



## **IN-BUILDING COMMUNICATION ENHANCEMENT SYSTEMS**



### **EMR CORPORATION**

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# INTRODUCTION TO EMR CORPORATION COMMUNICATION ENHANCEMENT SYSTEMS

By:  
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Founder, EMR Corporation

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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 5 full years 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.

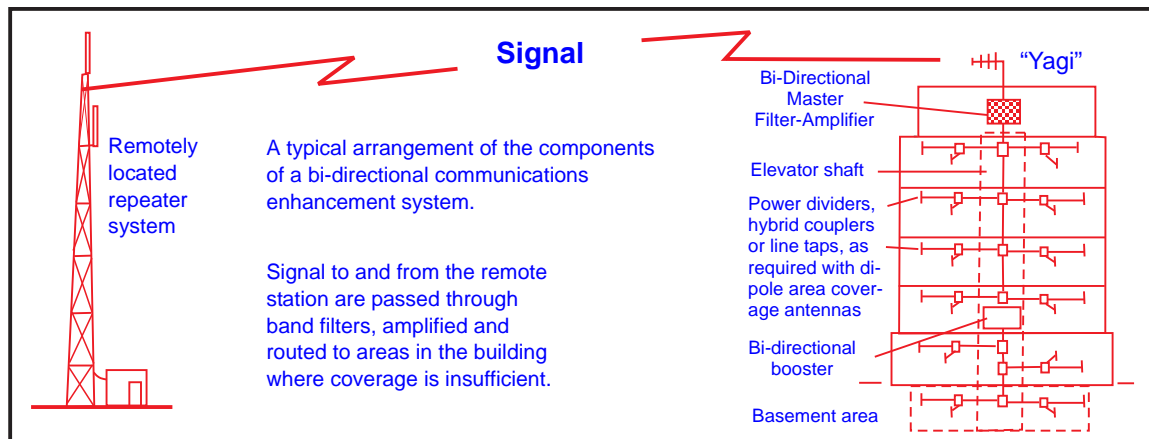
## WHAT ARE BI-DIRECTIONAL AND UNI-DIRECTIONAL AMPLIFIER SYSTEMS?

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:

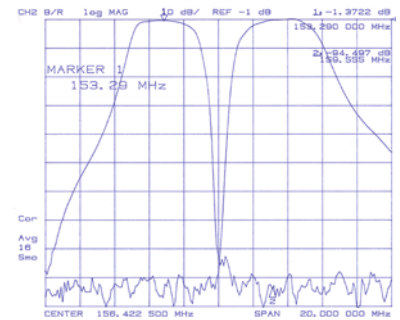
- Designed specifically to meet your enhancement needs.
- Amplifiers are unique to enhancement signal characteristics and F.C.C. type accepted.
- System gain set provisions and signal overload protection assures optimum performance.
- Filtering is custom designed and tuned to meet individual system requirements.
- Ultra reliable - Field tested designs utilizing the highest quality components.
- Five 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

840622/CUSTOM

## ELECTRICAL SPECIFICATIONS

Model Number	840622	850622/B	850622	850622/C
Frequency Band	150 - 174	390 - 400	400 - 470	470-512
Description	Standard	Standard	Standard	Standard
Passband Width (Note 4)	<=1.5 MHz	<=5 MHz	<=1.5 MHz	<=100 KHz
Stop Band Width	>=3.5 MHz	>=5 MHz	>=3.5 MHz	>=2.9 MHz
Amplifier Gain Typical	75 dB	70 dB	72 dB	72 dB
System Gain Typical	60 dB	60 dB	60 dB	60 dB
Amplifier O/P Power Max.	+37 dBm	+37 dBm	+37 dBm	+37 dBm
System O/P Power	Note 1	Note 1	Note 1	Note 1
Amplifier Noise Figure	4.0 dB	4.0 dB	4.0 dB	4.0 dB
System Noise Figure	Note 2	Note 2	Note 2	Note 2
1 dB Compression Point	+38 dBm	+38 dBm	+38 dBm	+38 dBm
IP3	+49 dBm	+49 dBm	+49 dBm	+49 dBm
Nominal Impedance	50 Ω	50 Ω	50 Ω	50 Ω
VSWR (Max.)	1.35:1	1.35:1	1.35:1	1.35:1
Amplifier Bias Voltage	13.6 VDC	13.6 VDC	13.6 VDC	13.6 VDC
System Voltage (Note 3)	115 VAC	115 VAC	115 VAC	115 VAC
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
List Price	\$9,125.00	\$9,125.00	\$9,125.00	\$9,125.00



