

EMR corp.

Bi-Directional & Uni-Directional RF Systems



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INTRODUCTION TO EMR CORPORATION COMMUNICATION ENHANCEMENT SYSTEMS

By:
William F. Lieske, Sr.
Founder, EMR Corporation

As SMR (trunking) systems gained popularity in the 1980's and high performance portable radio transceiver units for these systems became available, an upsurge of portable usage took place. It was quickly found that portable coverage into and out of buildings, tunnels and areas deeply shaded from the base station site suffered from intermittent to a complete lack of coverage.

The idea of enhancement coverage using uni-directional or bi-directional filter-amplifiers provided an answer to the problem. Placing an antenna array in the clear, aimed at the remote site provides access to the communications system. Either "lossy" line or hard line with properly located antennas throughout the areas to be covered, provides distribution of the desired signal.

EMR Corporation began work in this very specialized area in 1985 with enhancement systems located in city and county jail facilities. Soon, tunnels, state and federal correctional facilities, airports, gambling casinos and semiconductor fabrication plants were equipped with enhancement systems. Many cities throughout the world require, as part of their building code, enhancement systems for public safety communications within large or underground structures. Shopping malls, convention centers and multi-story office buildings have been enhanced to provide communications for police, fire and emergency medical aid, as well as routine administrative operations. Extending communications into such areas for safety and site security is fast becoming the rule, rather than the exception.

EMR engineers found that suitable amplifiers for optimum enhancement system performance could not be found on the market. After an analysis of system requirements, we have designed special amplifiers to meet this need.

Using our experience in broad band filter design, we developed very effective filtering components. We now have a complete, mature line of enhancement system products. These include multi-band and cross band systems that will handle midband, FM broadcast, VHF, UHF, cellular, 800 and 900 MHz SMR, PCS and VHF, UHF and 900 MHz paging operations. Our enhancement systems perform equally well for digital or analog radio communications system applications.

Over the years we have built solid experience in a wide variety of signal enhancement systems in the spectrum from 66 MHz to 960 MHz. To support these systems we maintain stocks of all active amplifiers and power supplies for immediate replacement. We warranty our enhancement systems for a full year from date of shipment.

EMR Corporation can design a system for you or provide assistance in the development of a plan for a suitable enhancement system design. Your needs can be met with an EMR Corporation signal enhancement system.

No enhancement project is too large or too small for EMR, please contact our engineers. We know you will be impressed with our approach, knowledge and suggestions.

APPLICATION NOTES FOR COMMUNICATION ENHANCEMENT SYSTEMS

WHERE IS SIGNAL ENHANCEMENT USED?

In buildings, tunnels, and areas that are shaded from adequate RF Signal coverage.

WHAT ARE THE BENEFITS?

Signals from a remotely located trunking or pager site are received and amplified with radiating elements distributed as needed to provide desired coverage. Using the same distribution cables and/or antennas, portable radio signals are filtered and amplified sufficiently to provide full coverage. The "donor" site must be near enough to the enhanced site to provide a minimum of signal strength relative to ambient and system noise. These levels are usually determined by field measurements.

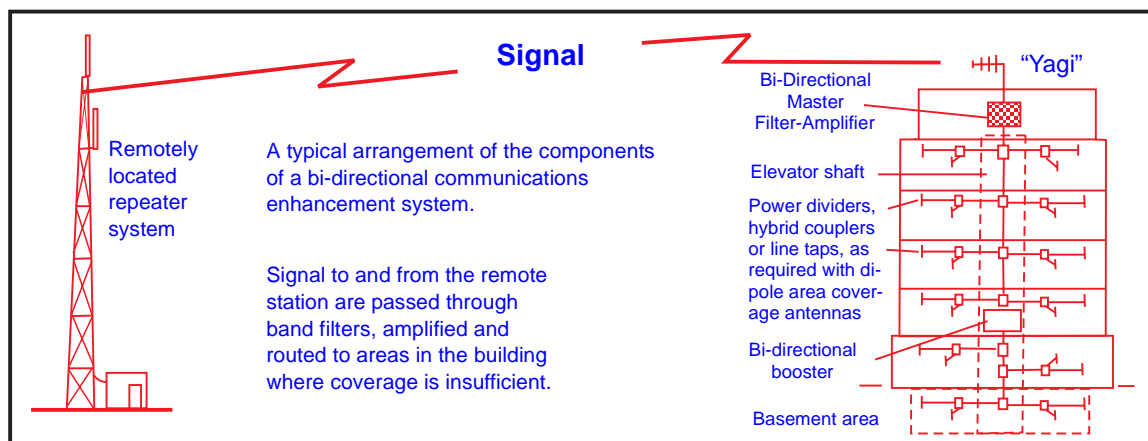
WHAT ARE BI-DIRECTIONAL AND UNI-DIRECTIONAL AMPLIFIER SYSTEMS?

