Bead, Balun and Broadband Kit II

(Part Number 0199000011)

Intrinsic Magnetic Material Properties

Property	Symbol	73	43	61	65	Unit
Initial Permeability	μ_i	2500	850	125	100	—
Flux Density (@H = 10 Oe) (@H = 800 A/m)	B	4000 400	2750 275	2350 235	2150 215	gauss mT
Residual Flux Density	B_r	1000 100	1200 120	1200 120	1300 130	gauss mT
Coercive Force	H_c	.18 14.3	.30 23.9	1.6 127	2.35 187	oersted A/m
Curie Temperature	T_c	>160	>130	>350	>400	°C
Volume Resistivity	ρ	10^2	10^5	10^8	10^8	Ω cm

A broad selection of thirty-four parts, including shield beads, 6 hole beads, beads on leads and multi-apertu cores, make up this engineering evaluation kit. To obtain optimum performance over a wide frequency rang parts are supplied in four Fair-Rite suppressor materials; 73, 43, 61 and 65.

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Fair-Rite Products Corp.

Specifications for Parts in the Bead, Balun and Broadband Kit II

Position in Kit	Part Number	Impedance *(Ω)				Dimensions*					
		10 MHz	25 MHz	100 MHz	250 MHz	A	B	C	D	E	Fig.
1	2673000101	20 Min.	35 ± 20%	—	—	**3.5 ± 0.2** .138	**1.3 ± 0.1** .051	**3.25 ± 0.25** .128			A
2	2643000101	—	21 Min.	40 ± 20%	—	**3.5 ± 0.2** .138	**1.3 ± 0.1** .051	**3.25 ± 0.25** .128			A
3	2661000101	—	—	22 Min.	38 ± 20%	**3.5 ± 0.2** .138	**1.3 ± 0.1** .051	**3.25 ± 0.25** .128			A
4	2873002302	—	36 Min.	—	—	**2.0 ± 0.15** .079	**3.45 ± 0.25** .136	**2.35 ± 0.25** .093	**1.45 ± 0.1** .057	**0.75 + 0.25** .034	B
5	2843002302	—	—	35 Min.	—	**2.0 ± 0.15** .079	**3.45 ± 0.25** .136	**2.35 ± 0.25** .093	**1.45 ± 0.1** .057	**0.75 + 0.25** .034	B
6	2865002302	—	—	39 Min.	—	**2.0 ± 0.15** .079	**3.45 ± 0.25** .136	**2.35 ± 0.25** .093	**1.45 ± 0.1** .057	**0.75 + 0.25** .034	B
7	2673000301	35 Min.	62 ± 20%	—	—	**3.5 ± 0.2** .138	**1.3 ± 0.1** .051	**6.0 ± 0.25** .236			A
8	2643000301	—	37 Min.	60 ± 20%	—	**3.5 ± 0.2** .138	**1.3 ± 0.1** .051	**6.0 ± 0.25** .236			A
9	2661000301	—	—	40 Min.	70 ± 20%	**3.5 ± 0.2** .138	**1.3 ± 0.1** .051	**6.0 ± 0.25** .236			A
10	2873002402	—	64 Min.	—	—	**4.2 - 0.25** .160	**7.0 ± 0.25** .276	**6.2 ± 0.25** .244	**2.9 ± 0.1** .114	**1.7 + 0.2** .071	B
11	2843002402	—	—	83 Min.	—	**4.2 - 0.25** .160	**7.0 ± 0.25** .276	**6.2 ± 0.25** .244	**2.9 ± 0.1** .114	**1.7 + 0.2** .071	B
12	2865002402	—	—	78 Min.	—	**4.2 - 0.25** .160	**7.0 ± 0.25** .276	**6.2 ± 0.25** .244	**2.9 ± 0.1** .114	**1.7 + 0.2** .071	B
13	2673000701	70 Min.	125 ± 20%	—	—	**3.5 ± 0.2** .138	**1.3 ± 0.1** .051	**12.7 ± 0.35** .500			A
14	2643000701	—	71 Min.	125 ± 20%	—	**3.5 ± 0.2** .138	**1.3 ± 0.1** .051	**12.7 ± 0.35** .500			A
