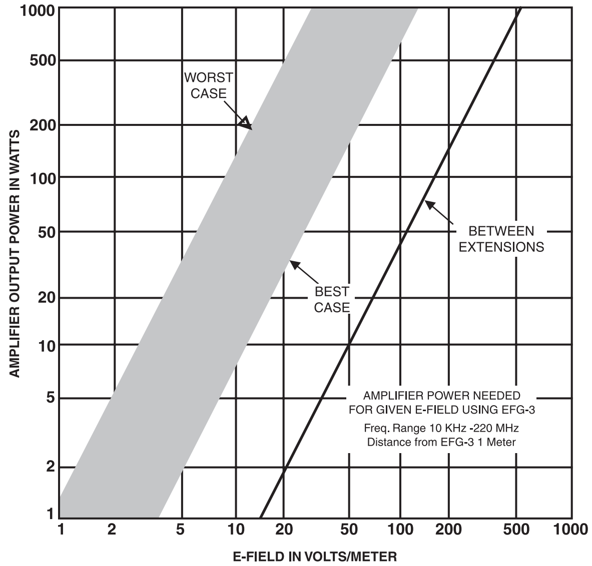
EFG-3/EFG-3B SERIES

E-Field Generating Antenna

EFG-3 1000 watts

EFG-3B 2000 watts

Fig. 2



The EFG-3 radiating system is small enough to be physically manageable and portable, but large enough to provide efficient conversion of RF power into a uniform electric field over a useful physical area. This high efficiency is obtained in several ways. As shown in Fig. 1, broadband transformers are used to step up the 50 ohm input impedance to 200 ohms. This is the design impedance of the terminated loop antenna system. Voltage between the upper and lower edges of the antenna system then becomes approximately twice that of the driving source. For example, a 25 watt power source will cause a 54 volt rms differential, after passing through the step up transformer.

Since the upper and lower edges of the antenna are spaced at 1 meter, any point in the plane of the antenna (and between these two edges) will have an E-Field gradient of twice the applied voltage, measured in volts per meter.

Furthermore, the upper and lower edges of the EFG-3 are equipped with pivoting projections that can be used to form an extended transmission line mode of operation at the outer surface of the antenna. Small objects (less than 1/2 meter in size) can be placed between the opening and will be subjected to the corresponding field intensity as a function of the applied voltage.

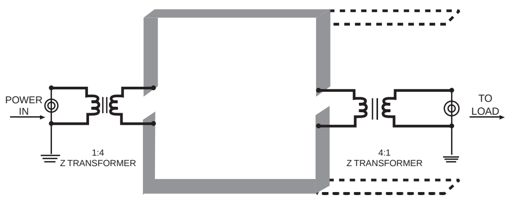


Fig. 1

For objects too large to be placed between these extensions, the EFG-3 may be used in an E-Field radiating mode. Fig. 2 shows the power required to generate a given field strength at a distance of 1 meter from the plane surface of the antenna. E-Field radiation is a non-linear function of frequency, which accounts for the wide band of related power and field strength, taking into account best and worst case conditions. Reflections can cause perturbations in the field distribution and widen the effective curve width for a given power input and desired E-Field.

In selecting a power source for use with the EFG-3, allowances should be made for these effects. The source should be capable of supplying sufficient power for the worst case conditions, under given use for the full frequency spectrum. Furthermore, there should be sufficient control over the power source to permit attenuation for use under best case conditions.

Unlike similar high power antennas intended for EMC/Susceptibility testing, the unused power is not dissipated in the EFG-3 itself. A second set of broadband transformers are employed to return the balanced loop 200 ohm termination impedance to an unbalanced 50 ohm output; this allows system termination with a conventional coaxial load. This output port can be connected directly to a termination capable of dissipating the appropriate power levels.

The actual antenna pattern is a cardioid with the null at the feed point where the antenna attaches to its horizontal pipe support. Both input and output connectors are located near this point. The input port of the EFG-3 system does not present an objectionable VSWR for most normal wide band laboratory grade amplifiers over the full rated frequency spectrum. Fig. 3 shows a VSWR plot with respect to frequency for a standard installation.

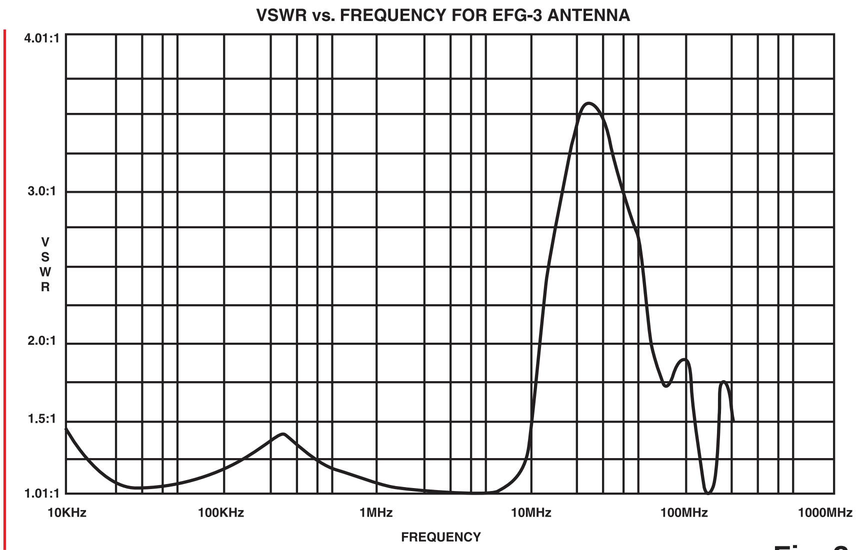


Fig. 3