A bi-directional system provides filtering and amplification both to and from the remote site. A uni-directional system provides one-way filtering and amplification.

WHAT DOES THE DISTRIBUTION SYSTEM CONSIST OF?

Coaxial transmission lines and accessory devices such as power splitters, hybrid couplers, sampling line taps and suitable antennas that are strategically placed. The use of "lossy line" cable is often used, particularly in tunnels and long corridors. The choice of distribution method depends on the nature of the structure in which signal enhancement is required.

TYPICAL BI-DIRECTIONAL ENHANCEMENT SYSTEM



BENEFITS & FEATURES OF EMR CORPORATION ENHANCEMENT SYSTEMS:

- Designed specifically to meet your enhancement needs.
- Amplifiers are unique to enhancement signal characteristics and F.C.C. type accepted.
- System gain set provisions and signal overload protection assures optimum performance.
- Filtering is custom designed and tuned to meet individual system requirements.
- Ultra reliable - Field tested designs utilizing the highest quality components.
- Two year warranty
- System designed assistance provided. We will ask you to provide details of the structure(s) to be enhanced. Certain measurements and tests must often be made in order that signal distribution may be determined. This work can be accomplished by your technical staff or EMR Corp.

BI-DIRECTIONAL SYSTEMS

150 - 512 MHz

8406x2



ELECTRICAL SPECIFICATIONS

Model Number	840612	8406x2	850612	8506x2
Frequency Band	150 - 174	150 - 174	406-512	406-512
Description	Master	Master	Master	Master
System Gain	50+ dB	50+ dB	50 dB	50 dB
O/P Pwr - Max	5 W	5 W	5 W	5 W
Noise Figure: Amplifier	3 dB	3 dB	3 dB	3 dB
3rd Order I.P.	+50 dBm	+50 dBm	+50 dBm	+50 dBm
Bandwidth	Single Channel	Multi-Channel	Single Channel	Multi-Channel
Nominal Impedance	50 Ohms	50 Ohms	50 Ohms	50 Ohms
VSWR (max.)	1.6:1	1.6:1	1.6:1	1.6:1
Operating Voltage (D.C.)	13.6 VDC	13.6 VDC	13.6 VDC	13.6 VDC
Current	3 A	3 A	4 A	4 A
Temperature Range	- 22 to +140 °F - 30 to 60 ° C	- 22 to +140 °F - 30 to 60 ° C	- 22 to +140 °F - 30 to 60 ° C	- 22 to +140 °F - 30 to 60 ° C