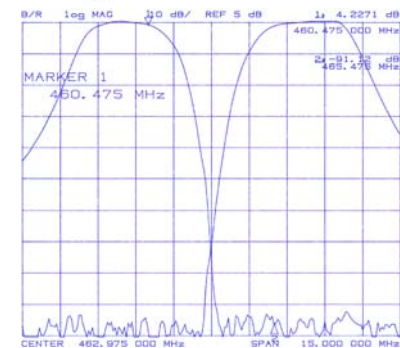
850622

## MECHANICAL SPECIFICATIONS

Connectors	N Female	N Female	N Female	N Female
Enclosure Typical	NEMA 4	NEMA 4	NEMA 4	NEMA 4
Finish	Painted	Painted	Painted	Painted
Actual Dimensions Inches (H x W x D)	16 x 12 x 7.25	Contact Factory	20 x 16 x 5	20 x 16 x 5
Metric	407 x 305 x 175		508 x 407 x 127	508 x 407 x 127
Ship Wt. lbs	53	53	53	53
kg	24.1	24.1	24.1	24.1

## SYSTEM UPGRADES

Alarm & Monitoring	✓	✓	✓	✓
UPS w/Battery B/U	✓	✓	✓	✓
80 dB System Gain	✓	✓	✓	✓



**Note 1:** System output power is a function of the number of carriers incident on the system, the signal level of these carriers to the signal enhancement system, and the insertion loss of the filters within the bidirectional system.

**Note 2:** System Noise Figure is the sum of the amplifier NF and the filter losses prior to the amplifier. The filter losses are dependent on the passband width for the uplink frequencies, the passband width for the downlink frequencies, and the stop band between them.

**Note 3:** Options are available for 12 VDC, 24 VDC, 48 VDC, 220 VAC

**Note 4:** Passband and stop band widths can and do vary. Please contact our factory with your frequencies as any of the standard bidirectional systems can be modified to different passband and/or stop band widths.

# BI-DIRECTIONAL SYSTEMS 764 - 861 MHz

850622/B



860632/C



## ELECTRICAL SPECIFICATIONS

Model Number	860622/B	860632/B	860642/B	860643/B
Frequency Band	764 - 806	764 - 806	764 - 806	764 - 861
Description	Standard	Standard	Standard	Standard
Passband Width (Note 4)	<=5 MHz	<=10 MHz	<=15 MHz	<=15 MHz
Stop Band Width	>=25 MHz	>=20 MHz	>=18 MHz	>=18/30 MHz
Amplifier Gain Typical	70 dB	70 dB	70 dB	70 dB
System Gain Typical	60 dB	60 dB	60 dB	60 dB
Amplifier O/P Power Max.	+37 dBm	+37 dBm	+37 dBm	+37 dBm
System O/P Power	Note 1	Note 1	Note 1	Note 1
Amplifier Noise Figure	3.0 dB	3.0 dB	3.0 dB	3.0 dB
System Noise Figure	Note 2	Note 2	Note 2	Note 2
1 dB Compression Point	+38 dBm	+38 dBm	+38 dBm	+38 dBm
IP3	+49 dBm	+49 dBm	+49 dBm	+49 dBm
Nominal Impedance	50 Ω	50 Ω	50 Ω	50 Ω
VSWR (Max.)	1.35:1	1.35:1	1.35:1	1.35:1
Amplifier Bias Voltage	13.6 VDC	13.6 VDC	13.6 VDC	13.6 VDC
System Voltage (Note 3)	115 VAC	115 VAC	115 VAC	115 VAC
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
List Price	\$9,125.00	\$9,125.00	\$9,125.00	Contact Factory

