainless steel construction
- Pole or tower top mount
- Broadband
- Low ice sensitivity, deicers optional

The DCR-MT top mount version of the popular quadrapole antenna is specifically designed for those applications where a near perfectly omnidirectional signal is desired. This antenna is designed to be self-supporting above the top of the mounting structure, thus eliminating the pattern distortion that is caused by mounting the antenna on the side of a metal tower or pole.

The high strength stainless steel construction provides an extremely rugged radiating element that imposes minimal windload on the mounting structure. The antenna base flange is designed to attach to a standard 6" pipe flange. The inside diameter of a 6" pipe is large enough to pass a standard 3 1/8" coax flange to feed the antenna. This antenna is currently available in a single bay design. It is conservatively rated for 18 kW of input power. For more information on this or other Dielectric products, please contact our factory.

General Specifications

Polarization:	Circular
Pattern Circularity in Free Space:	± 1 dB
VSWR (max.) at Input, w/o field trim:	
Top Mounted (±200 KHz)	1.05:1
Input:	3-1/8" EIA
Section Dimensions:	
Diameter	36" (915mm)
Height	60" (1525mm)

Electrical Specifications

Antenna Type	Gain[1] Power (dB)[1]	Power Rating kW[2]
DCR-MT1	0.46 (-3.37)	18

Notes:

(1) Power gain in each polarization
(2) Power rating based on 40˚C (104˚F) ambient. Multiply values listed by 0.8 for 50˚C (122˚F) ambient. DCT-MT with greater power ratings are available.

DCR-C / HDR-C

- DCR-C: Right Hand Circularly Polarized
- HDR-C: Left Hand Circularly Polarized
- DCR-C/HDR-C IBOC compatible
- Interleaved provides -40dB of isolation
- Stainless steel elements
- Ideal for Class B and C stations
- 10 kW for a single bay
- Fine matcher included
- Radomes or integral deicers optional
- VSWR field adjustable

General Specifications

Polarization:	Circular
Pattern Circularity in Free Space:	± 1 dB
VSWR (max.) at Input, w/o field trim:	
Top Mounted	1.2:1
Side Mounted	1.5:1
VSWR (max.) at Input, w/field trim, Top or Side Mounted (100 KHz):	1.07:1
Input:	3-1/8" EIA
Bay Dimensions (without Radome):	
Diameter	20.7" (526 mm)
Height	20" (503 mm))
Bay Dimensions (with Radome):	
Diameter	30" (762mm)
Height	29" (737mm)

The DCR-C/HDR-C is circularly polarized with a power rating of 10 kW for a single bay, and is available in stacked arrays of up to 12 bays with an input rating to 40 kW. 14 and 16 bay arrays are available with special VSWR specifications. For situations where ice formation is common, the arrays can be equipped with optional electrical deicers or radomes. The antenna is DC grounded for lightning protection and does not require shorting stubs. Each array is supplied with an input fine matcher for field optimization.

End-Fed or Center-Fed Arrays

Two power distribution methods are used with the DCR-C/HDR-C antenna. The array is usually end-fed unless it includes beam tilt and/or null fill. In this case, the sections are fed from a center point. The input connection in either case is 3-1/8" EIA.

Beam Tilt and Null Fill

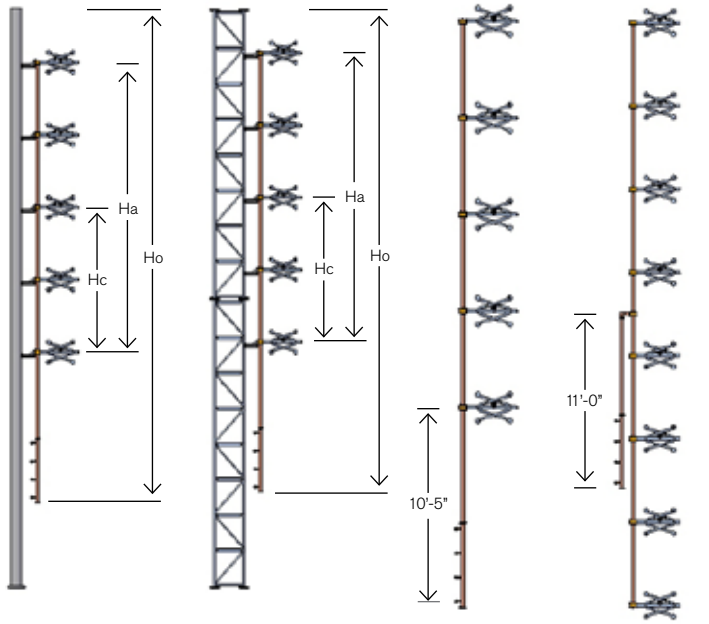
Beam tilt and/or null fill are optional extras on the DCR-C/HDR-C series. These options are ordinarily specified for arrays of 8 bays or more. Arrays with 6 bays or less may include one or both options and typically are designed as a center-fed array.

Directional Arrays

The DCR-C/HDR-C antenna series is available in directional arrays which are custom-built to the needs of the station.

DCR-C / HDR-C

Mounting Dimensions



Pole Mounting **Side Mounting** **End-Fed 1-7 Sections** **Center-Fed**

Ha = Antenna aperture length
Hc = Antenna center of radiation
Ho = Antenna overall length needed for mounting
Ha = 984/f x [s(x-1)]
Hc = Ha/2
$Ho_{end\text{-}fed} = Ha + 5'_{top} + 10' - 5"_{bottom}$
$Ho_{center\text{-}fed} = Ha + 5'_{top} + 5'_{bottom}$

All dimensions in feet
f = frequency in megahertz (MHz)
s = bay spacing in fraction of wavelengths
example: ½ wavelength = .5
x = number of antenna bays

Note: Antennas ordered w/beam tilt and/or null fill are supplied with center feed and require an even number of bays

DEICER SPECIFICATIONS:
Power (nominal per bay): 600 W

Voltage: may be wired for 208 V or 240 V service, single or three phase.

Optional: Ice sensor and deicer controller

Mechanical Specifications

Antenna Type DCR-C or HDR-C	# of Bays	Without Radomes				With Radomes				With Deicers			
		Weight lbs (kg)		CaAc ft² (m²)		Weight lbs (kg)		CaAc ft² (m²)		Weight lbs (kg)		CaAc ft² (m²)	
		λ Spaced	½ λ Spaced	λ Spaced	½ λ Spaced	λ Spaced	½ λ Spaced	λ Spaced	½ λ Spaced	λ Spaced	½ λ Spaced	λ Spaced	½ λ Spaced
DCR-C1 HDR-C1	1	145 (66)		5.4 (0.5)		175 (79)		9.2 (0.9)		148 (67)		5.7 (0.5)	
DCR-C2 HDR-C2	2	228 (103)	213 (97)	10.4 (1.0)	8.9 (0.8)	288 (131)	273 (124)	18.0 (1.7)	16.5 (1.5)	234 (106)	219 (99)	10.9 (1.0)	9.4 (0.9)
DCR-C3 HDR-C3	3	310 (141)	280 (127)	15.5 (1.4)	12.5 (1.2)	400 (181)	370 (168)	27.0 (2.5)	24.0 (2.2)	319 (145)	289 (131)	16.25 (1.5)	13.3 (1.2)
DCR-C4 HDR-C4	4	393 (178)	348 (158)	20.5 (1.9)	16.0 (1.5)	513 (233)	468 (212)	35.8 (3.3)	31.3 (2.9)	405 (184)	360 (163)	21.5 (2.0)	17.0 (1.6)
DCR-C5 HDR-C5	5	475 (215)	415 (188)	24.4 (2.3)	18.4 (1.7)	625 (283)	565 (256)	43.5 (4.0)	37.5 (3.5)	490 (222)	430 (195)	25.7 (2.4)	19.7 (1.8)
DCR-C6 HDR-C6	6	558 (253)	483 (219)	30.7 (2.9)	23.2 (2.2)	738 (335)	663 (301)	53.6 (5.0)	46.1 (4.3)	576 (261)	501 (227)	32.2 (3.0)	24.7 (2.3)
DCR-C7 HDR-C7	7	640 (290)	550 (250)	35.6 (3.3)	26.6 (2.5)	850 (386)	760 (345)	62.3 (5.8)	53.3 (5.0)	661 (300)	571 (259)	37.4 (3.5)	28.4 (2.6)
DCR-C8 HDR-C8	8	766 (347)	661 (300)	41.0 (3.8)	30.5 (2.8)	1006 (456)	901 (409)	71.6 (6.7)	61.1 (5.7)	790 (350)	685 (311)	43.0 (4.0)	32.5 (3.0)
DCR-C10 HDR-C10	10	901 (409)	766 (347)	51.1 (4.7)	37.6 (3.5)	1201 (545)	1066 (484)	89.3 (8.3)	75.8 (7.0)	931 (422)	796 (361)	53.6 (5.0)	40.1 (3.7)
DCR-C12 HDR-C12	12	1036 (470)	871 (395)	61.2 (5.7)	44.7 (4.2)	1396 (633)	1231 (558)	107.0 (9.9)	90.5 (8.4)	1072 (486)	907 (411)	64.2 (6.0)	47.7 (4.4)

Notes:

1. CaAc and weights include bays and standard extension brackets for mounting. Excludes feed custom mounts. For antennas that include pattern studies, contact factory for additional information.
2. Dimensions are for antennas at 98.0 MHz and can vary ± 10% across the band.
3. Ice shields are strongly recommended for areas subject to icing conditions. Dielectric is not responsible for antenna damage caused by impact from falling ice.
4. Calculated area (CaAc) expressed in TIA/EIA-222-F standard.
5. Specs. are for a single DCR-C antenna array or HDR-C antenna array, not both.

DCR-C / HDR-C

Electrical Specifications

Antenna Type DCR-C or HDR-C	Gain Polarization spacing				Power Rating kW[3]
	λ Spacing		½ λ Spacing		
	Power Gain	dB	Power Gain	dB	
DCR-C1 HDR-C1	0.46	-3.37			10
DCR-C2 HDR-C2	1.0	0	0.7	-1.55	20
DCR-C3 HDR-C3	1.5	1.76	1.0	0	30
DCR-C4 HDR-C4	2.1	3.22	1.3	1.14	40
DCR-C5 HDR-C5	2.7	4.31	1.6	2.04	40
DCR-C6 HDR-C6	3.2	5.05	1.8	2.55	40
DCR-C7 HDR-C7	3.8	5.80	2.1	3.22	40
DCR-C8 HDR-C8	4.3	6.34	2.4	3.8	40
DCR-C10 HDR-C10	5.5	7.40	3.1	4.91	40
DCR-C12 HDR-C12	6.6	8.2	3.7	5.68	40

Notes:

1. RMS gain data is given relative to dipole. Values are for midband and include standard harness configurations. Actual gain will vary depending on feed system, frequency, null fill, and beam tilt.
2. Average power ratings are nominal @ 40˚C ambient. Assumes constant pressurization with dry air or nitrogen. Ratings may vary based on specific feed system design and local conditions.
3. Higher power ratings and custom feed systems may be available on request.
4. Antenna components and feed harnesses are optimized for FM channels of interest.
5. Specs. are for a single DCR-C antenna array or HDR-C antenna array, not both.

DCR-H / HDR-H

- DCR-H: Right Hand Circularly Polarized
- HDR-H: Left Hand Circularly Polarized
- DCR-H/HDR-H IBOC compatible
- Interleaved provides >-40dB of isolation
- Stainless steel elements
- Ideal for Class A and B stations
- 4 kW for a single bay
- Fine matcher included
- Radomes or integral deicers optional
- VSWR field adjustable
- No circulators required

General Specifications

Polarization:	Circular
Pattern Circularity in Free Space:	± 1 dB
VSWR (max.) at Input, w/o field trim:	
Top Mounted	1.2:1
Side Mounted	1.5:1
VSWR (max.) at Input, w/field trim, Top or Side Mounted (±100 KHz):	1.07:1
Input:	1-5/8" EIA
Bay Dimensions (without Radome):	
Diameter	20.7" (526 mm)
Height	20" (503 mm))

The DCR-H/HDR-H antenna is a low-power version of the DCR-C/HDR-C and is available in one through twelve bays with an input power rating up to 12 kW. Each array is supplied with an input fine matcher for field optimization. For situations where ice formation is common, the arrays can be equipped with optional electrical deicers or radomes. The antenna is DC grounded for lightning protection and does not require shorting stubs. Each array is supplied with an input fine matcher for field optimization.

End-Fed or Center-Fed Arrays

Two power distribution methods are used with the DCR-H/HDR-H antenna. The array is usually end-fed unless it includes beam tilt and/or null fill. In this case, the sections are fed from a center point. The input connection in either case is 1-5/8" EIA.

Beam Tilt and Null Fill

Beam tilt and/or null fill are optional extras on the DCR-H/HDR-H series. If optional beam tilt or null fill is specified, the antenna is designed as a center-fed array.