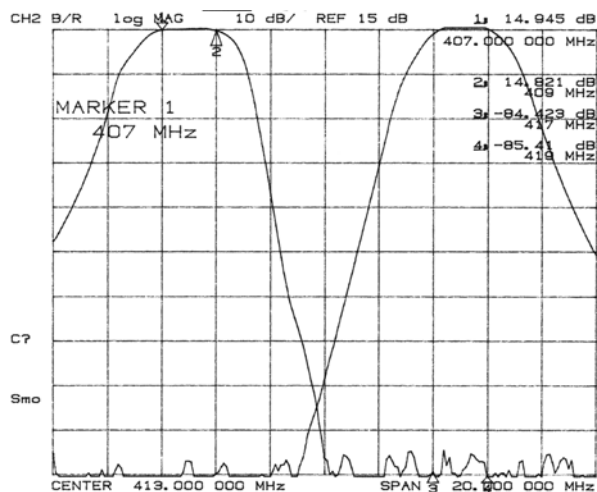
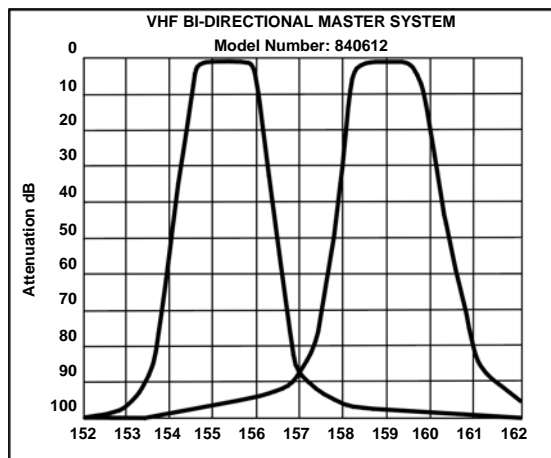
8506x2



MECHANICAL SPECIFICATIONS

Connectors	N Female	N Female	N Female	N Female
Finish	EMR Gray	EMR Gray	EMR Gray	EMR Gray
Actual Dimensions		Varies according to options available		
Inches	29 3/4 x 19 x 17		36 3/4 x 19 x 16	24 x 18 x 8
Metric	756 x 483 x 432		944 x 483 x 407	610 x 458 x 204
Ship Wt.		Varies according to options available		
lbs	52		36	53
kg	23.6		16.4	24.1

UHF BI-DIRECTIONAL MASTER SYSTEM
Model Number: 850612

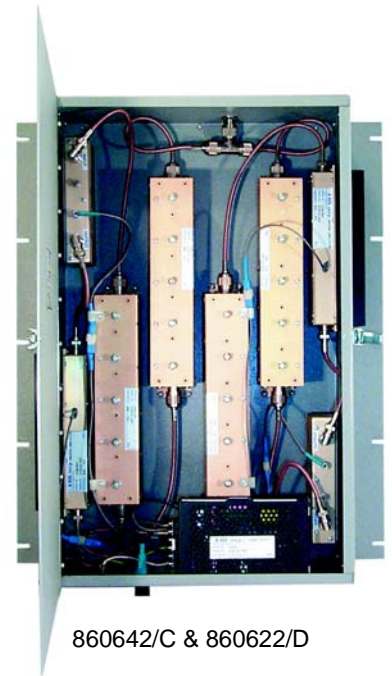


BI-DIRECTIONAL SYSTEMS

806 - 960 MHz

ELECTRICAL SPECIFICATIONS

Model Number	860622/C	860632/C	860642/C	860622/D
Frequency Band	806-894	806-894	806-894	894-960
Description	Master	Master	Master	Master
System Gain	50 dB	50 dB	50 dB	50 dB
O/P Pwr - Max	5 W	5 W	5 W	5 W
Noise Figure: Amplifier	2.0 dB	2.0 dB	2.0 dB	2.0 dB
3rd Order I.P.	+35 dBm	+35 dBm	+35 dBm	+35 dBm
Bandwidth	< 5 MHz	< 10 MHz	< 15 MHz	< 5 MHz
Nominal Impedance	50 Ohms	50 Ohms	50 Ohms	50 Ohms
VSWR (max.)	1.2:1	1.2:1	1.2:1	1.2:1
Operating Voltage	13.6 VDC	13.6 VDC	13.6 VDC	13.6 VDC
Current	4.5 A	4.5 A	4.5 A	4.5 A
Temperature Range	- 22 to +140 °F - 30 to +60 ° C	- 22 to +140 °F - 30 to +60 ° C	- 22 to +140 °F - 30 to +60 ° C	- 22 to +140 °F - 30 to +60 ° C