## MECHANICAL SPECIFICATIONS

Connectors	N Female	N Female	N Female	N Female
Enclosure Typical	NEMA 4	NEMA 4	NEMA 4	NEMA 4
Finish	Painted	Painted	Painted	Painted
Actual Dimensions Inches (H x W x D)	16 x 12 x 7.25	16 x 12 x 7.25	16 x 12 x 7.25	Contact Factory
Metric	407 x 305 x 185	407 x 305 x 185	407 x 305 x 185	Factory
Ship Wt. lbs	53	53	53	53
kg	24.1	24.1	24.1	24.1

## SYSTEM UPGRADES

Alarm & Monitoring	✓	✓	✓	✓
UPS w/Battery B/U	✓	✓	✓	✓
80 dB System Gain	✓	✓	✓	✓

**Note 1:** System output power is a function of the number of carriers incident on the system, the signal level of these carriers to the signal enhancement system, and the insertion loss of the filters within the bidirectional system.

**Note 2:** System Noise Figure is the sum of the amplifier NF and the filter losses prior to the amplifier. The filter losses are dependent on the passband width for the uplink frequencies, the passband width for the downlink frequencies, and the stop band between them.

**Note 3:** Options are available for 12 VDC, 24 VDC, 48 VDC, 220 VAC

**Note 4:** Passband and stop band widths can and do vary. Please contact our factory with your frequencies as any of the standard bidirectional systems can be modified to different passband and/or stop band widths.

# BI-DIRECTIONAL SYSTEMS 806 - 894 MHz

## ELECTRICAL SPECIFICATIONS

Model Number	860622/C	860632/C	860642/C	860652/C
Frequency Band	806 - 894	806 - 894	806 - 894	806 - 894
Description	Standard	Standard	Standard	Standard
Passband Width (Note 4)	<=5 MHz	<=10 MHz	<=15 MHz	<=20 MHz
Stop Band Width	>=40 MHz	>=35 MHz	>=30 MHz	>=25 MHz
Amplifier Gain Typical	70 dB	70 dB	70 dB	70 dB
System Gain Typical	60 dB	60 dB	60 dB	60 dB
Amplifier O/P Power Max.	+37 dBm	+37 dBm	+37 dBm	+37 dBm
System O/P Power	Note 1	Note 1	Note 1	Note 1
Amplifier Noise Figure	3.0 dB	3.0 dB	3.0 dB	3.0 dB
System Noise Figure	Note 2	Note 2	Note 2	Note 2
1 dB Compression Point	+39 dBm	+39 dBm	+39 dBm	+39 dBm
IP3	+49 dBm	+49 dBm	+49 dBm	+49 dBm
Nominal Impedance	50 Ω	50 Ω	50 Ω	50 Ω
VSWR (Max.)	1.35:1	1.35:1	1.35:1	1.35:1
Amplifier Bias Voltage	13.6 VDC	13.6 VDC	13.6 VDC	13.6 VDC
System Voltage (Note 3)	115 VAC	115 VAC	115 VAC	115 VAC
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
List Price	\$9,125.00	\$9,125.00	\$9,125.00	\$9,125.00

## MECHANICAL SPECIFICATIONS

Connectors	N Female	N Female	N Female	N Female
Enclosure Typical	NEMA 4	NEMA 4	NEMA 4	NEMA 4
Finish	Painted	Painted	Painted	Painted
Actual Dimensions Inches (H x W x D)	16 x 12 x 7.25	16 x 12 x 7.25	16 x 12 x 7.25	16 x 12 x 7.25
Metric	407 x 305 x 185	407 x 305 x 185	407 x 305 x 185	407 x 305 x 185
Ship Wt. lbs	53	53	53	53
kg	24.1	24.1	24.1	24.1