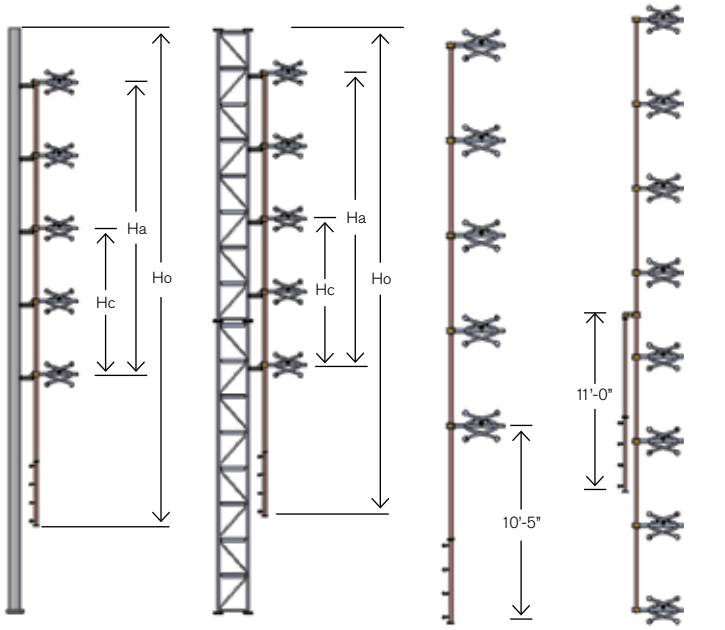
Directional Arrays

The DCR-H/HDR-H antenna is available in directional arrays which are custom-built to the needs of the station.

Low downward radiation options available — contact factory.

DCR-H / HDR-H

Mounting Dimensions



Pole Mounting **Side Mounting** **End-Fed 1-7 Sections** **Center-Fed**

Ha = Antenna aperture length
Hc = Antenna center of radiation
Ho = Antenna overall length needed for mounting
Ha = 984/f x [s(x-1)]
Hc = Ha/2
$Ho_{end\text{-}fed} = Ha + 5'_{top} + 10' - 5"_{bottom}$
$Ho_{center\text{-}fed} = Ha + 5'_{top} + 5'_{bottom}$

All dimensions in feet
f = frequency in megahertz (MHz)
s = bay spacing in fraction of wavelengths
example: ½ wavelength = .5
x = number of antenna bays

Note: Antennas ordered w/beam tilt and/or null fill are supplied with center feed and require an even number of bays

DEICER SPECIFICATIONS:
Power (nominal per bay): 600 W

Voltage: may be wired for 208 V or 240 V service, single or three phase.

Optional: Ice sensor and deicer controller

Mechanical Specifications

Antenna Type DCR-C or HDR-C	# of Bays	Without Radomes				With Radomes				With Deicers			
		Weight lbs (kg)		CaAc ft² (m²)		Weight lbs (kg)		CaAc ft² (m²)		Weight lbs (kg)		CaAc ft² (m²)	
		λ Spaced	½ λ Spaced	λ Spaced	½ λ Spaced	λ Spaced	½ λ Spaced	λ Spaced	½ λ Spaced	λ Spaced	½ λ Spaced	λ Spaced	½ λ Spaced
DCR-H1 HDR-H1	1	108 (49)		3.7 (0.3)		138 (63)		7.5 (0.7)		111 (50)		4.0 (0.4)	
DCR-H2 HDR-H2	2	176 (80)	169 (76)	7.1 (0.7)	6.3 (0.6)	182 (83)	175 (79)	14.7 (1.4)	13.9 (1.3)	182 (83)	175 (79)	7.6 (0.7)	6.8 (0.6)
DCR-H3 HDR-H3	3	243 (110)	228 (103)	10.6 (1.0)	9.0 (0.8)	333 (151)	318 (144)	22.1 (2.1)	20.5 (1.9)	252 (114)	237 (108)	11.4 (1.1)	9.8 (0.9)
DCR-H4 HDR-H4	4	311 (141)	289 (131)	14.1 (1.3)	11.7 (1.1)	431 (195)	409 (185)	29.4 (2.7)	27.0 (2.5)	323 (147)	301 (136)	15.1 (1.4)	12.7 (1.2)
DCR-H5 HDR-H5	5	378 (171)	348 (158)	16.4 (1.5)	13.2 (1.2)	528 (239)	498 (226)	35.5 (3.3)	32.3 (3.0)	393 (178)	363 (165)	17.7 (1.6)	14.5 (1.3)
DCR-H6 HDR-H6	6	446 (202)	409 (185)	21.1 (2.0)	17.1 (1.6)	626 (284)	589 (267)	44.0 (4.1)	40 (3.7)	464 (210)	427 (193)	22.6 (2.1)	18.6 (1.7)
DCR-H7 HDR-H7	7	513 (233)	468 (212)	24.4 (2.3)	19.6 (1.8)	723 (328)	678 (308)	51.1 (4.7)	46.3 (4.3)	534 (242)	489 (222)	26.2 (2.4)	21.4 (2.0)
DCR-H8 HDR-H8	8	624 (283)	572 (259)	28.2 (2.6)	22.6 (2.1)	864 (392)	812 (368)	58.8 (5.5)	53.2 (4.9)	648 (294)	596 (270)	30.2 (2.8)	24.6 (2.3)
DCR-H10 HDR-H10	10	714 (324)	647 (293)	35.1 (3.3)	27.9 (2.6)	1014 (460)	947 (429)	73.3 (6.8)	66.1 (6.1)	744 (337)	677 (307)	37.6 (3.5)	30.4 (2.8)
DCR-H12 HDR-H12	12	819 (371)	737 (334)	42.0 (3.9)	33.2 (3.1)	1179 (535)	1 097 (497)	87.8 (8.2)	79.0 (7.3)	855 (389)	773 (350)	45.0 (4.2)	36.2 (3.4)

Notes:

1. CaAc and weight includes bays and standard extension brackets for mounting. Excludes custom mounts. For antennas that include pattern studies, contact factory for additional information.
2. Dimensions are for antennas at 98.0 MHz and can vary ± 10% across the band.
3. Ice shields are strongly recommended for areas subject to icing conditions. Dielectric is not responsible for antenna damage caused by impact from falling ice.
4. Calculated area (CaAc) expressed in TIA/EIA-222-F standard.
5. Specs. are for a single DCR-H antenna array or HDR-H antenna array, not both.

DCR-H / HDR-H

Electrical Specifications

Antenna Type DCR-H or HDR-H	Gain Polarization spacing				Power Rating kW[3]
	λ Spacing		½ λ Spacing		
	Power Gain	dB	Power Gain	dB	
DCR-H1 HDR-H1	0.46	-3.37			4
DCR-H2 HDR-H2	1.0	0	0.7	-1.55	8
DCR-H3 HDR-H3	1.5	1.76	1.0	0	12
DCR-H4 HDR-H4	2.1	3.22	1.3	1.14	12
DCR-H5 HDR-H5	2.7	4.31	1.5	1.76	12
DCR-H6 HDR-H6	3.2	5.05	1.8	2.55	12
DCR-H7 HDR-H7	3.8	5.80	2.1	3.22	12
DCR-H8 HDR-H8	4.3	6.34	2.4	3.80	12
DCR-H10 HDR-H10	5.5	7.40	3.0	4.77	12
DCR-H12 HDR-H12	6.6	8.2	3.6	5.56	12

Notes:

1. RMS gain data is given relative to dipole. Values are for midband and include standard harness configurations. Actual gain will vay depending on feed system, frequency, null fill, and beam tilt.
2. Average power ratings are nominal @ 40˚C ambient. Assumes constant pressurization with dry air or nitrogen. Ratings may vary based on specific feed system design and local conditions.
3. Higher power ratings and custom feed systems may be available on request.
4. Antenna components and feed harnesses are optimized for FM channels of interest
5. Specs. are for a single DCR-H antenna array or HDR-H antenna array, not both.

DCR-S / DCR-M

- Superior bandwidth for analog or -10dB IBOC, or both
- Broadband arrays from 1/2 wave spaced to full wave spacing (see chart)
- Arrays from 2 to 12 bays
- Circular polarization
- Left or right hand polarization
- Full FM band operation available in 1/2 spaced arrays
- Low VSWR
- Series fed arrays
- High input power capability
- Simple design leads to ease of installation
- Common amplification or high level combined with single input
- Beam tilt and null fill available
- Radomes or deicers available

Dielectric offers DCR-M and DCR-S models at ½ wavelength spacing that can cover the entire FM band for purposes of multiplexing signals. The broadband DRCM and DCR-S antennas can be fed with a single line input or a dual input for redundancy purposes.

The input power can be significantly higher than our DCR-M models and we can feed with dual 6" inputs. Average Power ranges from 40 kW to over 120 kW are available and each system is quickly designed to meet the needs of the broadcaster and market they serve.

The antenna design is offered with customer required beam tilt and null fill requirements. Custom selections are engineered and manufactured at our facility. In addition, both the DCR-M and DCR-S are offered with heaters and radomes.

The full band operation allows broadcasters to simulcast from one antenna. The antenna is designed to handle the peak power of multiple signals including IBOC signals at -10 dB. The DCR-S was designed to handle more stations at a higher safety margin for multipke signals including IBOC at -10 dB. The higher peak power design should be considered. Dielectric takes pride in the safe power levels at the design stage to ensure the broadcaster has an antenna that will produce sound quality signals for many years.

DCR-S / DCR-M

Dielectric FM Achievable Bandwidths

	1/2 Wave Spaced	Funky Elbow	Full Wave Spaced
2E	15 MHz	7 MHz	5 MHz
2C	12 MHz	7 MHz	5 MHz
3E	15 MHz	7 MHz	5 MHz
4E	8 MHz	5 MHz	3 MHz
4C	15 MHz	7 MHz	5 MHz
5E	6 MHz	4 MHz	3 MHz
5C	15 MHz	7 MHz	5 MHz
6E	5 MHz	4 MHz	3 MHz
6C	15 MHz	7 MHz	5 MHz
8C	8 MHz	5 MHz	3 MHz
10C	15 MHz	7 MHz	5 MHz
12C	15 MHz	7 MHz	5 MHz

E = End Fed C = Center Fed

Notes:
Discuss additional bandwidth considerations with Dielectric sales representative.
Additional bandwidths available upon request.

Refer to DCR-S/HDR-S (pages 20-22) and DCR-M/HDR-M (pages 25-27) for specifications.

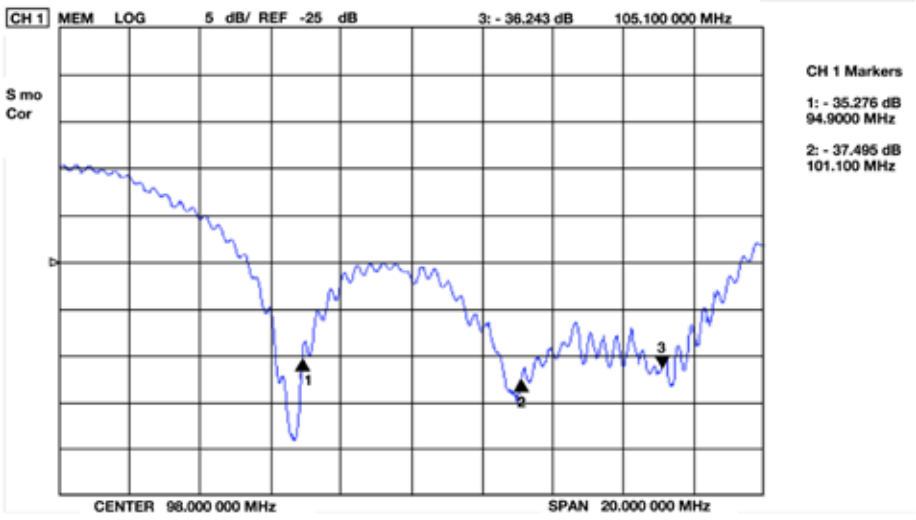
DCR-S / DCR-M

- Circular polarization
- Left or right hand polarization
- Full FM band operation
- Low VSWR
- Series fed arrays
- High input power capability
- Simple design leads to ease of installation
- Designed for analog and -10dB IBOC signals
- Common amplification or high level combined with single input
- 1/2 wave spaced arrays
- Beam tilt and null fill available
- Radomes or deicers available

Dielectric offers DCR-M and DCR-S models at ½ wavelength spacing that can cover the entire FM band for purposes of multiplexing signals. The auxiliary antenna is designed for a 4 bay or 6 bay antenna and can handle multiple signals including IBOC signals at -10 dB.

The input power can be significantly higher than our typical DCR-M models and we can feed with a 6" input. Average Power ranges from 40 kW to over 120 kW are available and each system is quickly designed to meet the needs of the broadcaster and market they serve. This auxilary antenna is designed to quickly deploy to site and give the customer flexibilty. In addition the antenna design allows the installer to quickly install. In addition the design is simple which yields a simplistic install that is error free. In addition both the DCR-M and DCR-S is offered with heaters and radomes.

The full band operation allows broadcatsres to simulcast from one antenna in emergency situations or when the main antenna is being maintained or serviced. The antenna is designed to handle the peak power of multiple signals including IBOC signals at -10 dB. The DCR-S was designed to handle more stations at a higher safety margin for multipkle signals including IBOC at -10 dB. The higher peak power design should be considered. Dielectric takes pride in the safe power levels at the design stage to ensure the broadcaster has an antenna that will produce sound quality signals for many years.



Notes:

System VSWR or 6 bay installed system.

Typical response for non-commercial band.