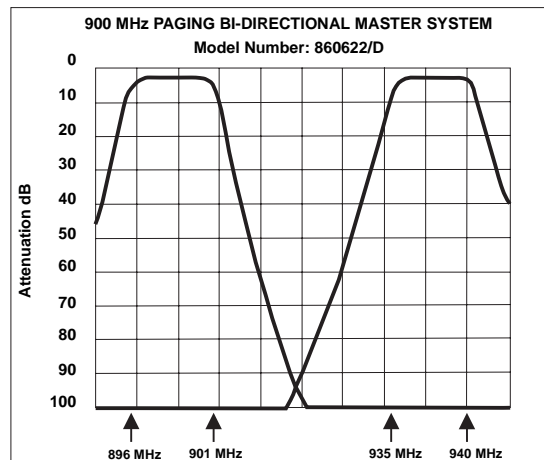
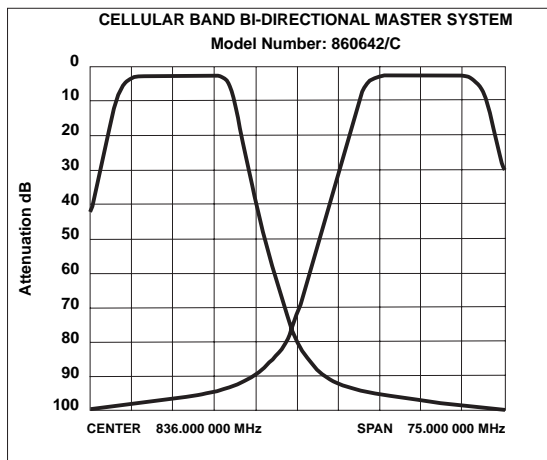
860642/C & 860622/D

MECHANICAL SPECIFICATIONS

Connectors	N Female	N Female	N Female	N Female
Finish	EMR Gray	EMR Gray	EMR Gray	EMR Gray
Actual Dimensions				
Inches	23 x 19 x 6 1/4	23 x 19 x 6 1/4	23 x 19 x 6 1/4	23 x 19 x 6 1/4
Metric	585 x 483 x 159	585 x 483 x 159	585 x 483 x 159	585 x 483 x 159
Ship Wt.				
lbs	31	31	31	31
kg	14.1	14.1	14.1	14.1



860632/C



UNI-DIRECTIONAL SYSTEMS

150 - 512 MHz



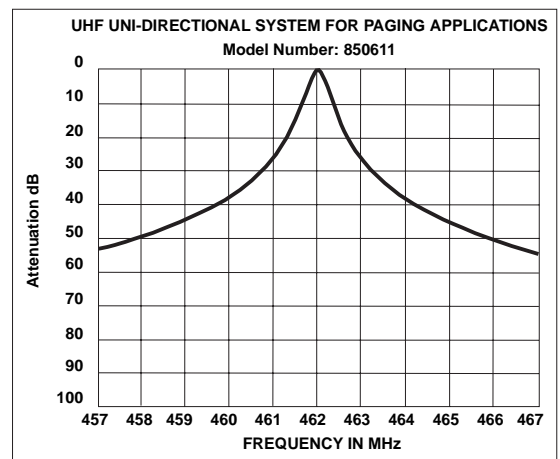
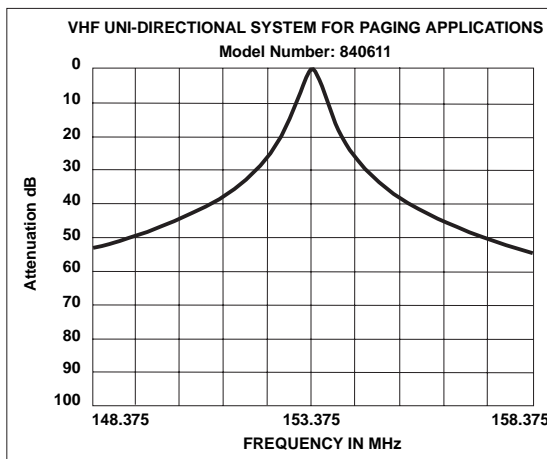
ELECTRICAL SPECIFICATIONS