## SYSTEM UPGRADES

Alarm & Monitoring	✓	✓	✓	✓
UPS w/Battery B/U	✓	✓	✓	✓
80 dB System Gain	✓	✓	✓	✓

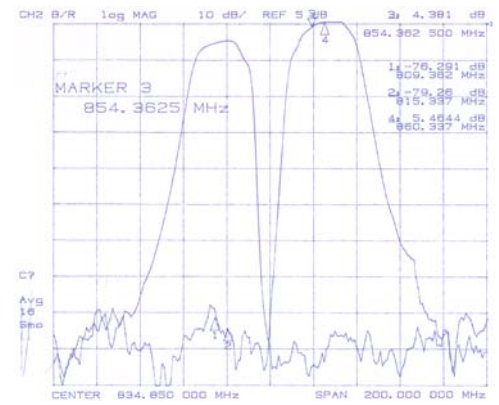
**Note 1:** System output power is a function of the number of carriers incident on the system, the signal level of these carriers to the signal enhancement system, and the insertion loss of the filters within the bidirectional system.

**Note 2:** System Noise Figure is the sum of the amplifier NF and the filter losses prior to the amplifier. The filter losses are dependent on the passband width for the uplink frequencies, the passband width for the downlink frequencies, and the stop band between them.

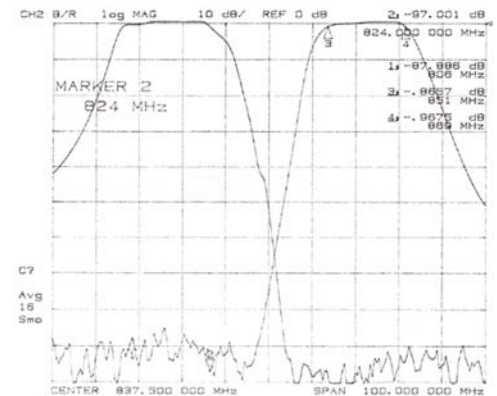
**Note 3:** Options are available for 12 VDC, 24 VDC, 48 VDC, 220 VAC

**Note 4:** Passband and stop band widths can and do vary. Please contact our factory with your frequencies as any of the standard bidirectional systems can be modified to different passband and/or stop band widths.