System includes 1200' of transmission line.
Refer to DCR-S/HDR-S (pages 20-22) and DCR-M/HDR-M (pages 25-27) for specifications.

DCR-S / DCR-M

Dielectric FM Achievable Bandwidths

	1/2 Wave Spaced	Funky Elbow	Full Wave Spaced
2E	15 MHz	7 MHz	5 MHz
2C	12 MHz	7 MHz	5 MHz
3E	15 MHz	7 MHz	5 MHz
4E	8 MHz	5 MHz	3 MHz
4C	15 MHz	7 MHz	5 MHz
5E	6 MHz	4 MHz	3 MHz
5C	15 MHz	7 MHz	5 MHz
6E	5 MHz	4 MHz	3 MHz
6C	15 MHz	7 MHz	5 MHz
8C	8 MHz	5 MHz	3 MHz
10C	15 MHz	7 MHz	5 MHz
12C	15 MHz	7 MHz	5 MHz

E = End Fed C = Center Fed

Notes:
Discuss additional bandwidth considerations with Dielectric sales representative.
Additional bandwidths available upon request.

Refer to DCR-S/HDR-S (pages 20-22) and DCR-M/HDR-M (pages 25-27) for specifications.

DCR-L

- 1 kW for a single bay
- Circularly polarized
- Pressurization not required
- Stainless steel construction
- Very low weight and windload
- Option available for field adjustable arms to any FM frequency

The DCR-L antenna series is intended for use by the low power broadcaster. The DCR-L is available in arrays from one to six sections.

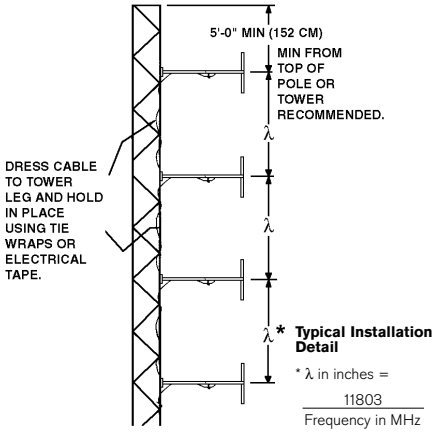
The antennas are constructed of stainless steel and are suitable for use in any environment. The type N connectors are weather tight so that no pressurization is needed. Low windload radomes are available for areas where protection from icing is desired.

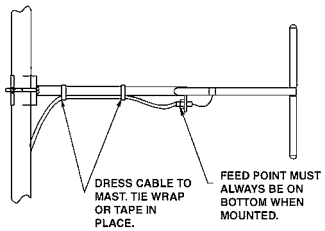
Feed System

The feed system has a type N female input and can be used up to 1 kW. The interbay feedline is flexible coax cable. Custom feed systems are available for several variations including special bay spacing to minimize downward radiation.

Mounting

The DCR-L antennas are made with an integral mount designed to attach to a tower leg or pole from 1" to 3-1/2" in diameter.





DCR-L

Electrical Specifications

Antenna Type	Gain Polarization[1]				Power Rating kW[3]
	λ Spacing		½ λ Spacing		
	Power Gain	dB	Power Gain	dB	
DCR-L1	0.46	-3.37	0.46	-3.37	1
DCR-L2	1.0	0	0.70	-1.55	1
DCR-L3	1.5	1.76	1.00	0	1
DCR-L4	2.1	3.22	1.30	1.14	1
DCR-L6	3.2	5.05	1.80	2.55	1

1. RMS gain data is given relative to dipole. Values are for each polarization and nominal for midband and include standard harness configurations. Actual gain will vary depending on feed system, frequency, null fill and bean tilt.
2. Average power ratings are nominal @ 40°C ambient. Assumes constant pressurization with dry air or nitrogen. Ratings may vary based on specific feed system design and local conditions.
3. If specified, antenna components and feed harnesses are optimized for FM channels of interest.

Mechanical Specifications

Antenna Type	# of bays	Without Radomes			With Radomes		
		Weight lbs (kg)	Windload lbs (kg)	Projected Area ft² (m²)	Weight lbs (kg)	Windload lbs (kg)	Projected Area ft² (m²)
DCR-L1	1	8 (4)	30 (14)	0.6 (0.1)	18 (8)	88 (40)	1.8 (0.2)
DCR-L2	2	31 (14)	75 (34)	1.5 (0.1)	51 (23)	176 (80)	3.5 (0.3)
DCR-L3	3	39 (18)	105 (48)	2.1 (0.2)	69 (31)	264 (120)	5.3 (0.5)
DCR-L4	4	47 (21)	135 (61)	2.7 (0.3)	87 (40)	352 (160)	7 (0.7)
DCR-L6	6	63 (29)	195 (89)	3.9 (0.4)	123 (56)	528 (240)	10.6 (1.0)

Notes:

1. Weights include bays and standard extension brackets for mounting. Excludes feed system and custom mounts. For antennas that included pattern studies, contact factory for additional information.
2. Projected area includes bays and standard extension brackets. Excludes feed system and custom mounts.
3. Dimensions are for antennas at 98.0 MHz and can vary ±10% across the band.
4. Ice shields are strongly recommended for areas subject to tower icing. Dielectric is not responsible for antenna damage caused by impact from falling ice.
5. Area calculated expressed in terms of equivalent flats (RS-222-C-standard).
6. Windload force calculated based on 50 pounds per square foot (50psf) on flats (RS-222-C-standard).
7. To convert area to equivalent rounds, multiply area by 1.5.
8. To convert area to Aerodynamic area (CaAa - linear or CaAc - discrete) based on EIA-222-F standard, multiply area by 1.8.

DCR-T

- Band tunable
- Economical
- IBOC compatible
- Aluminum elements
- Ideal for Class A and B stations
- 1 kW for single bay*
- VSWR field adjustible
- Ease of installation
- Lightweight

The DCR-T antenna is a low-power version of the DCR-H and is available in one through eight bays with an input power rating up to 8 kW. Each array is field tunable and can be optimized anywhere on the FM dial. The antenna is DC grounded for lightning protection and does not require shorting stubs.

Branch-Fed Arrays

The array is branch-fed. In this case, the sections are fed from a power divider and each element is 50 Ω (Ohm). The input connection is 1-5/8" EIA. Full wave and half wavelength options available. Upon request, other wavelength spacings are available.

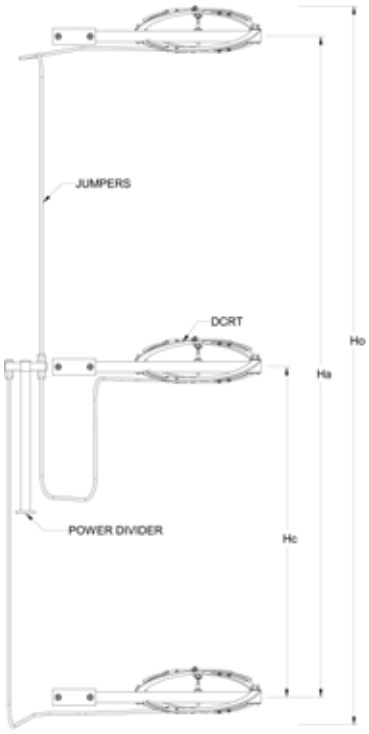
Beam Tilt and Null Fill

Beam tilt and/or null fill are optional extras on the DCR-T series.

General Specifications

Polarization:	Circular
Pattern Circularity in Free Space:	± 1 dB
VSWR (max.) at Input, w/o field trim:	
Top Mounted	1.2:1
Side Mounted	1.5:1
VSWR (max.) at Input, w/field trim, Top or Side Mounted (±100 KHz):	1.07:1
Input:	1-5/8" EIA
Bay Dimensions (without Radome):**	
Diameter	20.7" (526 mm)
Height	20" (503 mm))

Mounting Dimensions



Side Mounting

Ha = Antenna aperture length

Hc = Antenna center of radiation

Ho = Antenna overall length needed for mounting

Ha = 984/f x [s(x-1)]

Hc = Ha/2

$Ho_{center\text{-}fed} = Ha + 5'_{top} + 5'_{bottom}$

All dimensions in feet

f = frequency in megahertz (MHz)

s = bay spacing in fraction of wavelengths
example: ½ wavelength = .5

x = number of antenna bays

*Other power ratings available, please contact factory.
**Other input sizes available upon request.

DCR-T

Electrical Specifications

Antenna Type	Gain Polarization spacing λ Spacing Power Gain	dB	Power Rating kW[3]
DCRT1	0.46	-3.37	1
DCRT2	1.0	0	2
DCRT3	1.5	1.76	3
DCRT4	2.1	3.22	4
DCRT5	2.7	4.31	5
DCRT6	3.2	5.05	6
DCRT7	3.8	5.80	7
DCRT8	4.3	6.34	8

Notes:

1. RMS gain data is given relative to dipole. Values are for midband and include standard harness configurations. Actual gain will vay depending on feed system, frequency, null fill, and beam tilt.
2. Average power ratings are nominal @ 40˚C ambient. Ratings may vary based on specific feed system design and local conditions.
3. Higher power ratings and custom feed systems may be available on request.
4. Antenna components and feed harnesses are optimized for FM channels of interest.

Mechanical Specifications

Antenna Type	# of Bays	Weight lbs (kg) λ Spaced	Weight lbs (kg) ½ λ Spaced	CaAc ft² (m²) λ Spaced	CaAc ft² (m²) ½ λ Spaced
DCRT1	1	17.5 (8.0)	17.5 (8.0)	2.4 (0.22)	2.4 (0.22)
DCRT2	2	47.4 (21.5)	46.5 (21.1)	6.0 (0.56)	5.7 (0.53)
DCRT3	3	67.9 (30.9)	66.1 (30.0)	9.4 (0.87)	8.8 (0.82)
DCRT4	4	90.2 (41.0)	86.0 (39.1)	13.3 (1.24)	12.0 (1.11)
DCRT5	5	114.0 (51.8)	106.5 (48.4)	17.8 (1.65)	15.4 (1.43)
DCRT6	6	145.8 (66.3)	142.2 (64.6)	20.3 (1.89)	18.8 (1.74)
DCRT7	7	168.3 (76.5)	162.0 (73.6)	24.6 (2.29)	22.0 (2.04)
DCRT8	8	190.4 (86.5)	182.0 (82.7)	28.7 (2.67)	25.3 (2.35)

Notes:

1. CaAc and weight include bays, power dividers, inter-bay feedlines, and standard extension brackets for mounting.
2. Dimensions are for antennas at 98.0 MHz and can vary across the band.
3. Wind area (CaAc) is calculated per the TIA/EIA-222-F standard.

Vertically Polarized Medium Power FM Antenna

- 1 kW for a single bay
- Low Cost
- Low Windload
- Vertical Polarization
- High Power Handling
- Lightweight aluminum construction
- Input Power up to 40 kW
- VSWR Field Adjustable

The DCV antenna is designed for installations where a high power vertical polarization antenna is desired. It has an input power rating of 5 kW per bay. It is available in stacked arrays of up to 8 sections with an input power rating of 40 kW.

The Dipole element is made of lightweight aluminum tubing with a protective coating of iridite, resulting in a strong and lightweight structure. Where required, low windload radomes are available as an option.

Power gain is proportional to the number of dipoles in the array. Each dipole provides approximately 1.0 gain (0 dB). This factor improves slightly with the number of sections in the array as well as with directional patterns. Contact the factory to determine the gain for your application.

The bandwidth of the DCV antenna allows for the use with multi-station applications. The VSWR over a 6 MHz band using a branch feed system is 1.2:1.0. The VSWR using an end fed configuration is 1.2:1.0 over a 3 MHz band.

Diplexing equipment and transmission line for multi-station systems can be provided by Dielectric allowing one supplier for all your RF requirements.

DCPJ

- Omni or directional radiation pattern
- Economic design for single station operation
- Single line or split feed arrangements
- Designed for -10dB IBOC signals
- Single input per panel
- Fine matcher included
- Optional radomes
- Available in arrays of 1 to 12 layers
- Input: 3-1/8" 50 ohm EIA
- Multi-station options available

The DCPJ Cross Dipole FM Panel Antennas are designed to provide circularly polarized transmission for single station operation at an economical cost where optimum circularity of pattern or controlled directional characteristics are the prime requisites. The antenna is designed for face mounting, three panels per layer, around a triangular tower structure. Single or multi-layer operation is used, depending on the gain desired.

Feed System

The feed system is simple, comprised of a single 3-1/8" input with power dividers feeding each panel. The feed system is fully pressurized. Elements are at DC ground for lightning protection.

Radome Protection

For situations where ice formation is common the elements can be equipped with optional radomes.

Gains and Power Rating

RMS gains from 0.46 (-3.37dB) to 6.6 (8.2dB) are available.

Options

Electrical beam tilt and null fill are available.

Accommodates Split-Feed System

The DCPJ antenna is designed to operate with a single 3-1/8" array input however, the array may be configured to operate with two transmission lines between the array and the transmitter. In the event of failure of some array component, the inoperable half can be switched out of service and operation continued from the other half of the array at reduced ERP until the outage is corrected. Appropriate switching arrangements in the transmitter room will feed either or both portions.