15	2661000701	—	—	90 Min.	162 ± 20%	**3.5 ± 0.2** .138	**1.3 ± 0.1** .051	**12.7 ± 0.35** .500			A
16	2873000202	—	72 Min.	—	—	**7.5 ± 0.35** .295	**13.3 ± 0.6** .525	**14.35 ± 0.5** .565	**5.7 ± 0.25** .225	**3.8 ± 0.25** .150	B
17	2843000202	—	—	155 Min.	—	**7.5 ± 0.35** .295	**13.3 ± 0.6** .525	**14.35 ± 0.5** .565	**5.7 ± 0.25** .225	**3.8 ± 0.25** .150	B
18	2865000202	—	—	128 Min.	—	**7.5 ± 0.35** .295	**13.3 ± 0.6** .525	**14.35 ± 0.5** .565	**5.7 ± 0.25** .225	**3.8 ± 0.25** .150	B
19	2673021801	75 Min.	120 ± 20%	—	—	**5.1 ± 0.25** .200	**1.45 + 0.25** .062	**11.1 ± 0.35** .437			A
20	2643021801	—	77 Min.	131 ± 20%	—	**5.1 ± 0.25** .200	**1.45 + 0.25** .062	**11.1 ± 0.35** .437			A
21	2661021801	—	—	95 Min.	163 ± 20%	**5.1 ± 0.25** .200	**1.45 + 0.25** .062	**11.1 ± 0.35** .437			A
22	2873001802	—	85 Min.	—	—	**6.35 ± 0.25** .250		**6.15 ± 0.25** .242	**2.75 ± 0.2** .108	**1.1 + 0.3** .050	C
23	2843001802	—	—	128 Min.	—	**6.35 ± 0.25** .250		**6.15 ± 0.25** .242	**2.75 ± 0.2** .108	**1.1 + 0.3** .050	C
24	2865001802	—	—	110 Min.	—	**6.35 ± 0.25** .250		**6.15 ± 0.25** .242	**2.75 ± 0.2** .108	**1.1 + 0.3** .050	C
25	2673000801	44 Min.	70 ± 20%	—	—	**7.65 - 0.25** .296	**2.25 + 0.25** .094	**7.55 ± 0.25** .295			A
26	2643000801	—	50 Min.	92 ± 20%	—	**7.65 - 0.25** .296	**2.25 + 0.25** .094	**7.55 ± 0.25** .295			A
27	2673002402	15 Min.	24 ± 20%	—	—	**9.65 ± 0.25** .380	**5.0 ± 0.2** .197	**5.05 - 0.45** .190			A
28	2643002402	—	21 Min.	43 ± 20%	—	**9.65 ± 0.25** .380	**5.0 ± 0.2** .197	**5.05 - 0.45** .190			A
29	2673025301	8 Min.	15 ± 20%	—	—	**1.25 - 0.1** .047	**0.8 + 0.1** .033	**3.8 ± 0.2** .150			A
30	2673903301	16 Min.	30 ± 20%	—	—	**1.0 - 0.05** .038	**0.45 + 0.15** .021	**5.6 ± 0.25** .220			A
31	2643666611	See Bulletin, Table 2				**6.0 ± 0.25** .236	**0.75 + 0.15** .032	**10.0 ± 0.25** .394	**3.5 Ref** .138		D
32	2743001112	—	39 Min.	68 ± 20%	—	**3.5 ± 0.25** .138	**62.0 ± 1.5** 2.440	**4.45 ± 0.25** .175	**0.65** 22AWG		E
33	2743002112	—	70 Min.	133 ± 20%	—	**3.5 ± 0.25** .138	**62.0 ± 1.15** 2.440	**8.9 ± 0.3** .350	**0.65** 22AWG		E
34	2661666611	See Bulletin, Table 2				**6.0 ± 0.25** .236	**0.75 + 0.15** .032	**10.0 ± 0.25** .394	**3.5 Ref** 138		D

ll beads are measured with a single turn, multi-aperture cores with a single turn through oth holes. Impedance measurements are made with the HP 4193A, with the exception of eads in 61 material, which are tested with a HP 4191A.

* ***Bold numbers are in millimeters***, light numbers are in inches.
Kit materials color code: 73 = GREEN, 61 = BLUE, 65 = WHITE, 43 = NOT CODED. Production parts will not be color coded.