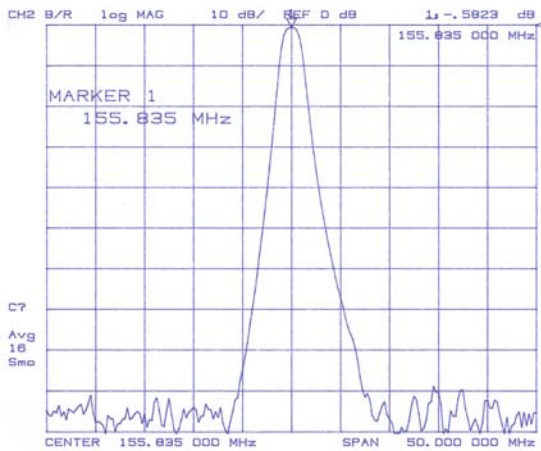
860642/C



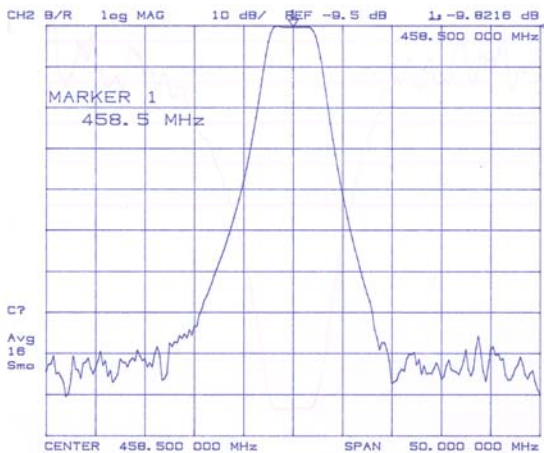
860652/C



# UNI-DIRECTIONAL SYSTEMS 150 - 512 MHz



850621



## ELECTRICAL SPECIFICATIONS

Model Number	840621	850621
Frequency Band	150-174	406-512
Description	Standard	Standard
Passband Width (Note 4)	<=1.5 MHz	<=1.5 MHz
Stop Band Width	>=4.5 MHz	>=4.5 MHz
Amplifier Gain Typical	75 dB	70 dB
System Gain Typical	60 dB	60 dB
Amplifier O/P Power Max.	+37 dBm	+37 dBm
System O/P Power	Note 1	Note 1
Amplifier Noise Figure	3.0 dB	3.0 dB
System Noise Figure	Note 2	Note 2
1 dB Compression Point	+38 dBm	+38 dBm
IP3	+49 dBm	+49 dBm
Nominal Impedance	50 Ω	50 Ω
VSWR (Max.)	1.35:1	1.35:1
Amplifier Bias Voltage	13.6 VDC	13.6 VDC
System Voltage (Note 3)	115 VAC	115 VAC
Temperature Range	- 22 to +140 °F - 30 to 60 ° C	- 22 to +140 °F - 30 to 60 ° C
List Price	\$4,975.00	\$4,975.00

## MECHANICAL SPECIFICATIONS

Connectors	N Female	N Female
Enclosure Typical	NEMA 4	NEMA 4
Finish	Painted	Painted
Actual Dimensions		
Inches	16 x 12 x 7.25	16 x 12 x 7.25
Metric	407 x 305 x 185	407 x 305 x 185
Actual Dimensions		
Inches (H x W x D)	53	53
Metric	24.1	24.1

## SYSTEM UPGRADES

Alarm & Monitoring	✓	✓
UPS w/Battery B/U	✓	✓
80 dB System Gain	✓	✓

**Note 1:** System output power is a function of the number of carriers incident on the system, the signal level of these carriers to the signal enhancement system, and the insertion loss of the filters within the bidirectional system.

**Note 2:** System Noise Figure is the sum of the amplifier NF and the filter losses prior to the amplifier. The filter losses are dependent on the passband width for the uplink frequencies, the passband width for the downlink frequencies, and the stop band between them.

**Note 3:** Options are available for 12 VDC, 24 VDC, 48 VDC, 220 VAC

**Note 4:** Passband and stop band widths can and do vary. Please contact our factory with your frequencies as any of the standard bidirectional systems can be modified to different passband and/or stop band widths.

# UNI-DIRECTIONAL SYSTEMS 764 - 960 MHz

## ELECTRICAL SPECIFICATIONS

Model Number	860621/B	86021/C	860621/D
Frequency Band	764-806	806-894	894-960
Description	Standard	Standard	Standard
Passband Width (Note 4)	<=5 MHz	<=5 MHz	<=5 MHz
Stop Band Width	>=25 MHz	>=40 MHz	>=34 MHz
Amplifier Gain Typical	70 dB	70 dB	70 dB
System Gain Typical	60 dB	60 dB	60 dB
Amplifier O/P Power Max.	+37 dBm	+37 dBm	+37 dBm
System O/P Power	Note 1	Note 1	Note 1
Amplifier Noise Figure	3.0 dB	3.0 dB	3.0 dB
System Noise Figure	Note 2	Note 2	Note 2
1 dB Compression Point	+39 dBm	+39 dBm	+39 dBm
IP3	+49 dBm	+49 dBm	+49 dBm
Nominal Impedance	50 Ω	50 Ω	50 Ω
VSWR (Max.)	1.35:1	1.35:1	1.35:1
Amplifier Bias Voltage	13.6 VDC	13.6 VDC	13.6 VDC
System Voltage (Note 3)	115 VAC	115 VAC	115 VAC
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
List Price	\$4,975.00	\$4,975.00	\$4,975.00