Pattern Circularity

On towers of triangular cross section up to 7-1/2 foot face width, the following omnidirectional circularity values can be obtained:

Horizontally Polarized Component:	+/-2 dB average
Vertically Polarized Component:	+/-2.5 dB average

On towers of triangular cross section with an 8 to 10 foot face width, the anticipated circularity is:

Horizontally Polarized Component:	+/-2 dB average
Vertically Polarized Component:	+/-3 dB average

Tower member configuration does influence circularity. Optional scaled pattern measurements taking into account the actual tower configuration provide more precise data.

DCPJ

Input VSWR

At the input to the antenna feed system the VSWR is 1.1:1 or better across the station channel bandwidth with field adjustment of the variable transformer provided.

Windloads

The antenna is designed to withstand winds of 110 mph. Under those conditions the windload on a layer of panels is shown in the table below. The values were calculated as follows:Windload =Frontal Windload +(2)(Frontal Windload)(cos 60 degrees). Therefore the tabulated values do not include the effect of the tower or assume any shielding of one panel by another panel.

Weights for the various numbers of layers are also given.

Electrical Specifications

Antenna Type	# of layers	Gain Polarization[1] λ Spacing		Power Rating kW[3]
		Power Gain	dB	
DCPJ-1	1	0.46	-3.37	10
DCPJ-2	2	1.0	0	20
DCPJ-3	3	1.5	1.76	30
DCPJ-4	4	2.1	3.22	40
DCPJ-5	5	2.7	4.31	45
DCPJ-6	6	3.3	5.19	45
DCPJ-8	8	4.4	6.43	45
DCPJ-10	10	5.5	7.40	45
DCPJ-12	12	6.6	8.20	45

Notes:

1. RMS gain data is given relative to dipole. Values are for each polarization and nominal for midband and include standard harness configurations. Actual gain will vary depending on feed system, frequency, null fill and bean tilt.
2. Average power ratings are nominal @ 40°C (104˚F) ambient. Assumes constant pressurization with dry air or nitrogen. Ratings may vary based on specific feed system design and local conditions.
3. Higher power ratings and custom feed systems may be available on request.
4. Antenna components and feed harnesses are optimized for FM channels of interest.

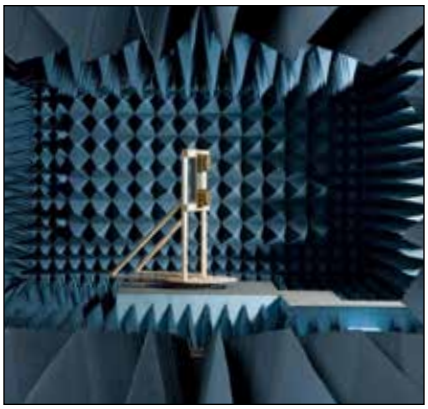
DCPJ

Mechanical Specifications

Antenna Type	# of layers	Without Radomes Weight lbs (kg)	Without Radomes Windload lbs (kg)	Projected Area ft² (m²)
DCPJ-1	1	925 (421)	850 (387)	17 (1.6)
DCPJ-2	2	1,700 (774)	1,700 (774)	34 (3.2)
DCPJ-3	3	2,475 (1,126)	2,550 (1,160)	51 (4.7)
DCPJ-4	4	3,365 (1,531)	3,400 (1,547)	68 (6.3)
DCPJ-5	5	4,250 (1,934)	4,250 (1,934)	85 (7.9)
DCPJ-6	6	5,180 (2,357)	5,100 (2,321)	102 (9.5)
DCPJ-8	8	6,875 (3,128)	6,800 (3,094)	136 (12.6)
DCPJ-10	10	8,620 (3,922)	8,500 (3,868)	170 (15.8)
DCPJ-12	12	10,350 (4,709)	10,200 (4,641)	204 (19.0)

Notes:

1. Weights include bays and standard extension brackets for mounting. Excludes feed system and custom mounts. For antennas that included pattern studies, contact factory for additional information.
2. Projected area excludes feed system and custom mounts.
3. Dimensions are for antennas at 98.0 MHz and can vary ±10% across the band.
4. Ice shields are strongly recommended for areas subject to tower icing. Dielectric is not responsible for antenna damage caused by impact from falling ice.
5. Area calculated expressed in terms of equivalent flats (RS-222-C-standard).
6. Windload force calculated based on 50 pounds per square foot (50psf) on flats (RS-222-C-standard).
7. To convert area to equivalent rounds, multiply area by 1.5.
8. To convert area to Aerodynamic area (CaAa - linear or CaAc - discrete) based on EIA-222-F standard, multiply area by 1.8.



Dielectric offers state-of-the-art anechoic chamber FM pattern measurements, or full-scale pattern measurements.

A PATTERN STUDY measures the effect a tower has on the antenna signal. PATTERN OPTIMIZATION is a modification of the pattern to meet specific customer requirements.

In a Pattern Study, the antenna is mounted on a replica of your tower and measurements are made to determine the relative signal strength around the tower. This replica includes all transmission line, waveguide runs, conduit and ladder assemblies passing through the antenna aperture. The measurements are repeated for different mountings and orientations of the antenna and the data is used to select an antenna mounting which best meets your requirements.

Optimization may require the addition of parasitic radiating elements to be mounted near the antenna to the direct pattern in a more desired direction.

Dielectric's FM azimuth pattern measurements are performed in the specially designed anechoic chamber operating at 4.4 times FM carrier frequencies. At this frequency, the antenna, tower structure, and transmission lines can be accurately modeled to 4.4:1 scale. The anechoic chamber allows for a more detailed study, in a noise and reflection free environment, resulting in the most accurate results.

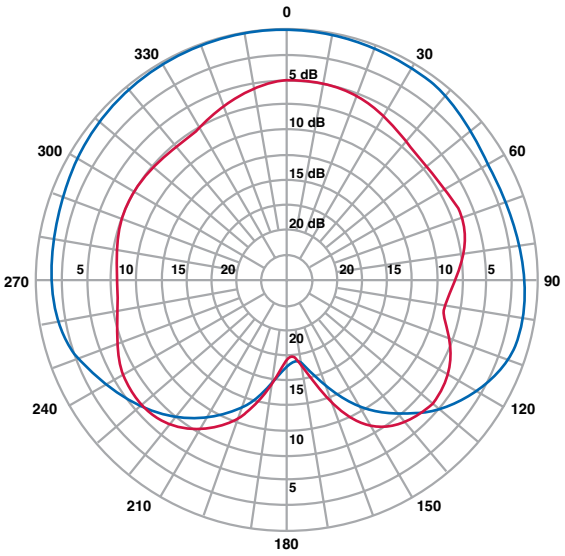
Test Method

The antenna/structure rotates 360 degrees while receiving a signal from a source antenna. The source is fed by a signal generator with directional coupler located at the antenna input. A reference signal is obtained from this coupler and compared to the “receive” signal of the antenna under test.

The transmit and scale model antennas are mounted at identical elevations and at the opposite ends of the chamber. A network analyzer supplies the RF signal to the source antenna at 4.4 times the fundamental FM frequency. The network analyzer also receives the signal that is intercepted by the antenna under test. The received signal of each polarization is converted to a relative level, referenced to the source. This level is stored on a computer acting as the master controller. The computer controls the measurement system via IEEE-488 control bus through a GPIB card.

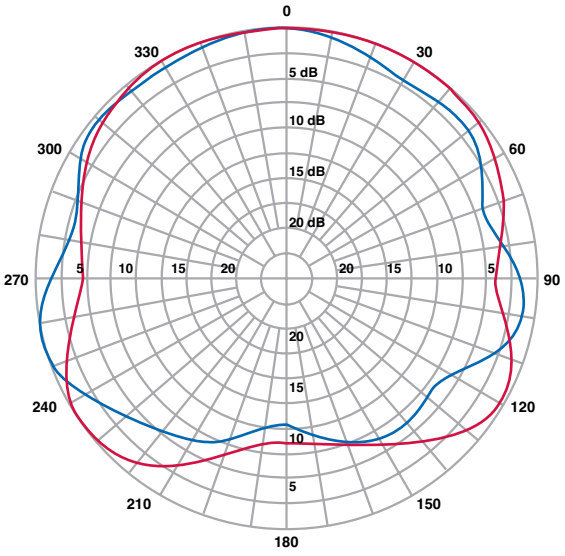
Pre-Optimization
Pattern exemplifies vertical component distortion caused by mounting structure.

Horizontal
Vertical

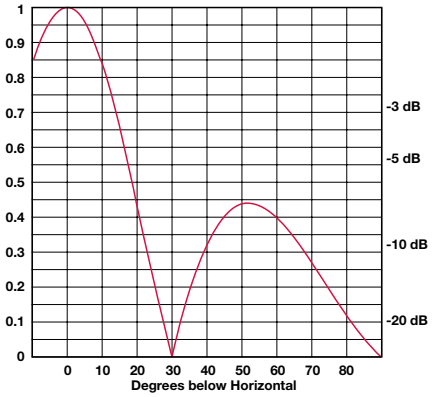


Post Optimization
Using two parasitic elements vertical circularity has improved to near free space performance.

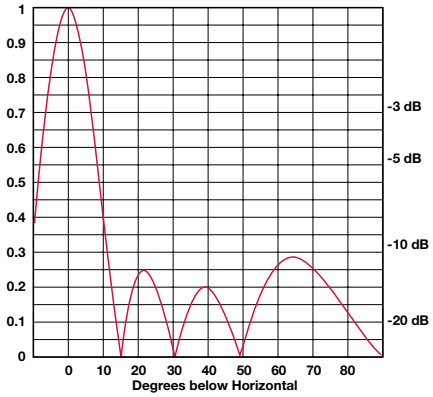
Horizontal
Vertical



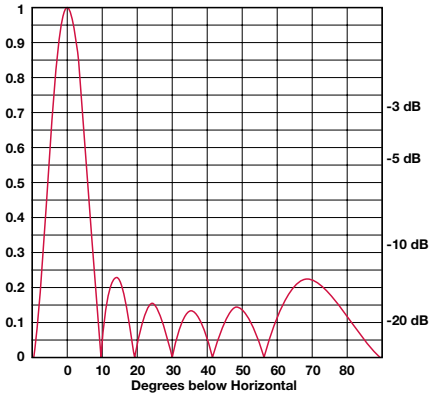
FM Elevation Patterns



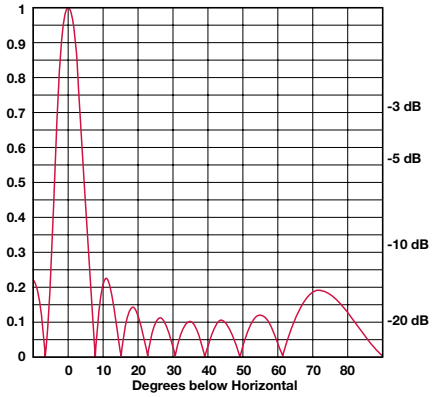
2 Bay λ



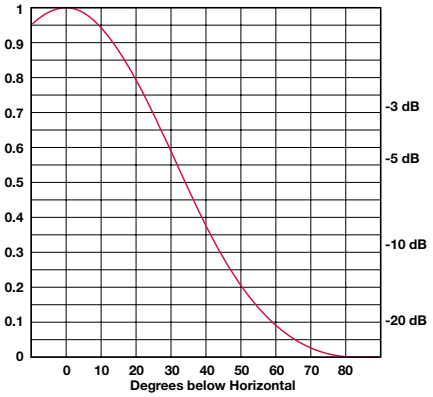
4 Bay λ



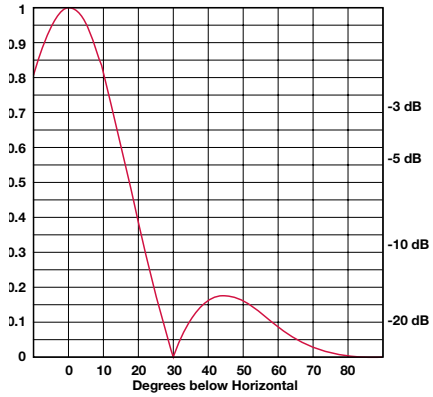
6 Bay λ



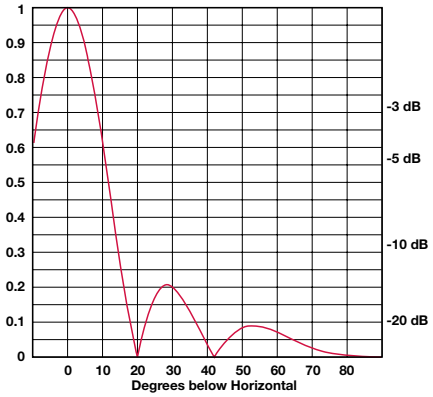
8 Bay λ



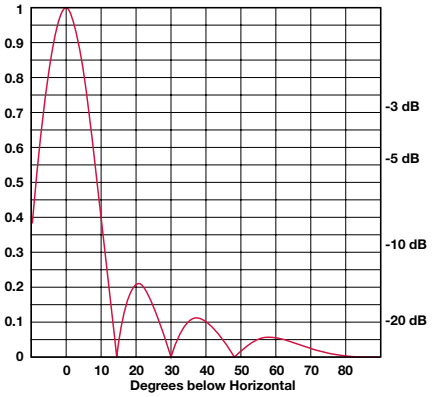
2 Bay λ/2



4 Bay λ/2



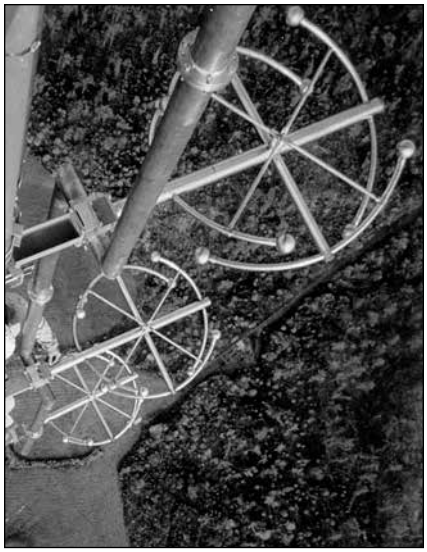
6 Bay λ/2



8 Bay λ/2

Check www.dielectric.com for latest patterns and our DASP (Dielectric System Planning software.)