Model Number	840611	8406x1	850611	8506x1
Frequency Band	150-174	150-174	406-512	406-512
Description	Master	Master	Master	Master
System Gain	45 dB	45 dB	50 dB	50 dB
O/P Pwr - Max	5 W	5 W	5 W	5 W
Noise Figure: Amplifier	3 dB	3 dB	3.0 dB	3.0 dB
3rd Order I.P.	+38 dBm	+38 dBm	+ 50 dBm	+ 50 dBm
Bandwidth	Single Channel	Multi-Channel	Single Channel	Multi-Channel
Nominal Impedance	50 Ohms	50 Ohms	50 Ohms	50 Ohms
VSWR (max.)	1.2:1	1.2:1	1.6:1	1.6:1
Operating Voltage	13.6 VDC	13.6 VDC	13.6 VDC	13.6 VDC
Current	1.0 A	1.0 A	2 A	2 A
Temperature Range	- 22 to +140 °F - 30 to +60 ° C	- 22 to +140 °F - 30 to +60 ° C	- 22 to +140 °F - 30 to +60 ° C	- 22 to +140 °F - 30 to +60 ° C



MECHANICAL SPECIFICATIONS

Connectors	N Female	N Female	N Female	N Female
Finish	EMR Gray	EMR Gray	EMR Gray	EMR Gray
Actual Dimensions		Varies according to options available		Varies according to options available
Inches	36 3/4 x 19 x 17		23 x 19 x 8	
Metric	934 x 483 x 432		585 x 483 x 204	
Ship Wt.		Varies according to options available		Varies according to options available
lbs	26		27	
kg	11.8		12.3	



UNI-DIRECTIONAL SYSTEMS

894 - 960 MHz

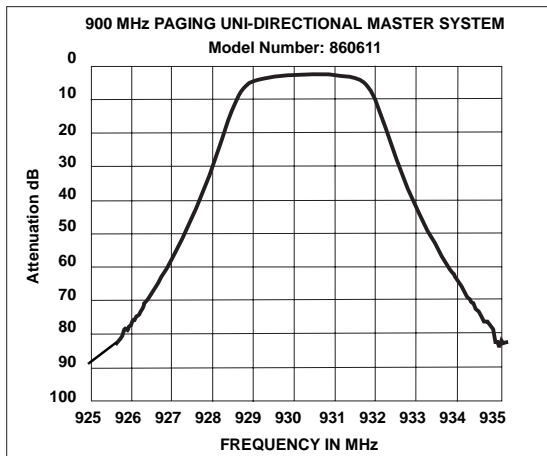
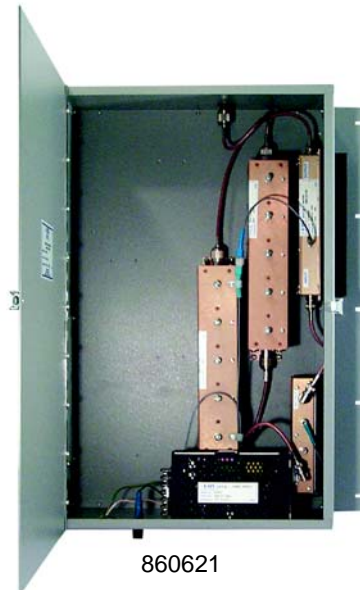
ELECTRICAL SPECIFICATIONS

Model Number	860611	8606x1
Frequency Band	894-960	894-960
Description	Master	Master
System Gain	50 dB	50 dB
O/P Pwr - Max	5 W	5 W
Noise Figure: Amplifier	2.0 dB	2.0 dB
3rd Order I.P.	+35 dBm	+35 dBm
Bandwidth	Single Channel	Multi-Channel
Nominal Impedance	50 Ohms	50 Ohms
VSWR (max.)	1.2:1	1.2:1
Operating Voltage	13.6 VDC	13.6 VDC
Current	2.3 A	2.3 A
Temperature Range	-22 to +140 °F - 30 to +60 ° C	-22 to +140 °F - 30 to +60 ° C



MECHANICAL SPECIFICATIONS

Connectors	N Female	N Female
Finish	EMR Gray	EMR Gray
Actual Dimensions		Varies according to options available
Inches	23 x 19 x 6 1/4	
Metric	585 x 483 x 159	
Ship Wt.		Varies according to options available
lbs	24	
kg	10.9	



