

Yagi Gain & Front to Back Performance

Shown below are gain and front to back figures for our 2 element and 3 element yagi. These values were measured on an antenna range using the protocol described in “Antenna Comparison Report: HF Tri-Banders” by Ward Silver (N0AX) and Steve Morris (K7LXC). To create this report, they took popular tri-banders and put them on a 48 foot tower and transmitted a signal to a dipole on a second tower several thousand feet away, with a spectrum analyzer connected to it. Using this configuration, they measured the gain and front to back ratio of each of the tri-band antennas. Their test represents the most realistic comparisons of yagis that we have seen to date.



SteppIR yagi shown in portable operation. The antenna took 15 minutes to completely install.

2 and 3 element Yagi Field Test Results

We tested our antenna using the same equipment and protocol. The results show that we achieve more gain and front to rear than any of our competitors utilizing equal boom length. In many cases, we outperform competitors products that are on much larger booms. We created antennas that have maximum gain and F/R without regard for bandwidth. It is well known that real world yagis have radiation resistances ranging from 16 ohms to 28 ohms. The yagi designs that reside in our control-

ler all have an impedance of 22 ohms. this allows us to use a very broadband, high power transmission line transformer to give us a nearly perfect match to 50 ohms at every frequency. The computerized antenna modeling also takes into account the changing electrical boom length as frequency changes. When the 180 degree function is enabled, a new yagi is created that takes into account the change in element spacing – the reflector is now closer to the driven element and the director is farther away. The result is slightly different gain and front to rear specifications. Ironically, you will get a slight bit more gain in the 180 degree direction.

We then go to the antenna range and correlate the modeled antenna to the real world. In other words, we determine as closely as possible the electrical length of the elements. We are very close to the modeled antennas, but it is virtually impossible to get closer than a few tenths of a dB on gain and several dB on front to rear. The specification figures on the following page are very close, but not exact.

2 Element Yagi

3 Element Yagi

Band	Gain dBd	F/B dB	Band	Gain dBd	F/B dB
20m	4.2	18	20m	5.0	42
17m	4.2	19	17m	5.5	44
15m	4.1	14	15m	5.7	44
12m	4.0	13	12m	6.2	17
10m	3.8	10	10m	6.3	15
6m	2.6	1.5	6m	3.0	4

Gain & F/B Performance (continued)

There are three factors that make our antennas outstanding performers:

1. They are tuned to a specific frequency for maximum gain and front to rear – without the compromise in performance that tuning for bandwidth causes.
2. They are very efficient antennas with high conductivity conductors, a highly efficient matching system (99% plus) and low dielectric losses.
3. There are no inactive elements, traps or linear loading to reduce antenna performance.

Note: The values shown below are not the maximum or average for a given band – this performance is across the entire band. Additionally, the rear response figures for our 2 and 3 element yagis are front to rear, as opposed to front to back. **Front to rear** means the worst case response off of the back of the antenna. Front to back is simply the response exactly 180 degrees from the forward direction. Front to rear measurement is a more realistic, conservative specification.



3 element SteppIR yagi shown being utilized in a permanent installation. The SteppIR was a replacement for a log periodic antenna.

Computer Models of Free Space Gain and Front to Rear vs Frequency

2 Element Yagi

3 Element Yagi

Band	Gain dBi	½ Power Angle	F/R dB	Band	Gain dBi	½ Power Angle	F/R dB
20m	6.6	+/- 35°	21	20m	7.4	+/- 34°	25
17m	6.6	+/- 35°	16	17m	8.3	+/- 32°	25
15m	6.5	+/- 34°	13	15m	8.5	+/- 29°	20
12m	6.4	+/- 35°	11	12m	8.8	+/- 28°	15
10m	6.2	+/- 35°	9	10m	9.0	+/- 29°	11
6m	5.0	+/- 35°	2	6m	6.2	+/- 35°	3
				6m**	10.1	+/- 25°	20

*With optional passive element kit

4 Element 20m Yagi

Band	Gain dBi	1/2 power	F/R dB
20m	9.5	+/- 30°	21
17m	10.0	+/- 26°	20
15m	10.2	+/- 28°	27
12m	10.4	+/- 28°	21
10m	10.6	+/- 28°	11
6m*	13.0	+/- 20°	30

Available Products:

1/4 wave Dipole	13.800—54.000 mhz
2 element yagi (57 inch boom)	13.800—54.000 mhz
3 element yagi (16 ft boom)	13.800—54.000 mhz
4 element yagi (32 ft boom)	13.800—54.000 mhz
4 element yagi (34 ft boom)	6.900—54.000 mhz
1/4 wave Vertical	7.000—54.000 mhz

If you have a requirement for frequency coverage not listed above, please contact us with your specifications

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