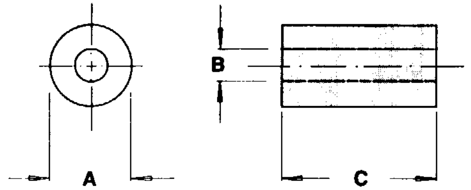

Figure A Shield Bead

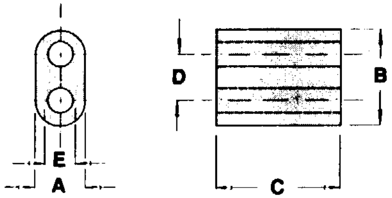

Figure B Multi-Aperture Core

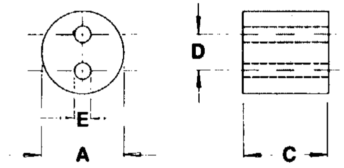

Figure C Multi-Aperture Core

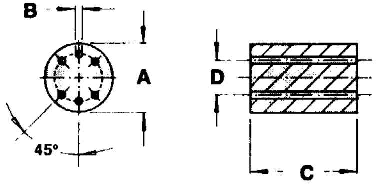

Figure D 6 Hole Bead

OFHC COPPER wire with a 95/5 tin/lead coating.

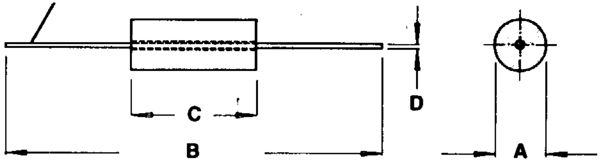

Figure E Bead on Lead **Taped and reeled per EIA RS-296-E.**
(Inside tape spacing 52.4 mm)

1	2	3	4	5	6
7	8	9	10	11	12
13	14	15	16	17	18
19	20	21	22	23	24
25	26	27	28	29	30
31	32		33		34

Bead, Balun and Broadband Kit II

(Part Number 0199000011)

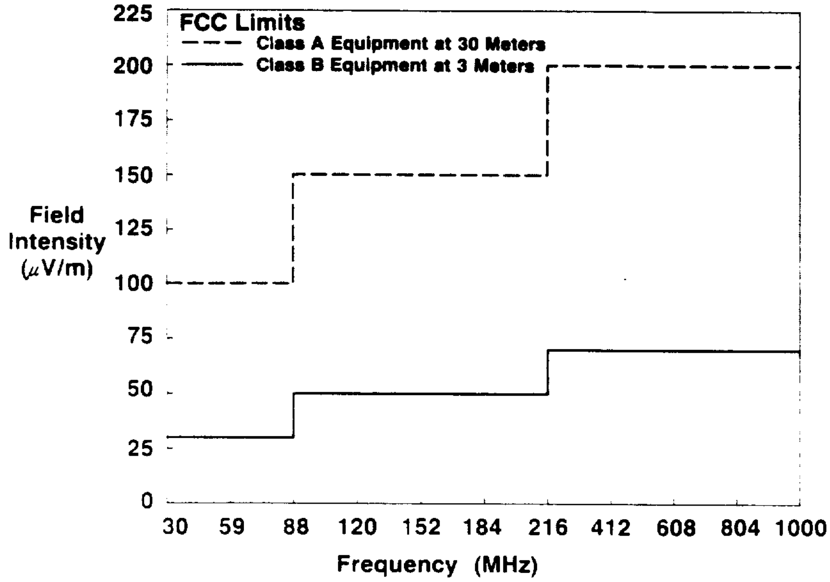

Figure 1 FCC Radiation limits for class A & B equipment.

Introduction

Ferrites, a class of ceramic ferrimagnetic materials, combine a high initial permeability with a high electrical resistivity. Their initial use, in the late 1940's, was in high frequency applications where conventional magnetic materials, such as iron alloy laminations and iron powder cores, either had excessive losses or lacked sufficient permeability. These first reported applications for ferrite devices were filter inductors and matching transformers for use in frequency division multiplex equipment.

Over the years ferrite cores have been used in a great variety of magnetic designs. Today, a major soft ferrite application is the use of ferrite cores in suppressing and controlling electromagnetic interference (EMI) on printed circuit boards, in wiring and cables. FCC regulations, promulgated in the early 80's, set limits and controls on radiation for data processing and electronic office equipment. Figure 1 shows the current radiation limits for class A (industrial) and class B (mass-market) equipment. To meet these requirements, manufacturers increasingly use ferrite suppression cores as a means of protecting against emitting or receiving interfering high frequency signals.

Fair-Rite Products Corp., started manufacturing in 1953, and initially produced such ferrite components as antenna rods, chokes and low loss inductor cores used in radio and television sets. Armed with the knowledge of ferrite's high frequency loss characteristic and its effectiveness as an EMI attenuator, Fair-Rite pursued the expansion of the use of ferrite components in suppression devices. This led to the first Fair-Rite Engineering Evaluation Kit, developed and marketed in 1978.