Subject to change.



Downward radiation, or RFR has been a concern of broadcasters for a number of years. Regulations surrounding this issue will never get any easier on the broadcaster. RFR poses interference problems to neighboring electronic equipment, and exposure to non-ionizing radiation is a serious health issue. Health concerns are a particular concern if the antenna is installed near an area where people work or live.

Conscientious broadcasters are very concerned about their image in the community as to providing a safe environment in which to work and live. This poses numerous issues since a broadcast facility is an expensive undertaking and is typically constructed as a permanent location for the station. In many cases, it is difficult to predict what changes will occur in the community surrounding the facility. Over the years, people have chosen to locate their homes near broadcast facilities and even though the radio station was there first, it becomes incumbent on the station to make sure that the station doesn't pose a hazard to their neighbors or to interfere with their electronics.

Good engineering therefore dictates that a substantial safety factor be included in the antenna design to avoid future problems and ever tightening regulations. Most Dielectric side mounted antenna arrays can be designed with reduced bay spacing, greatly reducing downward radiation and the associated RFR concerns. Contact your Dielectric representative for additional details.

Dielectric's DCR series antennas are available in (N-1)/N and 1/2 wavelength designs to reduce RFR exposure. They offer a solution with lower weight and windloading.

Medium and High Power Bandstop Filter

- For Indoor Applications
- Temperature Compensated
- Retunable
- FM and FM-HD Channel Bandwidths Compliance
- Modular Design

Bandstop filters are used to suppress interference from another broadcaster that is coming down the transmitter from the antenna. These interfering signals can mix in a transmitter's high power amplifier and generate intermodulation products that can interfere with another FM broadcaster. The notch is selected to match the transmitter power output. The filter is tuned to pass the desired channel and the notch is tuned to the interfering frequency. A dual notch can be used for close channel spacing or each notch in a dual can be tuned to two different interferers.

All Dielectric filters have been designed with HD radio in mind. The passband parameters are optimized over the complete FM channel (+/- 200 kHz).

Every unit is factory tuned and may also be retuned in the field by the customer if desired. Dielectric's bandstop filters are modular in design — a single notch can be expanded to two notches if more suppression or closer channel spacing is required. Deeper notch depth is available for wider channel suppressions.

Specifications

Model Number	DFF-140-01BS	DFF-140-02BS	DFF-240-01BS	DFF-240-02BS
Frequency	88…108MHz	88…108MHz	88…108MHz	88…108MHz
Average Power Handling	<=20kW	<=20kW	<=40kW	<=40kW
Impedance	50 Ohms	50 Ohms	50 Ohms	50 Ohms
Type	(Band Stop)	(Band Stop)	(Band Stop)	(Band Stop)
VSWR	<=1.06	<=1.06	<=1.06	<=1.06
Altitude[1]	5,000FT (1,524M)	5,000FT (1,524M)	5,000FT (1,524M)	5,000FT (1,524M)
Insertion Loss/Attenuation				
F0[2]	<=0.1dB	<=0.13dB	<=0.1dB	<=0.1dB
Notch Depth **Notch Spacing**	>=20dB ≥1.2MHz	>=20dB ≥0.8MHz	>=30dB ≥2.0MHz	>=30dB ≥0.8MHz
Number of Cavities	1	2	1	2
Cavity Size	14"	14"	24"	24"
Group Delay Variation	<=25 ns @+/-150Khz	<=30 ns @+/-150Khz	<=25 ns @+/-150Khz	<=30 ns @+/-150Khz
Hybrids	N/A	N/A	N/A	N/A
Connectors	EIA 3-1/8", 1-5/8"	EIA 3-1/8", 1-5/8"	EIA 3-1/8"	EIA 3-1/8"
Blowers and Shrouds	NO	NO	NO	NO
Ambient Temperature	32°F(0°C) to 104°F(+40°C)	32°F(0°C) to 104°F(+40°C)	32°F(0°C) to 104°F(+40°C)	32°F(0°C) to 104°F(+40°C)
Storage Temperature	32°F(0°C) to 122°F(+50°C)	32°F(0°C) to 122°F(+50°C)	32°F(0°C) to 122°F(+50°C)	32°F(0°C) to 122°F(+50°C)
Ambient/Storage Humidity	0-98%, non condensing	0-98%, non condensing	0-98%, non condensing	0-98%, non condensing
Material	AL	AL	AL	AL
Dimensions (LxWxH)	15"x15"x46"	15"x40"x46"	27"x27"x46"	27"x60"x46"
Weight[3]	170Lbs. (77Kg)	340Lbs. (154Kg)	170Lbs. (77Kg)	410Lbs. (186Kg)
Application	FM/FM-HD	FM/FM-HD	FM/FM-HD	FM/FM-HD

Notes

1) For more than 5,000 feet (1,524m), please consult the factory
2) F0 - Center Frequency
3) Estimated

Medium Power Bandpass Filter

- For Indoor Applications
- Temperature Compensated
- Retunable
- FM and FM-HD Channel Bandwidths Compliance
- Modular Design

FM Bandpass Filters are used as building blocks for channel combiners or as stand-alone filters to mitigate interference from nearby broadcasters. If there are several FM broadcasters on the same or nearby antennas then there may be power passed down from the antenna to a high power transmitter. This power can mix in the output stage of the high power amplifier and create intermodulation (IM) products. A bandpass filter will both reduce the amount of interfering power applied to a transmitter and also attenuate the resulting intermodulation product. At the frequency separation listed in the "channel separation" row the filter will have at least 40 dB of rejection. This rejection assures compliance with an -80dB IM specification regardless of transmitter turnaround loss.

All Dielectric filters have been designed with HD radio in mind. The passband parameters are optimized over the complete FM channel (+/- 200 kHz).

Every unit is factory tuned and may also be retuned in the field if desired. Dielectric's bandpass filters are modular in design: a three pole filter can be changed to a four or five pole by simply adding cavities.

Specifications

Model Number	DFF-140-02BP	DFF-140-03BP	DFF-140-04BP	DFF-140-05BP
Frequency	88…108MHz	88…108MHz	88…108MHz	88…108MHz
Average Power Handling[4]	<=25KW	<=20KW	<=15KW	<=12KW
Average Power with Blowers	<=30kW	<=25kW	<=20kW	<=17kW
Impedance	50 Ohms	50 Ohms	50 Ohms	50 Ohms
VSWR	<=1.06	<=1.06	<=1.06	<=1.06
Altitude[1]	5,000FT (1,524M)	5,000FT (1,524M)	5,000FT (1,524M)	5,000FT (1,524M)
Insertion Loss/Attenuation				
F0[2]	<=0.15dB	<=0.25dB	<=0.35dB	<=0.45dB
F0+/-1.2 MHz	>=4.50dB	>=19.0dB	>=43.0dB	>=62.0dB
Channel Spacing	≥=10.2MHz	≥=2.8MHz	≥=1.2MHz	≥=0.8MHz
Number of Cavities	2	3	4	5
Cavity Size	14"	14"	14"	14"
Group Delay Variation	<=30 ns @+/-150Khz	<=50 ns @+/-150Khz	<=70 ns @+/-150Khz	<=160 ns @+/-150Khz
Hybrids	N/A	N/A	N/A	N/A
Connectors	EIA 3-1/8", 1-5/8"	EIA 3-1/8", 1-5/8"	EIA 3-1/8", 1-5/8"	EIA 3-1/8", 1-5/8"
Ambient Temperature	32°F(0°C) to 104°F(+40°C)	32°F(0°C) to 104°F(+40°C)	32°F(0°C) to 104°F(+40°C)	32°F(0°C) to 104°F(+40°C)
Storage Temperature	32°F(0°C) to 122°F(+50°C)	32°F(0°C) to 122°F(+50°C)	32°F(0°C) to 122°F(+50°C)	32°F(0°C) to 122°F(+50°C)
Ambient/Storage Humidity	0-98%, non condensing	0-98%, non condensing	0-98%, non condensing	0-98%, non condensing
Material	AL	AL	AL	AL
Dimensions (LxWxH)	28"x17"x57" (711x432x1448mm)	42"x17"x57" (1067x432x1448mm)	56"x17"x57" (1423x432x1448mm)	70"x17"x57" (1778x432x1448mm)
Weight[3]	320Lbs (145Kg)	480Lbs (218Kg)	630Lbs (286Kg)	790Lbs (359Kg)
Application	FM/FM-HD	FM/FM-HD	FM/FM-HD	FM/FM-HD

Notes

1) For more than 5,000 feet (1,524m), please consult the factory
2) F0 - Center Frequency
3) Estimated
4) Free convection cooled

High Power Bandpass and Bandstop Filters

- For Indoor Applications
- Temperature Compensated
- Retunable
- FM and FM-HD Channel Bandwidths Compliance
- Modular Design

Dielectric's High Power Bandpass and Bandstop Filters are custom designed to address your station's specific requirements. These units reduce intermod and spurious product outputs to greater than 80 dB below carrier as specified by the FCC.

All Dielectric filters have been designed with HD radio in mind. The passband parameters are optimized over the complete FM channel (+/- 200 kHz).

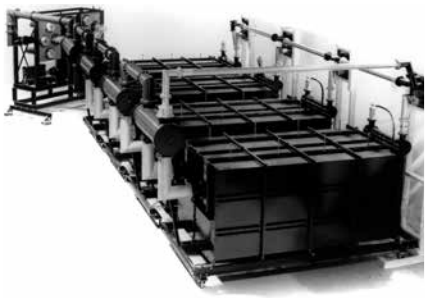
Every unit is factory tuned and may also be retuned in the field if desired. Dielectric's band-pass filters are modular in design, a three pole filter can be changed to a four or five pole by simply adding cavities.

Specifications

Model Number	DFF-240-02BP	DFF-240-03BP	DFF-140-04BP	DFF-240-05BP
Frequency	88…108MHz	88…108MHz	88…108MHz	88…108MHz
Average Power Handling[4]	<=35KW	<=28KW	<=23KW	<=20KW
Average Power with Blowers	<=45kW	<=38kW	<=33kW	<=30kW
Impedance	50 Ohms	50 Ohms	50 Ohms	50 Ohms
Type	Reflective (Band Pass)	Reflective (Band Pass)	Reflective (Band Pass)	Reflective (Band Pass)
VSWR	<=1.06	<=1.06	<=1.06	<=1.06
Altitude[1]	5,000FT (1,524M)	5,000FT (1,524M)	5,000FT (1,524M)	5,000FT (1,524M)
Insertion Loss/Attenuation				
F0[2]	<=0.10dB	<=0.15dB	<=0.25dB	<=0.35dB
F0+/-1.2 MHz	>=4.50dB	>=19.0dB	>=43.0dB	>=62.0dB
Channel Spacing	≥=10.2MHz	≥=2.8MHz	≥=1.2MHz	≥=0.8MHz
Number of Cavities	2	3	4	5
Cavity Size	24"	24"	24"	24"
Group Delay Variation	<=30 ns @+/-150Khz	<=50 ns @+/-150Khz	<=70 ns @+/-150Khz	<=160 ns @+/-150Khz
Hybrids	N/A	N/A	N/A	N/A
Connectors	EIA 3-1/8" to 6-1/8"	EIA 3-1/8" to 6-1/8"	EIA 3-1/8" to 6-1/8"	EIA 3-1/8" to 6-1/8"
Ambient Temperature	32°F(0°C) to 104°F(+40°C)	32°F(0°C) to 104°F(+40°C)	32°F(0°C) to 104°F(+40°C)	32°F(0°C) to 104°F(+40°C)
Storage Temperature	32°F(0°C) to 122°F(+50°C)	32°F(0°C) to 122°F(+50°C)	32°F(0°C) to 122°F(+50°C)	32°F(0°C) to 122°F(+50°C)
Ambient/Storage Humidity	0-98%, non condensing	0-98%, non condensing	0-98%, non condensing	0-98%, non condensing
Material	AL	AL	AL	AL
Dimensions (LxWxH)	48"x28"x57" (1219x711x1448mm)	72"x28"x57" (1829x711x1448mm)	96"x28"x57" (2439x711x1448mm)	120"x28"x57" (3048x711x1448mm)
Weight[3]	360Lbs (164Kg)	545Lbs (247Kg)	723Lbs (328Kg)	900Lbs (408Kg)
Application	FM/FM-HD	FM/FM-HD	FM/FM-HD	FM/FM-HD

Notes

1) For more than 5,000 feet (1,524m), please consult the factory
2) F0 - Center Frequency
3) Estimated
4) Free convection cooled



General Description

It is very common for FM transmitters, operating on different frequencies, to share a common antenna. The hardware which enables this is the FM combiner. The main function of the combiner is to combine each high power signal with low loss and maintain high isolation between the transmitters. A second, somewhat less appreciated function is to assure that the spurious and intermodulation products generated by combined transmitters are attenuated below the level required by the FCC.