## MECHANICAL SPECIFICATIONS

Connectors	N Female	N Female	N Female
Enclosure Typical	NEMA 4	NEMA 4	NEMA 4
Finish	Painted	Painted	Painted
Actual Dimensions Inches (H x W x D)	16 x 12 x 7.25	16 x 12 x 7.25	16 x 12 x 7.25
Metric	407 x 305 x 185	407 x 305 x 185	407 x 305 x 185
Ship Wt. lbs	53	53	53
kg	24.1	24.1	24.1

## SYSTEM UPGRADES

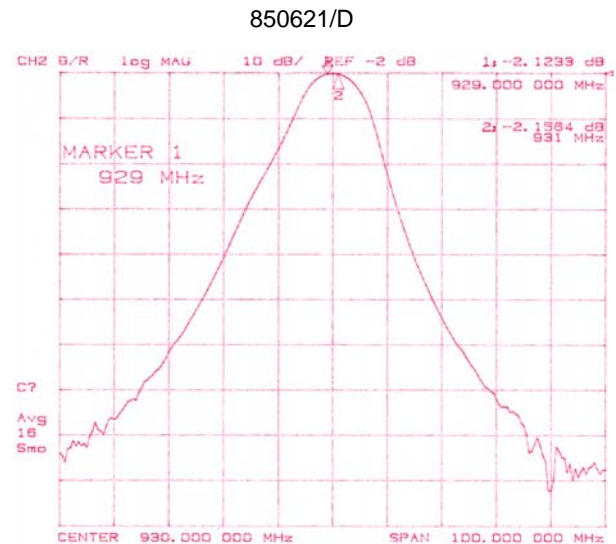
Alarm & Monitoring	✓	✓	✓
UPS w/Battery B/U	✓	✓	✓
80 dB System Gain	✓	✓	✓

**Note 1:** System output power is a function of the number of carriers incident on the system, the signal level of these carriers to the signal enhancement system, and the insertion loss of the filters within the bidirectional system.

**Note 2:** System Noise Figure is the sum of the amplifier NF and the filter losses prior to the amplifier. The filter losses are dependent on the passband width for the uplink frequencies, the passband width for the downlink frequencies, and the stop band between them.

**Note 3:** Options are available for 12 VDC, 24 VDC, 48 VDC, 220 VAC

**Note 4:** Passband and stop band widths can and do vary. Please contact our factory with your frequencies as any of the standard bidirectional systems can be modified to different passband and/or stop band widths.



# BI & UNI-DIRECTIONAL LINE TAPS

## 150 - 512 MHz

### ELECTRICAL SPECIFICATIONS

Model Number	2492/T	2492/T2	2592/T	2592/T2
Frequency Band	150-174	150-174	406-512	406-512
Coupling Range	6-10 or 10-25 dB	6-10 or 10-25 dB	6-10 or 10-25 dB	6-10 or 10-25 dB
# of Tap Points	1	2	1	2
Input Power	250 Watts	250 Watts	250 Watts	250 Watts
Nominal Impedance	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
List Price	\$270.00	\$360.00	\$240.00	\$330.00

### MECHANICAL SPECIFICATIONS

Connectors	N Female	N Female	N Female	N Female
Finish	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	8 x 1 x 1 7/8	8 x 1 x 2 3/4
Metric	299 x 26 x 48	299 x 26 x 70	204 x 26 x 48	204 x 26 x 70
Ship Wt.				
lbs	3	3	2	2
kg	1.4	1.4	1.0	1.0