Since the introduction of this kit, Fair-Rite has become the leader in the application of ferrite components for EMI suppression. As such, Fair-Rite feels a responsibility to provide innovative and cost effective core designs, supplied with data obtained on state-of-the-art test equipment. The Bead, Balun and Broadband Kit II, is part of this ongoing commitment to satisfy the needs of our customers. This evaluation kit contains a selection of bead sizes in three Fair-Rite suppressor materials. Also included are samples of multi-aperture cores in three Fair-Rite materials, 73, 43 and 65. Samples of beads on leads in 43 ferrite and six hole beads in 43 and 61 material complete this engineering evaluation kit.

Use of Ferrite Suppressor Cores

When there is an EMI problem in an electronic design, the first step is to identify the source of the unwanted signals and to check how this noise is being transmitted to the affected circuits. Three methods can be employed to control electromagnetic interference:

1 suppress the noise at the source,

2 make receptor insensitive to the noise, and

3 reduce the noise transmission.

Most, if not all, EMI problems require some control of noise transmission. Transmission of an interference signal can be by conduction, through wires, printed circuit board traces and

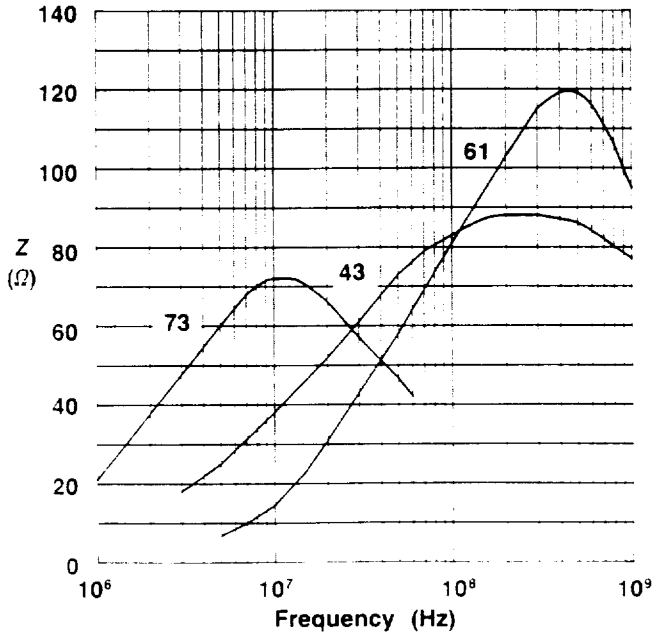

Figure 2 Impedance vs. Frequency for shield bead 26 - - 000801 in 73, 43 and 61 material.

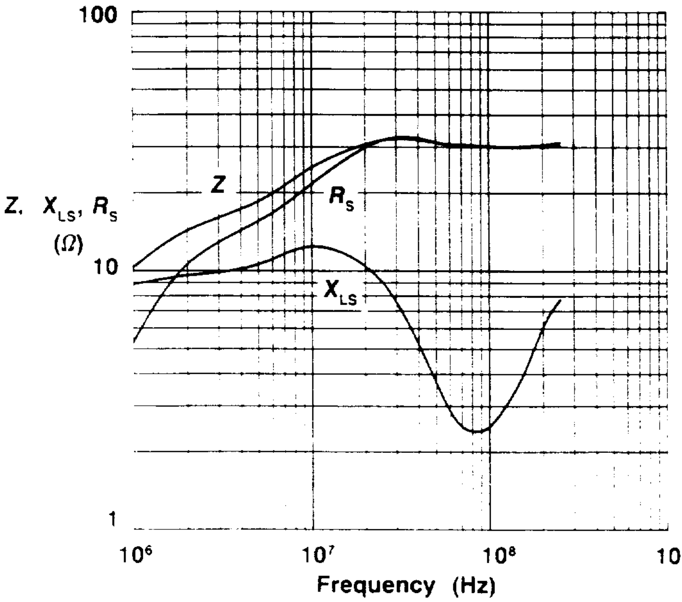

Figure 3 Impedance, Reactance and Resistance vs. Frequency for 73 material shield bead 2673000101.

cables, or by radiation. Both types of noise transmission require their own set of solutions. To reduce radiated noise, shielding in metal enclosures most often will give the desired results. To get rid of conducted EMI, ferrite suppression cores are the answer! They have been used in this application very successfully for decades.