The spurious emissions of an FM transmitter are governed by FCC part 73. This requires that any emission greater than 600 kHz from the carrier be at least -80 dB below the carrier. When multiple transmitters are added in a combiner some amount of signal from each added channel will mix with the main signal in the output stage of each transmitter. This mixing generates intermodulation products which are output from the transmitter. The frequency of the intermodulation product depends upon the frequency of the two (or more) transmitters. Generally, 3rd order intermodulation products can lie in the FM band and are easily transmitted by an FM antenna. The magnitude of the intermodulation product depends upon the magnitude of the mixing signal, the turn-around loss of the transmitter and the filtering at the respective frequencies. The filtering used to combine multiple transmitters plays an auxiliary role in reducing the signal to be mixed and the resulting spurious caused by the mixing. If the turn-around loss of the transmitters is known Dielectric will supply a combiner which assures compliance with the FCC requirements.

All Dielectric filters are tuned with HD radio in mind. The full channel bandwidth (fc+/-200 kHz) has excellent match and minimized insertion loss/group delay. Output tee's and hybrids are chosen to allow 10 dB IBOC operation with 2x voltage safety factor.

A branch combiner is an effective and economical way to combine two or three transmitters onto a single line. This approach uses a single band-pass filter for each channel and "tees" the power together at the output end. The delay lines between the filter and tees assure minimum in-band loss and maximum isolation between transmitters. A branch combiner can be used for channel spacing as small as 800 kHz.

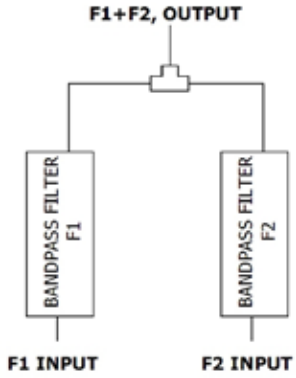
A manifold combiner is recommended as an economical solution for combining three to ten channels. This approach is similar to the branch combiner in that there is one filter per channel. The output end consists of a "tee" for each channel arranged in a single manifold line. There is an additional short-circuited stub at the end of the manifold which helps realize compact delay lines for reduced overall size. The approach can also be used for channel spacing as small as 800 kHz. For combinations of more than six channels contact the factory for evaluation.

The constant impedance combiner is a standard FM combining approach. The reasons for its prevalence are its excellent power handling, very high isolations and the ability to add channels in the future with minimal interruption to the on air channels. A constant impedance module consists of two band-pass filters, two 3 dB hybrids and a reject load. These modules can be chained together to combine ten or more stations into a single antenna. The last modules in the chain will see the combined power of all the added channels. The output stage and hybrid of these last modules need to be sized correctly for the combined power.

One approach to combining IBOC transmitters with analog transmitters is to remove the reject load from a constant impedance combining module and attach the digital transmitter to this port. This results in the analog powers summing in one direction along the output chain and the digital powers summing the opposite direction. Two feeds can be used to feed the analog and digital portions of the antenna separately.

2 Channel (Medium Power)

- For Indoor Applications
- Temperature Compensated
- High Isolation
- FM and FM-HD Channel Bandwidths Compliance
- Modular Design



Specifications

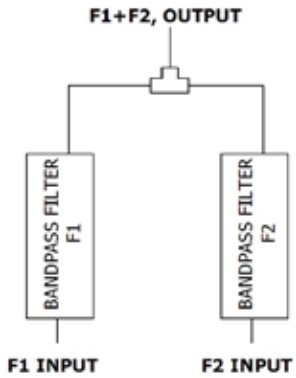
Model Number	DFC14002BR2	DFC14003BR2	DFC14004BR2	DFC14005BR2
Frequency	87.5…108MHz	87.5…108MHz	87.5…108MHz	87.5…108MHz
Combiner Type	Branch Combiner	Branch Combiner	Branch Combiner	Branch Combiner
Channel Spacing	>=10.2MHz	>=2.8MHz	>=1.2MHz	>=0.8MHz
Input 1, 2				
Average Power Handling	25KW (per INPUT)	20KW (per INPUT)	15KW (per INPUT)	12KW (per INPUT)
Average Power with Blowers	30KW (per INPUT)	25KW (per INPUT)	20KW (per INPUT)	17KW (per INPUT)
Temperature Compensated	YES	YES	YES	YES
Insertion Loss				
F0[1]	<=0.15dB	<=0.25dB	<=0.35dB	<=0.45dB
VSWR	<=1.06	<=1.06	<=1.06	<=1.06
Group Delay Variation	<=30nS @+/-150Khz	<=50nS @+/-150Khz	<=70nS @+/-150Khz	<=160nS @+/-150Khz
Number of Cavities	2	3	4	5
Cavity Size	14"	14"	14"	14"
Input Connector	EIA 3-1/8"	EIA 3-1/8"	EIA 3-1/8"	EIA 3-1/8"
Output Connector	EIA 3-1/8"	EIA 3-1/8"	EIA 3-1/8"	EIA 3-1/8"
Isolation Between Inputs	>=35dB	>=35dB	>=35dB	>=35dB
Material	AL+Cu Resonators +INVAR Roads	AL+Cu Resonators +INVAR Roads	AL+Cu Resonators +INVAR Roads	AL+Cu Resonators + INVAR Roads
Ambient Temperature	32°F(0°C) to 104°F(+40°C)	32°F(0°C) to 104°F(+40°C)	32°F(0°C) to 104°F(+40°C)	32°F(0°C) to 104°F(+40°C)
Storage Temperature	32°F(0°C) to 122°F(+50°C)	32°F(0°C) to 122°F(+50°C)	32°F(0°C) to 122°F(+50°C)	32°F(0°C) to 122°F(+50°C)
Dimensions (LxWxH)	48"x28"x57" (1219x711x1448mm)	72"x28"x57" (1829x711x1448mm)	96"x28"x57" (2439x711x1448mm)	120"x28"x57" (3048mmx711mmx1448mm)
Weight[2]	360Lbs (164Kg)	545Lbs (247Kg)	723Lbs (328Kg)	900Lbs (408Kg)
Altitude[3]	5,000ft (1524m)	5,000ft (1524m)	5,000ft (1524m)	5,000ft (1524m)
Application	FM/FM-HD	FM/FM-HD	FM/FM-HD	FM/FM-HD

Notes

1) F0 - Center Frequency
2) Estimated
3) For more than 5,000 feet (1,524m), please consult the factory

2 Channel (High Power)

- For Indoor Applications
- Temperature Compensated
- High Isolation
- FM and FM-HD Channel Bandwidths Compliance
- Modular Design



Specifications

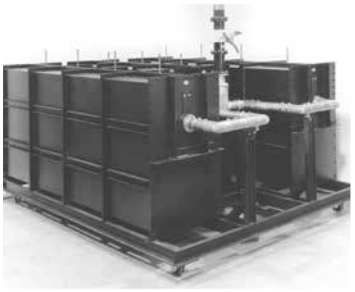
Model Number	DFC24002BR2	DFC24003BR2	DFC24004BR2	DFC24005BR2
Frequency	87.5…108MHz	87.5…108MHz	87.5…108MHz	87.5…108MHz
Combiner Type	Branch Combiner	Branch Combiner	Branch Combiner	Branch Combiner
Channel Spacing	>=10.2MHz	>=2.8MHz	>=1.2MHz	>=0.8MHz
Input 1, 2				
Average Power Handling	35KW (per INPUT)	28KW (per INPUT)	23KW (per INPUT)	20KW (per INPUT)
Average Power with Blowers	45KW (per INPUT)	38KW (per INPUT)	33KW (per INPUT)	30KW (per INPUT)
Temperature Compensated	YES	YES	YES	YES
Insertion Loss				
F0[1]	<=0.10dB	<=0.15dB	<=0.25dB	<=0.35dB
VSWR	<=1.06	<=1.06	<=1.06	<=1.06
Group Delay Variation	<=30nS @+/-150Khz	<=50nS @+/-150Khz	<=70nS @+/-150Khz	<=160nS @+/-150Khz
Number of Cavities	2	3	4	5
Cavity Size	24"	24"	24"	24"
Input Connector	EIA 3-1/8"	EIA 3-1/8"	EIA 3-1/8"	EIA 3-1/8"
Output Connector	EIA 6-1/8"	EIA 6-1/8"	EIA 6-1/8"	EIA 6-1/8"
Isolation Between Inputs	>=35dB	>=35dB	>=35dB	>=35dB
Material	AL+Cu Resonators + INVAR Roads	AL+Cu Resonators + INVAR Roads	AL+Cu Resonators + INVAR Roads	AL+Cu Resonators + INVAR Roads
Ambient Temperature	32°F(0°C) to 104°F(+40°C)	32°F(0°C) to 104°F(+40°C)	32°F(0°C) to 104°F(+40°C)	32°F(0°C) to 104°F(+40°C)
Storage Temperature	32°F(0°C) to 122°F(+50°C)	32°F(0°C) to 122°F(+50°C)	32°F(0°C) to 122°F(+50°C)	32°F(0°C) to 122°F(+50°C)
Dimensions (LxWxH)	55"x66"x57" (1397mmx1.677mm x1.448mm)	79"x66"x57" (2007mmx1.677mm x1.448mm)	103"x66"x57" (1.616mmx1.677mm x1.448mm)	127"x66"x57" (3226mmx1.677mm x1.448mm)
Weight[2]	740lb (336Kg)	1110lb (504Kg)	1466lb (665Kg)	1820lb (826Kg)
Altitude[3]	5,000FT (1,524m)	5,000FT (1,524m)	5,000FT (1,524m)	5,000FT (1,524m)
Application	FM/FM-HD	FM/FM-HD	FM/FM-HD	FM/FM-HD

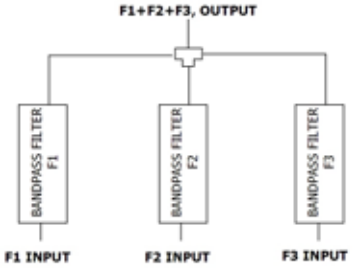
Notes

1) F0 - Center Frequency
2) Estimated
3) For more than 5,000 feet (1,524m), please consult the factory

3 Channel

- For Indoor Applications
- Temperature Compensated
- High Isolation
- FM and FM-HD Channel Bandwidths Compliance
- Modular Design





Specifications

Model Number	DFC14003BR3	DFC14004BR3	DFC14005BR3
Frequency	87.5…108MHz	87.5…108MHz	87.5…108MHz
Combiner Type	Branch Combiner	Branch Combiner	Branch Combiner
Channel Spacing	>=2.8MHz	>=1.2MHz	>=0.8MHz
Input 1, 2, 3			
Average Power Handling	20KW (per INPUT)	15KW (per INPUT)	12KW (per INPUT)
Average Power with Blowers	25KW (per INPUT)	20KW (per INPUT)	17KW (per INPUT)
Temperature Compensated	YES	YES	YES
Insertion Loss			
F0[1]	<=0.25dB	<=0.35dB	<=0.45dB
VSWR	<=1.06	<=1.06	<=1.06
Group Delay Variation	<=50nS @+/-150Khz	<=70nS @+/-150Khz	<=160nS @+/-150Khz
Number of Cavities	3	4	5
Cavity Size	14"	14"	14"
Input Connector	EIA 3-1/8"	EIA 3-1/8"	EIA 3-1/8"
Output Connector	4-1/16" FLG	4-1/16" FLG	4-1/16" FLG
Isolation Between Inputs	>=35dB	>=35dB	>=35dB
Material	AL+Cu Resonators +INVAR Roads	AL+Cu Resonators +INVAR Roads	AL+Cu Resonators +INVAR Roads
Ambient Temperature	32°F(0°C) to 104°F(+40°C)	32°F(0°C) to 104°F(+40°C)	32°F(0°C) to 104°F(+40°C)
Storage Temperature	32°F(0°C) to 122°F(+50°C)	32°F(0°C) to 122°F(+50°C)	32°F(0°C) to 122°F(+50°C)
Dimensions (LxWxH)	60"x66"x57" (1524mmx1.677mm x1.448mm)	73"x66"x57" (1.854mmx1.677mm x1.448mm)	107"x66"x57" (2718mmx1.677mm x1.448mm)
Weight[2]	1465lb (665Kg)	1925lb (873Kg)	2385lb (1082Kg)
Altitude[3]	5,000FT (1,524m)	5,000FT (1,524m)	5,000FT (1,524m)
Application	FM/FM-HD	FM/FM-HD	FM/FM-HD

Notes

1) F0 - Center Frequency
2) Estimated
3) For more than 5,000 feet (1,524m), please consult the factory

3 Channel

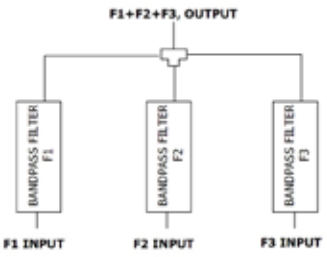
- For Indoor Applications
- Temperature Compensated
- High Isolation
- FM and FM-HD Channel Bandwidths Compliance
- Modular Design

Dielectric's FM Branch Combiners are used when it is necessary to combine two (or three) FM channels into a single master antenna. Dielectric's combining systems are designed in modular fashion. The diplexing module is the fundamental building block. By cascading additional modules, new stations may be added.