2492/T



2492/T2



2592/T



2592/T2

# BI & UNI-DIRECTIONAL LINE TAPS

## 806 - 960 MHz

ELECTRICAL SPECIFICATIONS				
Model Number	2692/T-8	2692/T2-8	2692/T-9	2692/T2-9
Frequency Band	806-894	806-894	894-960	894-960
Coupling Range	6-10 or 10-25 dB	6-10 or 10-25 dB	6-10 or 10-25 dB	6-10 or 10-25 dB
# of Tap Points	1	2	1	2
Input Power	250 Watts	250 Watts	250 Watts	250 Watts
Nominal Impedance	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
List Price	\$230.00	\$315.00	\$230.00	\$315.00
MECHANICAL SPECIFICATIONS				
Connectors	N Female	N Female	N Female	N Female
Finish	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	5 1/2 x 1 x 1 7/8	5 1/2 x 1 x 2 3/4
Metric	140 x 26 x 48	140 x 26 x 70	140 x 26 x 48	140 x 26 x 70
Ship Wt.				
lbs	2	2	2	2
kg	1.0	1.0	1.0	1.0

2692/T-8



2692/T-9

2692/T2-8



2692/T2-9

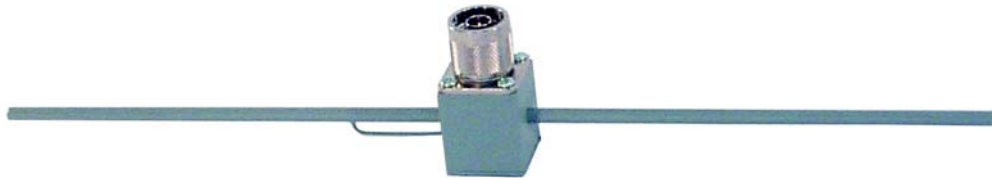
# BI & UNI-DIRECTIONAL ANTENNAS

## 406 - 512 MHz

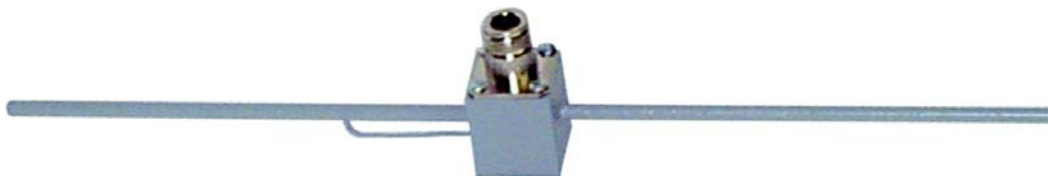
ELECTRICAL SPECIFICATIONS				
Model Number	B1K3/Q5BM	B1K3/Q5BF	B2K3/Q5BM	B2K3/Q5BF
Frequency Band	406-512	406-512	406-512	406-512
Description	1/4 Wave	1/4 Wave	Dipole	Dipole
Gain	Unity	Unity	Unity	Unity
Bandwidth	20MHz	20 MHz	20 MHz	20 MHz
Nominal Impedance	50 Ohms	50 Ohms	50 Ohms	50 Ohms
VSWR	1.5:1 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
List Price	\$240.00	\$240.00	\$220.00	\$220.00
MECHANICAL SPECIFICATIONS				
Connectors	N Male	N Female	N Male	N Female
Finish	EMR Gray	EMR Gray	EMR Gray	EMR Gray
Actual Dimensions				
Inches	8 x 12 x 12	8 x 12 x 12	12 1/2 x 1 x 2	12 1/2 x 1 x 2
Metric	204 x 305 x 305	204 x 305 x 305	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

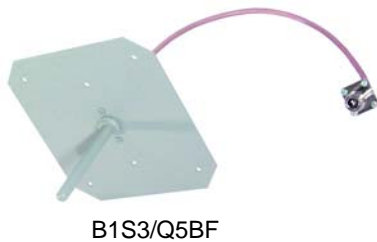
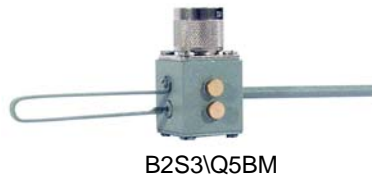
## 806 - 940 MHz