Brief Theory

When a suitable ferrite suppressor core is inserted in a circuit that contains the desired signal and some level of interference, the desired signal should pass through unimpeded while the unwanted frequency must be attenuated. This is accomplished by the magnetic coupling into the circuit of the frequency dependent impedance of the suppressor core. As a result, low frequency signals are not affected by the low impedance of the suppressor core. The suppressor core characteristic of high impedance at high frequencies, will attenuate the unwanted interfering signal.

Figure 2 shows the relationship of impedance vs. frequency for the same size ferrite core but in three different Fair-Rite suppressor materials. As is evident from these curves, several ferrite materials must be made available to provide optimum performance over a wide frequency spectrum.

The impedance of a suppression device can be considered the series combination of inductive reactance and the equivalent loss resistance. Both these parameters are frequency dependent. At low frequencies the impedance of a suppressor core is nearly identical with the inductive reactance, which is a function of the initial permeability of the ferrite material. At higher frequencies the rate of increase of the reactance will decrease until the reactance is reduced. This is due to the sharp decrease of the ferrite permeability above its ferromagnetic resonance frequency. At approximately this frequency the magnetic losses of the ferrite material are increasing sharply, producing a further rise in impedance, which at these frequencies has become primarily resistive. Figures 3, 4 and 5 show typical values of impedance, reactance and loss resistance as a function of frequency for the same bead size in the three suppressor materials, 73, 43 and 61. These sets of curves demonstrate that suppressor core performance at low frequencies is mainly a function of the inductive reactance or initial permeability of the ferrite material. At high frequencies, magnetic material losses are the major contributor to the impedance.

Samples in this kit include, shield beads, multi-aperture cores, beads on leads and six hole beads. To accommodate a variety of potential suppression applications over a wide frequency range, samples are supplied in four Fair-Rite materials; 73, 43, 61 and 65.

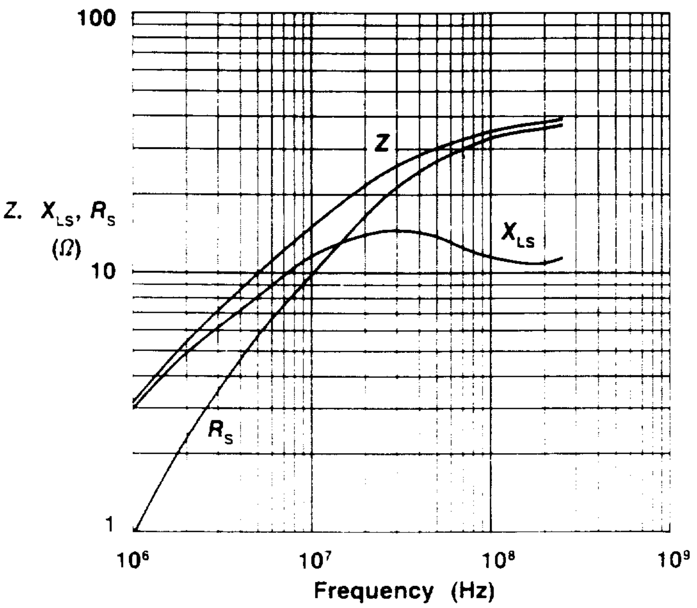

Figure 4 Impedance, Reactance and Resistance vs. Frequency for 43 material shield bead 2643000101.

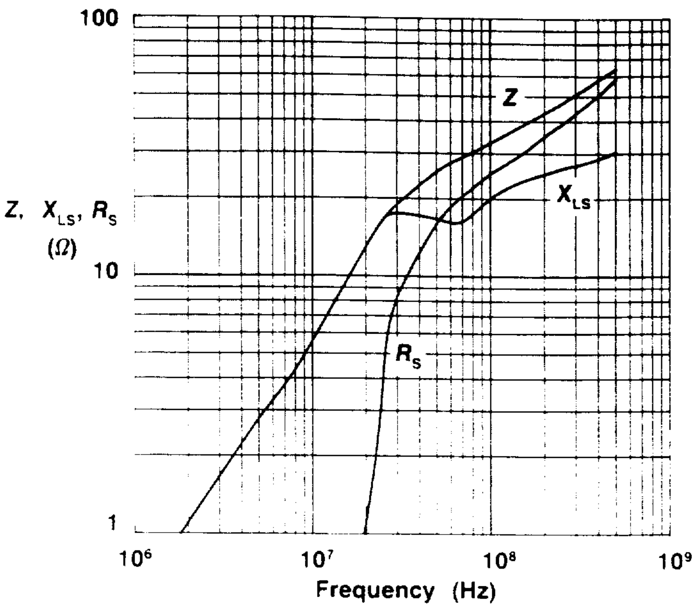

Figure 5 Impedance, Reactance and Resistance vs. Frequency for 61 material shield bead 2661000101.