All Dielectric filters have been designed with HD radio in mind. The passband parameters are optimized over the complete FM channel (+/- 200 kHz).

Specifications

Model Number	DFC24003BR3	DFC24004BR3	DFC24005BR3
Frequency	87.5…108MHz	87.5…108MHz	87.5…108MHz
Combiner Type	Branch Combiner	Branch Combiner	Branch Combiner
Channel Spacing	>=2.8MHz	>=1.2MHz	>=0.8MHz
Input 1, 2			
Average Power Handling	28KW (per INPUT)	23KW (per INPUT)	20KW (per INPUT)
Average Power with Blowers	38KW (per INPUT)	33KW (per INPUT)	30KW (per INPUT)
Temperature Compensated	YES	YES	YES
Insertion Loss			
F0[1]	<=0.15dB	<=0.25dB	<=0.35dB
VSWR	<=1.06	<=1.06	<=1.06
Group Delay Variation	<=50nS @+/-150Khz	<=70nS @+/-150Khz	<=160nS @+/-150Khz
Number of Cavities	3	4	5
Cavity Size	24"	24"	24"
Input Connector	EIA 3-1/8"	EIA 3-1/8"	EIA 3-1/8"
Output Connector	EIA 6-1/8"	EIA 6-1/8"	EIA 6-1/8"
Isolation Between Inputs	>=35dB	>=35dB	>=35dB
Material	AL+Cu Resonators +INVAR Roads	AL+Cu Resonators +INVAR Roads	AL+Cu Resonators +INVAR Roads
Blowers and Shrouds	P>=25KW (per INPUT)	P>=25KW (per INPUT)	P>=25KW (per INPUT)
Ambient Temperature	32°F(0°C) to 104°F(+40°C)	32°F(0°C) to 104F(+40C)	32°F(0°C) to 104F(+40C)
Storage Temperature	32°F(0°C) to 122°F(+50°C)	32°F(0°C) to 122F(50C)	32°F(0°C) to 122F(50C)
Dimensions (LxWxH)	90"x95"x57" (2286mm x 2413mm x1.448mm)	113"x95"x57" (2870mmx2413mm x1.448mm)	137"x95"x57" (3480mmx2413mm x1.448mm)
Weight[2]	1660lb (753Kg)	2200lb (998Kg)	2730lb (1238Kg)
Altitude[3]	5,000FT (1,524m)	5,000FT (1,524m)	5,000FT (1,524m)
Application	FM/FM-HD	FM/FM-HD	FM/FM-HD



Notes

1) F0 - Center Frequency
2) Estimated
3) For more than 5,000 feet (1,524m), please consult the factory

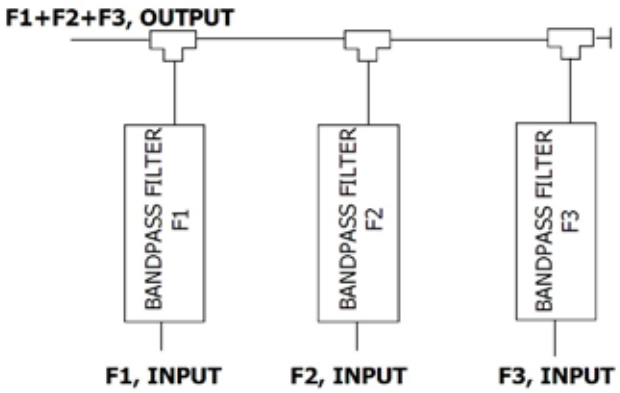
3 Channel to 10 Channel

- Combines 3 or more stations
- For Indoor Applications
- Temperature Compensated
- High Isolation
- FM and FM-HD Channel Bandwidths Compliance
- Modular Design

Manifold combiners are an excellent alternative to constant impedance combiners. With proven performance up to 10 channels, a manifold will combine channels with less loss and with less space than a constant impedance combiner. One manifold spine will generally handle the peak voltages created when combining multiple IBOC channels better than the hybrids required for a CIF combiner. When channel assignments are known ahead of time, a manifold is the logical approach.

Specifications

Model Number	DFCXX00XMX
Total Average Power	140kW
Frequency	87.5…108MHz
Combiner Type	MANIFOLD
Channel Spacing	>=1.2MHz [1]
Insertion Loss	
F0[2]	<=0.35dB4)
VSWR	<=1.08
Group Delay Variation	Channel Spacing Dependent
Number of Cavities	4 (OR 3) [3]
Cavity Size	14" (OR 24")
Isolation between Inputs	>=35dB
Output Connector	4-1/16" FLG/6-1/8" FLG
Average Power per Input	Channel Spacing Dependent
Material	AL+Cu Resonators +IN-VAR Roads
Ambient Temperature	32˚F(0˚C) to 104˚F(+40˚C)
Storage Temperature	32˚F(0˚C) to 122˚F(+50˚C)
Dimensions (LxWxH)	Contact Factory
Weight (lbs.)	Contact Factory
Altitude[1]	5,000FT (1,524m)
Application	FM/FM-HD



Notes

1) For less than 1.2MHz, please contact the factory
2) F0 - Center Frequency
3) Depends of the channel spacing
4) For more than 5,000 feet (1,524m), please consult the factory
5) Optional blowers may be required for higher power
6) Varying with the cavity size and number of cavities per channel

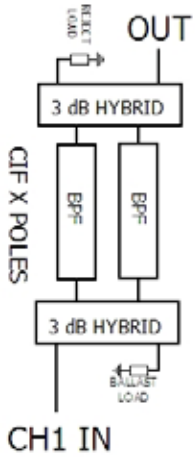
FM Constant Impedance Filter/Combiner

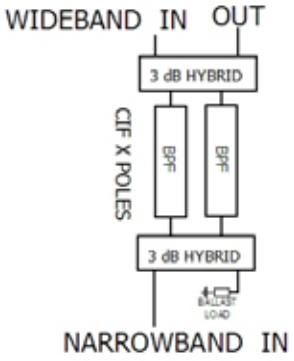
Medium Power

- For Indoor Applications
- Temperature Compensated
- High Isolation
- FM and FM-HD Channel Bandwidths Compliance
- Modular Design

Specifications

Model Number	DFC14003CIF	DFC14004CIF	DFC14005CIF
Frequency	87.5…108MHz	87.5…108MHz	87.5…108MHz
Combiner Type	Constant Impedance Filter	Constant Impedance Filter	Constant Impedance Filter
Channel Spacing	>=2.0MHz	>=1.2MHz	>=0.8MHz
Narrow Band Input			
Average Power Handling	40kW	30kW	24kW
Average Power with Blowers	50KW (per INPUT)	40KW (per INPUT)	34KW (per INPUT)
Temperature Compensated	YES	YES	YES
Insertion Loss			
F0[2]	<=0.25dB	<=0.35dB	<=0.45dB
VSWR	<=1.06	<=1.06	<=1.06
Group Delay Variation	<=50nS @+/-150Khz	<=70nS @+/-150Khz	<=160nS @+/-150Khz
Number of Cavities	3	4	5
Cavity Size	14"	14"	14"
Input Hybrid	EIA 3-1/8"	EIA 3-1/8"	EIA 3-1/8"
Input Connector	EIA1-5/8" OR EIA 3-1/8"	EIA1-5/8" OR EIA 3-1/8"	EIA1-5/8" OR EIA 3-1/8"
Wide Band Input			
Insertion Loss	<=0.1dB	<=0.15dB	<=0.2dB
Group Delay Variation[4]	<=20nS @+/-150Khz	<=30nS @+/-150Khz	<=200nS @+/-150Khz
VSWR	<=1.07	<=1.07	<=1.07
Input Connector	EIA 3-1/8" OR 4-1/16"FLG	EIA 3-1/8" OR 4-1/16"FLG	EIA 3-1/8" OR 4-1/16"FLG
Isolation			
NB to WB	>=35dB	>=35dB	>=35dB
WB to NB	>=50dB	>=55dB	>=55dB
Maximum Output Power Handling	70kW	70kW	70kW
Ouput Hybrid	4-1/16" FLG	4-1/16" FLG	4-1/16" FLG
Output Connector	EIA 3-1/8" OR 4-1/16"FLG	EIA 3-1/8" OR 4-1/16"FLG	EIA 3-1/8" OR 4-1/16"FLG
Material	AL+Cu Resonators +INVAR Roads	AL+Cu Resonators +INVAR Roads	AL+Cu Resonators +INVAR Roads
Ambient Temperature	32°F(0°C) to 104°F(+40°C)	32°F(0°C) to 104°F(+40°C)	32°F(0°C) to 104°F(+40°C)
Storage Temperature	32°F(0°C) to 122°F(+50°C)	32°F(0°C) to 122°F(+50°C)	32°F(0°C) to 122°F(+50°C)
Dimensions (LxWxH)	65"x43"x63" (1.651mm x 1.092mm x 1.600mm)	84"x43"x63" (2.124mm x 1.092mm x 1.600mm)	104"x43"x63" (2.642mm x 1.092mm x 1.600mm)
Weight[3]	1120Lbs	1445lb (Kg)	1766Lbs
Altitude[1]	5,000FT (1,524m)	5,000FT (1,524m)	5,000FT (1,524m)
Application	FM/FM-HD	FM/FM-HD	FM/FM-HD





Notes

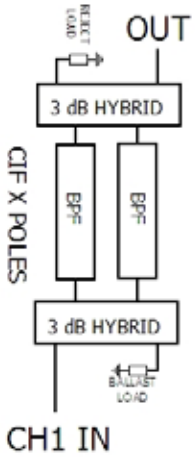
1) For more than 5,000 feet (1,524m), please consult the factory
2) F0 - Center Frequency
3) Estimated
4) Wide band group delay is added to narrow band delay of upstream filter

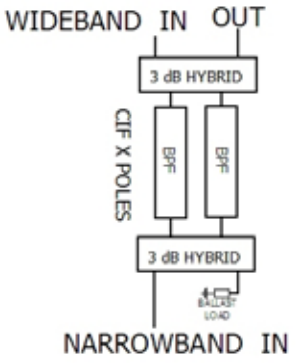
High Power

- For Indoor Applications
- Temperature Compensated
- High Isolation
- FM and FM-HD Channel Bandwidths Compliance
- Modular Design

Specifications

Model Number	DFC24003CIF	DFC24004CIF	DFC24005CIF
Frequency	87.5…108MHz	87.5…108MHz	87.5…108MHz
Combiner Type	Constant Impedance Filter	Constant Impedance Filter	Constant Impedance Filter
Channel Spacing	>=2.0MHz	>=1.2MHz	>=0.8MHz
Narrow Band Input			
Average Power Handling	56kW	46kW	40kW
Average Power with Blowers	70KW (per INPUT)	66KW (per INPUT)	60KW (per INPUT)
Temperature Compensated	YES	YES	YES
Insertion Loss			
F0[1]	<=0.15dB	<=0.25dB	<=0.35dB
VSWR	<=1.06	<=1.06	<=1.06
Group Delay Variation	<=50nS @+/-150Khz	<=70nS @+/-150Khz	<=160nS @+/-150Khz
Number of Cavities	3	4	5
Cavity Size	24"	24"	24"
Input Hybrid	4-1/16" FLG	4-1/16" FLG	4-1/16" FLG
Input Connector	EIA 3-1/8" OR 4-1/16"FLG	EIA 3-1/8" OR 4-1/16"FLG	EIA 3-1/8" OR 4-1/16"FLG
Wide Band Input			
Insertion Loss	<=0.1dB	<=0.15dB	<=0.2dB
Group Delay Variation[2]	<=20nS @+/-150Khz	<=30nS @+/-150Khz	<=200nS @+/-150Khz
VSWR	<=1.07	<=1.07	<=1.07
Input Connector	4-1/16" FLG OR EIA 6-1/8"	4-1/16" FLG OR EIA 6-1/8"	4-1/16" FLG OR EIA 6-1/8"
Isolation			
NB to WB	>=35dB	>=35dB	>=35dB
WB to NB	>=50dB	>=55dB	>=55dB
Maximum Output Power Handling	120kW	120kW	120kW
Ouput Hybrid	EIA 6-1/8"	EIA 6-1/8"	EIA 6-1/8"
Output Connector	4-1/16" FLG OR EIA 6-1/8"	4-1/16" FLG OR EIA 6-1/8"	4-1/16" FLG OR EIA 6-1/8"
Material	AL+Cu Resonators +INVAR Roads	AL+Cu Resonators +INVAR Roads	AL+Cu Resonators +INVAR Roads
Ambient Temperature	32°F(0°C) to 104°F(+40°C)	32°F(0°C) to 104°F(+40°C)	32°F(0°C) to 104°F(+40°C)
Storage Temperature	32°F(0°C) to 122°F(+50°C)	32°F(0°C) to 122°F(+50°C)	32°F(0°C) to 122°F(+50°C)
Dimensions (LxWxH)	107"x58"x66" (2.667mm x 1.473mm x 1.676mm)	133"x58"x66" (3.378mm x 1.473mm x 1.676mm)	158"x58"x66" (4.013mm x 1.473mm x 1.676mm)
Weight[3]	1265Lbs	1630Lbs	1990Lbs
Altitude[4]	5,000FT (1,524m)	5,000FT (1,524m)	5,000FT (1,524m)
Application	FM/FM-HD	FM/FM-HD	FM/FM-HD