### 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	110 MHz	110 MHz	110 MHz	110 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
List Price	\$220.00	\$220.00	\$220.00	\$220.00

### 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



## ORDERING, TERMS & POLICIES

**ORDER PLACEMENT:** All prices shown are list price, FOB factory (Phoenix Arizona - USA) and are subject to change without prior notice. Prices include domestic packaging and are exclusive of federal, state or local excise or sales taxes, duty or brokerage charges on export shipments. Unless otherwise negotiated freight will be prepaid and added to the invoice.

**OPERATING FREQUENCIES:** Operating frequencies and power levels used in preparing EMR products are those provided by the customer. Errors in operating frequencies or power levels made by EMR will be corrected at no charge. Errors due to faulty information from the customer are subject to all shipping charges and any material and/or labor cost incurred by EMR Corporation to correct the order.

**TERMS OF SALE:** Terms of sales are C.O.D., or Cash with Order unless other terms have been established prior to shipment. Open account status will be extended upon reasonable assurance of credit worthiness. Past due accounts are subject to a late charge of up to 2.0% monthly, beginning 30 days after the date of issuance of our valid invoices.

**ORDER ACCEPTANCE:** An order is considered contractually valid when a purchase order is accepted by mail, telephone, facsimile or e-mail. Cancellations made less than 15 days prior to scheduled ship date may be subject to a cancellation charge.

**CLAIMS FOR SHIPPING LOSS OR DAMAGE:** All shipments will be made via the customers specified mode of transportation. If coded "best way" the shipment will be consigned to the most economical, reliable commercial carrier. Insurance will be taken unless the customer specifically takes responsibility for shipping loss or damage. Although claims for loss are the responsibility of the consignee, EMR will assist in all ways in making claims and tracking for loss or damage to any of its shipment.

**MODIFICATION AND DELAYS:** EMR reserves the right to make design changes or modifications to any of its products without specific prior notification provided that such modifications do not materially reduce the value or performance of the equipment concerned. EMR will not be responsible for delays in shipment occasioned by slow or interrupted deliveries to EMR of components, materials or processes necessary to the completion of any project as originally scheduled.

**PRODUCT RETURNS:** Merchandise returned without having first obtained written acknowledgment from EMR may be rejected. Unless otherwise authorized, credit or refund will not exceed 90% of originally invoiced amounts, and in no event shall include transportation costs. Return authorizations shall expire in 60 days unless otherwise specifically noted.

**MECHANICAL SEALS:** EMR provides mechanical seals on many of its products. These seals insure that the unit has not been modified or tampered with once it has left the factory. "Breaking" these seals without consent from an authorized EMR Corporation engineer or technician may void the warranty policy stated below.

**STANDARD WARRANTY POLICY:** EMR Corporation, hereinafter called EMR, warrants that all equipment of its manufacture shall be free from defects in design, material and workmanship for a period of 5 years from date of shipment unless otherwise covered by special warranty. If any such product, entirely or in part, fails to produce the performance as set forth in the brochure, quotations or literature provided by EMR, such product will be replaced or repaired at EMR's expense provided that the failure was not the result of alteration, misuse, tampering, misapplication, shipping damage or vandalism. If a product failure is found to be the fault of EMR the cost of transportation to the EMR factory and its return will be born by EMR. A reasonable charge for travel and subsistence costs will be invoiced when on-site repairs are necessary. Should EMR supply components not of its own manufacture, but specified by a customer, the warranty shall reflect the original manufacturers warranty, only.

It is understood that this statement constitutes EMR's entire and only warranty, there being no other warranties expressed or implied in law or in fact, including implied warranties of fitness. In no event shall EMR be liable for damages, either direct or consequential, that may be occasioned by any defect in material, workmanship or product support.





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