Impedance vs. Attenuation

Ferrite materials used in EMI applications, should be selected for maximum impedance vs. interference frequency, as illustrated in Figure 2. The core selection is one of required geometry and impedance level. Generally, the selection of ferrite material and core shape is obvious, but to obtain a specific circuit attenuation the required core impedance has to be determined.

Figure 6 is the equivalent circuit of an interference source with an internal impedance of Z_s, generating an interference signal through the series impedances of the suppressor core Z_{sc} and the load impedance Z_L. The formula for attenuation (or insertion loss) is as follows:

Attenuation = 20 $\log_{10} E_1/E_2$ dB

E_1 = Voltage across the load impedance Z_L, without the suppressor core in the circuit.

E_2 = Voltage across the load impedance Z_L, with the suppressor core in the circuit.

This attenuation formula can easily be expressed in terms of the circuit impedances:

Z_s = source impedance

Z_{sc} = suppressor core impedance

Z_L = load impedance

Attenuation = 20 $\log_{10} |Z_s + Z_{sc} + Z_L| / |Z_s + Z_L|$ dB

Note the above impedances are the impedance values at the interference frequency.

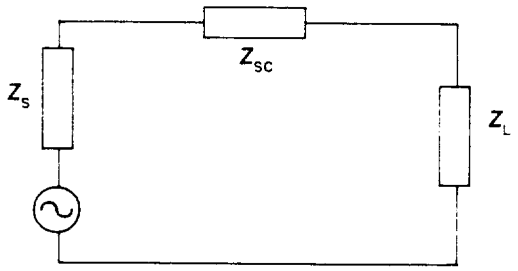

Figure 6 Equivalent Circuit.

Figure 7 shows suppressor core impedance as a function of the circuit attenuation, with the sum of source impedance and load impedance (Z_s + Z_L), as parameter. This set of curves can be used in the selection of a suppressor core with the required impedance for a specific circuit attenuation. It is also evident from these graphs, that ferrite suppressor devices are most effective in circuits where the sum of source and load impedance is 50 ohm or less.

Since it is often difficult to establish the impedance values for Z_s and Z_L at the high interference frequency, we recommended that the attenuation calculations be verified in the actual circuit by appropriate measurements.