BI & UNI-DIRECTIONAL LINE TAPS

150 - 512 MHz

ELECTRICAL SPECIFICATIONS

Model Number	2492/T	2492/T2	2492/T4	2592/T	2592/T2	2592/T4
Frequency Band	150-174	150-174	150-174	406-512	406-512	406-512
Coupling Range	6-25 dB	6-25 dB	6-25 dB	6-25 dB	6-25 dB	6-25 dB
# of Tap Points	1	2	4	1	2	4
Input Power	250 Watts	250 Watts	250 Watts	250 Watts	250 Watts	250 Watts
Nominal Impedance	50 Ohms	50 Ohms	50 Ohms	50 Ohms	50 Ohms	50 Ohms
Temperature Range	- 22 to +140 °F - 30 to +60 ° C	- 22 to +140 °F - 30 to +60 ° C	- 22 to +140 °F - 30 to +60 ° C	- 22 to +140 °F - 30 to +60 ° C	- 22 to +140 °F - 30 to +60 ° C	- 22 to +140 °F - 30 to +60 ° C

MECHANICAL SPECIFICATIONS

Connectors	N Female	N Female	N Female	N Female	N Female	N Female
Finish	EMR Gray	EMR Gray	EMR Gray	EMR Gray	EMR Gray	EMR Gray
Actual Dimensions						
Inches	11 3/4 x 1 x 1 7/8	11 3/4 x 1 x 2 3/4	24 3/8 x 1 x 2 3/4	8 x 1 x 1 7/8	8 x 1 x 2 3/4	14 1/2 x 1 x 2 3/4
Metric	299 x 26 x 48	299 x 26 x 70	620 x 26 x 70	204 x 26 x 48	204 x 26 x 70	369 x 26 x 70
Ship Wt.						
lbs	3	3	4	2	2	3
kg	1.4	1.4	1.9	1.0	1.0	1.4



2492/T



2492/T2



2592/T



2592/T2



2592/T4

BI & UNI-DIRECTIONAL LINE TAPS

806 - 960 MHz

ELECTRICAL SPECIFICATIONS						
Model Number	2692/T-8	2692/T2-8	2692/T4-8	2692/T-9	2692/T2-9	2692/T4-9
Frequency Band	806-894	806-894	806-894	894-960	894-960	894-960
Coupling Range	6-25 dB	6-25 dB	6-25 dB	6-25 dB	6-25 dB	6-25 dB
# of Tap Points	1	2	4	1	2	4
Input Power	250 Watts	250 Watts	250 Watts	250 Watts	250 Watts	250 Watts
Nominal Impedance	50 Ohms	50 Ohms	50 Ohms	50 Ohms	50 Ohms	50 Ohms
Temperature Range	- 22 to +140 °F - 30 to 60 ° C	- 22 to +140 °F - 30 to 60 ° C	- 22 to +140 °F - 30 to 60 ° C	- 22 to +140 °F - 30 to 60 ° C	- 22 to +140 °F - 30 to 60 ° C	- 22 to +140 °F - 30 to 60 ° C

MECHANICAL SPECIFICATIONS						
Connectors	N Female	N Female	N Female	N Female	N Female	N Female
Finish	EMR Gray	EMR Gray	EMR Gray	EMR Gray	EMR Gray	EMR Gray
Actual Dimensions						
Inches	5 1/2 x 1 x 1 7/8	5 1/2 x 1 x 2 3/4	11 x 1 x 2 3/4	5 1/2 x 1 x 1 7/8	5 1/2 x 1 x 2 3/4	11 x 1 x 2 3/4
Metric	140 x 26 x 48	140 x 26 x 70	280 x 26 x 70	140 x 26 x 48	140 x 26 x 70	280 x 26 x 70
Ship Wt.						
lbs	2	2	3	2	2	3
kg	1.0	1.0	1.4	1.0	1.0	1.4