Notes

1) F0 - Center Frequency
2) Wide band group delay is added to narrow band delay of upstream modules
3) Estimated
4) For more than 5,000 feet (1,524m), please consult the factory

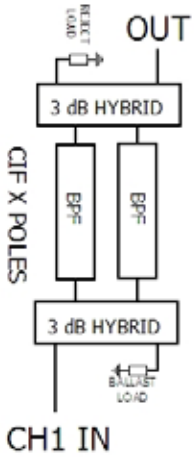
Dielectric®

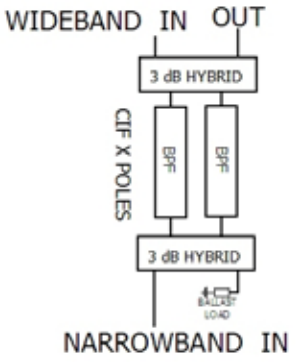
Very High Power

- For Indoor Applications
- Temperature Compensated
- High Isolation
- FM and FM-HD Channel Bandwidths Compliance
- Modular Design

Specifications

Model Number	DFC24003CIF-H	DFC24004CIF-H	DFC24005CIF-H
Frequency	87.5…108MHz	87.5…108MHz	87.5…108MHz
Combiner Type	Constant Impedance Filter	Constant Impedance Filter	Constant Impedance Filter
Channel Spacing	>=2.0MHz	>=1.2MHz	>=0.8MHz
Narrow Band Input			
Average Power Handling	56kW	46kW	40kW
Average Power with Blowers	P>=70KW (per INPUT)	P>=66KW (per INPUT)	P>=60KW (per INPUT)
Temperature Compensated	YES	YES	YES
Insertion Loss			
F0[1]	<=0.15dB	<=0.25dB	<=0.35dB
VSWR	<=1.06	<=1.06	<=1.06
Group Delay Variation	<=50nS @+/-150Khz	<=70nS @+/-150Khz	<=160nS @+/-150Khz
Number of Cavities	3	4	5
Cavity Size	24"	24"	24"
Input Hybrid	EIA 6-1/8"	EIA 6-1/8"	EIA 6-1/8"
Input Connector	4-1/16" FLG OR EIA 6-1/8"	4-1/16" FLG OR EIA 6-1/8"	4-1/16" FLG OR EIA 6-1/8"
Wide Band Input			
Insertion Loss	<=0.1dB	<=0.15dB	<=0.2dB
Group Delay Variation[2]	<=20nS @+/-150Khz	<=30nS @+/-150Khz	<=200nS @+/-150Khz
VSWR	<=1.07	<=1.07	<=1.07
Input Connector	EIA 6-1/8" OR EIA 9-3/16"	EIA 6-1/8" OR EIA 9-3/16"	EIA 6-1/8" OR EIA 9-3/16"
Isolation			
NB to WB	>=35dB	>=35dB	>=35dB
WB to NB	>=50dB	>=55dB	>=55dB
Maximum Output Power Handling	250kW	250kW	250kW
Ouput Hybrid	EIA 9-3/16"	EIA 9-3/16"	EIA 9-3/16"
Output Connector	EIA 6-1/8" OR EIA 9-3/16"	EIA 6-1/8" OR EIA 9-3/16"	EIA 6-1/8" OR EIA 9-3/16"
Material	AL+Cu Resonators +INVAR Roads	AL+Cu Resonators +INVAR Roads	AL+Cu Resonators +INVAR Roads
Ambient Temperature	32°F(0°C) to 104°F(+40°C)	32°F(0°C) to 104°F(+40°C)	32°F(0°C) to 104°F(+40°C)
Storage Temperature	32°F(0°C) to 122°F(+50°C)	32°F(0°C) to 122°F(+50°C)	32°F(0°C) to 122°F(+50°C)
Dimensions (LxWxH)	112"x58"x70" (2.845mm x 1.473mm x 1.778mm)	138"x58"x70" (3.505mm x 1.473mm x 1.778mm)	163"x58"x70" (4.140mm x 1.473mm x 1.778mm)
Weight[3]	1295Lbs	1660Lbs	2020Lbs
Altitude[4]	5,000FT (1,524m)	5,000FT (1,524m)	5,000FT (1,524m)
Application	FM/FM-HD	FM/FM-HD	FM/FM-HD

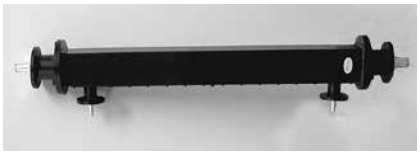




Notes

1) F0 - Center Frequency
2) Wide band group delay is added to narrow band delay of upstream modules
3) Estimated
4) For more than 5,000 feet (1,524m), please consult the factory

HD Radio High Level Analog-Digital Combiner/Injector



Dielectric's High Level HD Radio Combiner/Injector provides another degree of freedom to the broadcaster. It allows a digital signal to be added to an existing run of line, without the addition of a new feed line or antenna. The units were designed with ease of installation in mind. Simply install the unit in place of a straight section of transmission line in the transmitter room. The aluminum construction is such that the weight of the unit is comparable to that of the line section it replaces.

Specifications

Frequency Range:	88 - 108 MHz
Impedance:	50 ohms
I/O Ports:	EIA flanged
VSWR:	1.05:1 or better when terminated in a matched load
Insertion Loss:	<0.1 dB
Isolation:	>45 dB
Group Delay Variation:	<10 nS over any 400 kHz band
Mounting:	Any Position
Finish:	Black Paint
Catalog No:	DC-HDR- () -Size from Chart () -Type chart
Example:	DCR-HDR-A-1 1 5/8" Combiner with 10 dB coupling

Size	**A**	**B**	**C**	**D**
Analog Port	1 5/8"	3 1/8"	4 1/16"	6 1/8"
Max. Total Power	12	40	50	70
Type	**1**	**2**	**3**	**4**
Coupling Factor	10 dB	9 dB	8 dB	Custom

RF Scout XLT Monitor

- Enhanced Local User Interface
- Transmission system monitor for VSWR, pressure and over-powering
- Forward and reverse remote power sensors measure power at directional couplers

The Dielectric RF Scout XLT monitors RF transmission system VSWR and forward power and is designed to aid in detecting VSWR problems as they develop. In many cases this will allow the transmitter operator to detect and remedy transmission system contributors to elevated VSWR before they affect operations. The unit continuously monitors forward and reflected power. The system displays the values and can hold up to a years worth of data and alarm events. In addition, the system can also be configured to monitor transmission line pressure and temperature. User settable options include warning and alarm levels, enable / disable interlock trip for each monitoring function and a VSWR alarm strike-out number.

The RF Scout XLT monitoring and communications capabilities offer a high degree of flexibility. The unit's status is available to local operators via a 3" touch panel. In addition, the data is available to remote operators through an Ethernet interface with FTP, HTTP (web page).

User PCs may communicate using Java WEB Applet.

The RF Scout monitoring system is comprised of a rack mountable unit with two power sensors and their associated 25' cables along with a dual directional coupler with factory pre-set coupling values consistent with the forward power level. The coupler sections are designed for the various line sizes available. The RF Scout may also be supplied without the coupling section for systems which already have the appropriate couplers in place. Pressure transducers and thermocouples can be supplied separately.

Specifications

Processor:	Embedded PLC Controller
Display:	3" Multi-colored, Back lit Touch Panel (Green, Red, Orange)
Display Functions:	VSWR Value Forward Power Reflective Power Line Pressure Temperature User Set-Up Menu for all options/parameters
Sensor Inputs:	(2) 0 to 5 VDC for RF Power (1) 0 to 5 VDC for Pressure (1) Resistive Thermal Detector
RF Sensors-standard:	Dielectric P/N 97730, 50 to 800 MHz, True Average Power, 50 Ohm, Type N, 1.0 W Max.
RF Sensors-low power:	Dielectric P/N 11000005351, 50 to 800 MHz, True Average Power, 50 Ohm, Type N, 100 mW Max.
Transmitter Interlock:	SPDT; Dry contacts, Latching Relay (250VAC, 2.5amps)
Remote Interface Functions:	
Output (24 VDC)	TX Interlock trip VSWR Alarm Forward Power Alarm Pressure Alarm
Input (24 VDC)	Interlock Reset
Lan Port:	10/100 base T Ethernet, FTP Server, Web
Power:	100-240 VAC, 60/50 Hz
Dimensions, in(cm):	2 Rack Unit, 19"(48.2)W x 8"(20.3)D x 13.5"(34.3)H

Transmission Line

- High Conductivity Copper
- Welded Construction
- Expansion Compensation
- Low Loss PTFE Dielectric
- Heavy Wall Tubing

Dielectric is the world's largest manufacturer of Rigid Coaxial Transmission Line. Our record of reliable service and superior quality, as well as our ongoing research and development programs have kept Dielectric the industry's leader. More Radio and TV stations, utilizing rigid Coaxial transmission line, are on the air with Dielectric.

Standard offerings include:

- 1-5/8" to 9-3/16"
- EIA, digiTLine® (broadband), EHTLine (enhanced heat transfer), and Ultimate Line.

Coaxial Patch Panels

- High Isolation
- Low VSWR
- Sizes 1-5/8" Through 9-3/16"
- 3, 4 or 7 Port Standard
- Custom Types Available

Dielectric patch panels are a low cost reliable solution to multi-connection routing situations. Patch panels are available in sizes of 1-5/8" through 6-1/8" with 3, 4 or 7 ports and 8-3/16" (and larger) in 3 or 4 ports. Patch panels are available with or without interlocks. Bolt type (EIA) flanges are standard. Transitions to "no flange" or other line sizes are available. Dielectric can supply panels in custom configurations for special requirements.

60000 Series

The 60000 Series Motorized Switches are blade type SPDT or 4 port transfer switches. Sizes include 7/8", 1-5/8", 3-1/8", 4-1/16", and 6-1/8". Switch position is indicated by a mechanical pointer and through auxiliary switches used for readout and interlocking circuits. In the closing mode, the interlock switches do not activate until the RF contacts are ready to accept full power. In the opening mode, the interlock switches open prior to the RF contacts to prevent the breaking of the RF contacts while under power. Manual operation is provided for by a knob. Terminations are standard EIA fixed flanges with non-removable male connectors.

- Additional sizes available upon request.

Control Systems for Motorized Switches

Remote/Local

Dual Universal Switch Controller

Dielectric's Dual Universal Switch Controller (P/N 11000010590) allows control of one or two switches in either local or remote operation.

Optional control cable for 50000 Series Switch: 25'(7.5m) (P/N 11000007364)
Optional control cable for 60000 Series Switch: 25'(7.5m) (P/N 0101873025)
Optional control cable for 60000 Series Switch: 50'(15m) (P/N 0101873050)

Lockout/Tagout Switch

The RF "LOCKOUT/TAGOUT" Safety Switch prevents the accidental exposure of workers to RF energy. It acts as an isolation device preventing the flow of RF energy to the transmission line and antenna system. This unit helps stations to comply with OSHA Rule 1910.147 regarding the general protection of workers.

Specifications

Isolation	> 50 dB
Insertion Loss (in disengaged mode)	< 0.03 dB @ 100 MHz
Characteristic Impedance	50 or 75 ohms
Power Rating	equal to specific line size
RF Connections	7/8" to 6-1/8" EIA flanged
Frequency Range	300 kHz to 1 GHz
VSWR (in disengaged mode)	< 1.05:1

- Adjustable system pressure allows for altitude compensation to assure peak efficiency at any elevation
- Self-regenerating twin tower drying system for years of trouble free operation.

Dielectric's automatic, self-contained compressor dehydrators, Models 200, 600, 850 and 1200 provide a dry air source for a variety of small volume applications. These compact units are the ideal choice for low volume dry air requirements. Each of these models is available in four alarm/output pressure configurations and in 115V/60-50 Hz or 220V/60-50 Hz to provide optimum capabilities for all applications.

Unit Capabilities

Line Size Model	1-5/8" ft (m)	3-1/8" ft (m)	4-1/16" ft (m)	6-1/8" ft (m)
TLS 300	5000 (1525)	1650 (1500)	850 (260)	
TLS 1000		5000 (1525)	3000 (915)	1500 (460)
200C	5000 (1525)		850 (260)	
600C		3500 (1070)	2100 (640)	900 (275)
850C		5000 (1525)	3000 (915)	1500 (460)

Global Presence

Dielectric products are represented in 90 countries around the world. With the rapid expansion of communications, Dielectric is positioned to service the broadcast needs of small and large stations, DTV and NTSC, FM and specialty RF systems, complete systems and components.

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Specifications subject to change without notice.