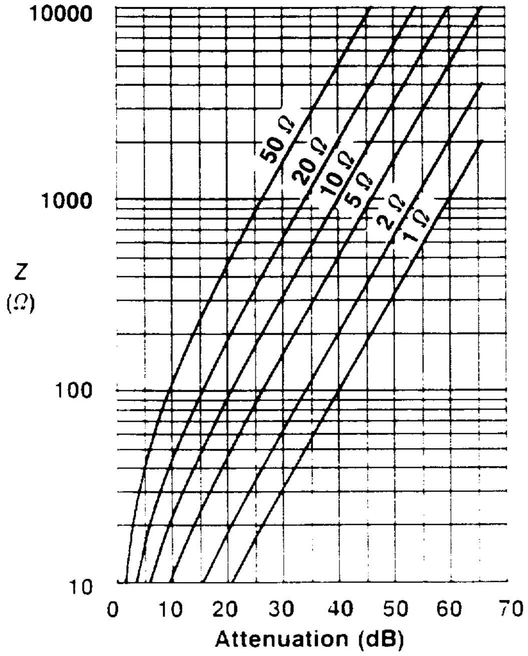

Figure 7 Impedance vs. Attenuation with $(Z + Z)$ as parameter

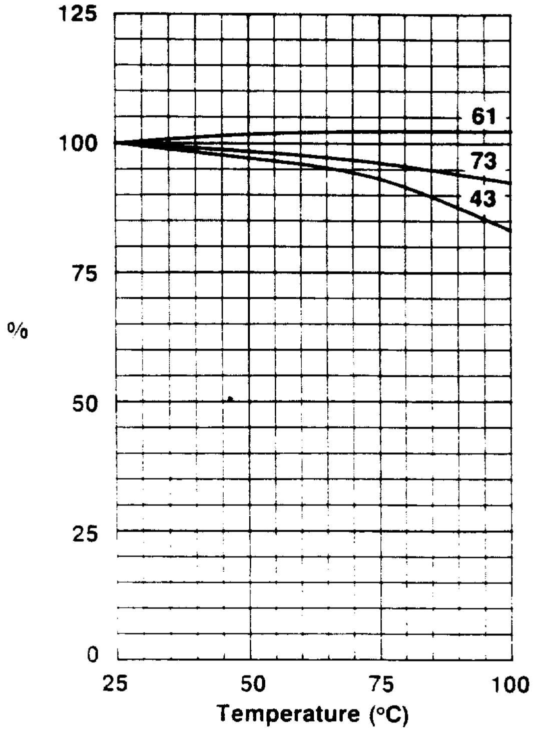

Figure 8 Percent of Original Impedance vs. Temperature at 25 MHz. Shield bead 26 - - 000801 in 73, 43 and 61 material.

Effects of Temperature and Bias

Temperature effects the intrinsic magnetic material parameters, initial permeability and losses. These changes in ferrite characteristics due to temperature, will logically result in changes in core impedance, hence in circuit attenuation. Typical changes in impedance vs. temperature for the three suppressor materials, measured at 25 and 100 MHz, are shown in Figures 8 and 9. The designer may use these curves to establish required room temperature impedance values for suppressor cores, if they will be operating at elevated temperatures.

As is the case with temperature, dc and 50 or 60 Hz power currents also will affect these same intrinsic ferrite characteristics. This in turn will result in a reduction of the core impedance and circuit attenuation. Figures 10, 11 and 12 show how bias currents reduce the impedance of typical ferrite beads in 73, 43 and 61 material respectively. The dc bias influences the material permeability more than the losses, therefore the impedance drop will be most pronounced at frequencies where the reactive component contributes most of the impedance.

Broadband Transformers

The material choice for a broadband transformer design is basically the selection of the ferrite material with the highest permeability at the lower cutoff frequency, f_1, of the bandwidth, see Figure 13. The impedance vs. frequency curves in Figures 14 through 24, provide this information. For each material holds that at low frequencies the impedance value is identical with the

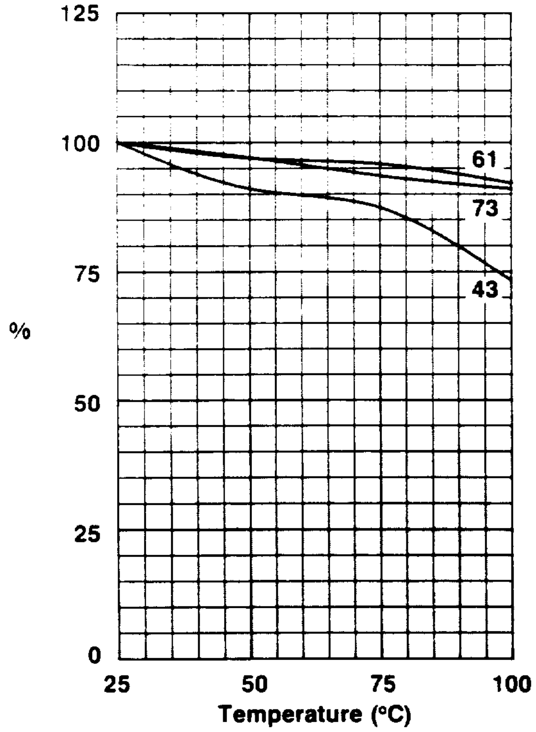

Figure 9 Percent of Original Impedance vs. Temperature at 100 MHz. Shield bead 26 - - 000801 in 73, 43 and 61 material.

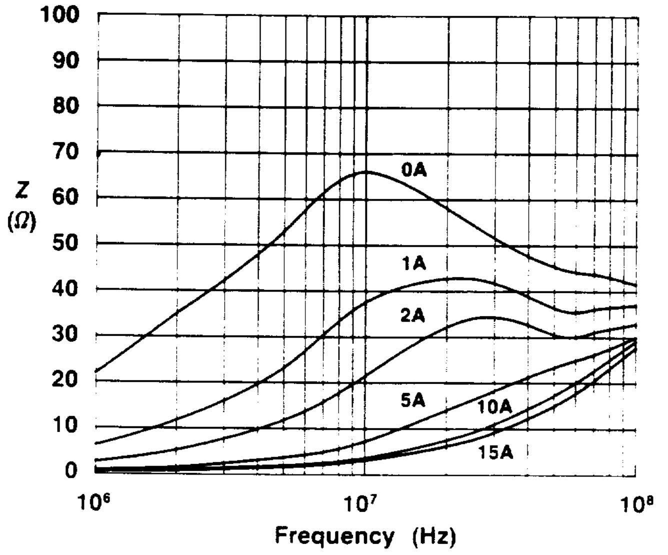

Figure 10 Impedance vs. Frequency and dc bias for 73 material shield bead 2673000801.