BI & UNI-DIRECTIONAL ANTENNAS

150 - 512 MHz

ELECTRICAL SPECIFICATIONS

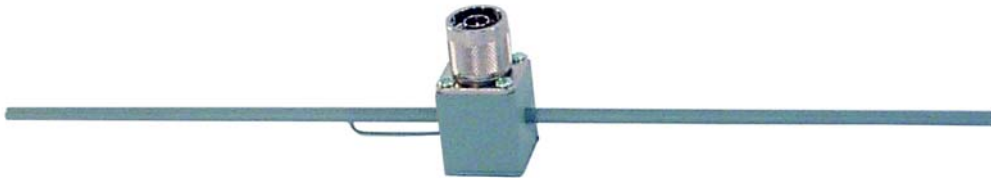
Model Number	B2H3/Q5BM	B2H3/Q5BF	B2K3/Q5BM	B2K3/Q5BF
Frequency Band	150-174	150-174	406-512	406-512
Description	Dipole	Dipole	Dipole	Dipole
Gain	Unity	Unity	Unity	Unity
Bandwidth	4 MHz	4 MHz	10 MHz	10 MHz
Nominal Impedance	50 Ohms	50 Ohms	50 Ohms	50 Ohms
VSWR	1.5:1 or Better	1.5:1 or Better	1.5:1 or Better	1.5:1 or Better
Temperature Range	- 22 to +140 °F - 30 to +60 ° C	- 22 to +140 °F - 30 to +60 ° C	- 22 to +140 °F - 30 to +60 ° C	- 22 to +140 °F - 30 to +60 ° C

MECHANICAL SPECIFICATIONS

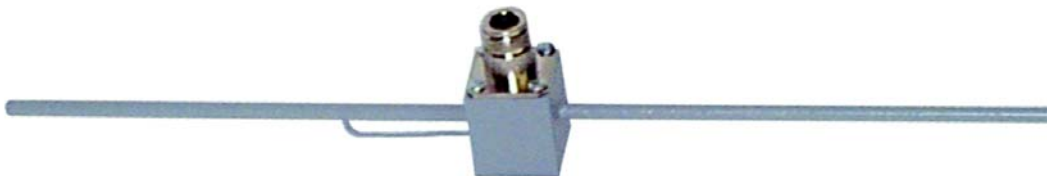
Connectors	N Male	N Female	N Male	N Female
Finish	EMR Gray	EMR Gray	EMR Gray	EMR Gray
Actual Dimensions				
Inches	36 x 1 x 2	36 x 1 x 2	12 1/2 x 1 x 2	12 1/2 x 1 x 2
Metric	915 x 26 x 51	915 x 26 x 51	318 x 26 x 51	318 x 26 x 51
Ship Wt.				
lbs	2	2	1	1
kg	1.0	1.0	0.5	0.5



B2H3/Q5BM



B2K3/Q5BM



B2K3/Q5BF

BI & UNI-DIRECTIONAL ANTENNAS

806 - 940 MHz

ELECTRICAL SPECIFICATIONS

Model Number	B1S3/Q5BM	B1S3/Q5BF	B2S3/Q5BM	B2S3/Q5BF
Frequency Band	806-940	806-940	806-940	806-940
Description	Quarter Wave	Quarter Wave	Dipole	Dipole
Gain	Unity	Unity	Unity	Unity
Bandwidth	40 MHz	40 MHz	20 MHz	20 MHz
Nominal Impedance	50 Ohms	50 Ohms	50 Ohms	50 Ohms
VSWR	1.5:1 or Better	1.5:1 or Better	1.5:1 or Better	1.5:1 or Better
Temperature Range	- 22 to +140 °F - 30 to +60 ° C	- 22 to +140 °F - 30 to +60 ° C	- 22 to +140 °F - 30 to +60 ° C	- 22 to +140 °F - 30 to +60 ° C

MECHANICAL SPECIFICATIONS

Connectors	N Male	N Female	N Male	N Female
Finish	EMR Gray	EMR Gray	EMR Gray	EMR Gray
Actual Dimensions				
Inches	4 1/2 x 6 x 6	4 1/2 x 6 x 6	6 1/2 x 1 x 2	6 1/2 x 1 x 2
Metric	115 x 153 x 153	115 x 153 x 153	166 x 26 x 51	165 x 26 x 51
Ship Wt.				
lbs	1	1	1	1
kg	0.5	0.5	0.5	0.5