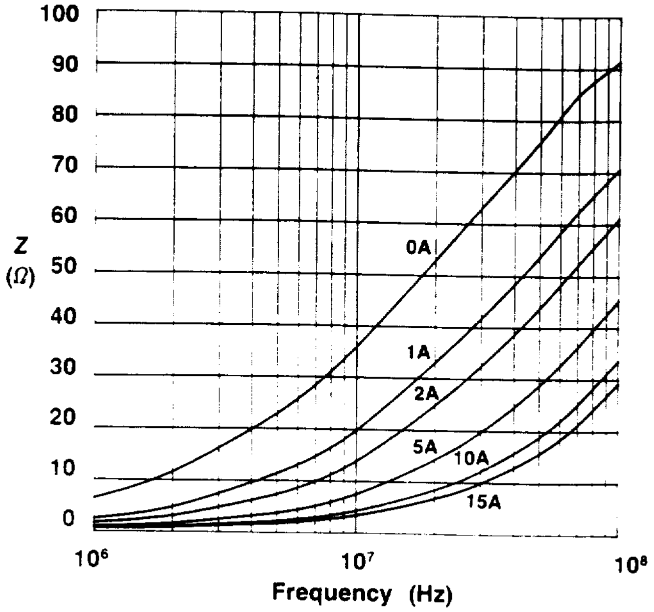

Figure 11 Impedance vs. Frequency and dc bias for 43 material shield bead 2643000801.

inductive reactance, which is a function of the initial permeability of the material. Therefore, depending upon the specific value of f.. these curves will identify for each core type the optimum material at that frequency.

Data and Specifications

All Fair-Rite shield beads and beads on leads are specified at two frequencies. These frequencies are 10 & 25 MHz for 73 material, 25 & 100 MHz for 43 material and 100 & 250 MHz for 61 material. At the low frequencies there are guaranteed minimum impedance values, while at the high frequencies nominal impedances are specified with a ±20% tolerance.

Minimum impedance values are specified for the multi-aperture cores and the six hole beads. Multi-aperture cores, wound with a single turn through both holes, in 73 material are measured at 25 MHz, and in 43 and 65 material at 100 MHz. The six hole beads, wound with a 1½ test winding, have minimum impedance specifications at three frequencies. For 43 material these are 10, 50 and 100 MHz, and for 61 material 50, 100 and 200 MHz.

Typical performance data for the thirty-four suppression cores of this kit are shown in Figures 14 through 27. These graphs of impedance vs. frequency, are measured on a HP 4191A RF Impedance Analyzer, except for the multi-aperture cores, which are tested on the HP 4193A Vector Impedance Meter. Table 1 identifies for each part, its kit position, the number of parts, part number, nomenclature and reference to the performance curve. Tables 2A and 2B list the specification limits for the six hole beads in 43 and 61 material, wound in the various winding configurations.

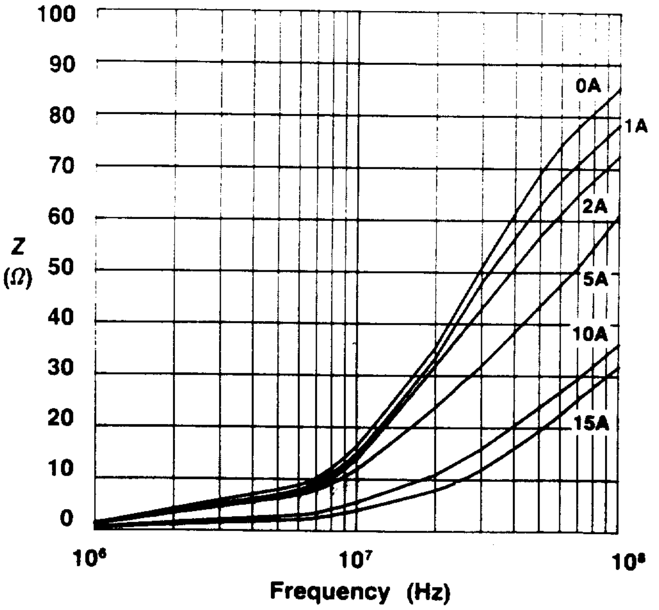

Figure 12 Impedance vs. Frequency and dc bias for 61 material shield bead 2661000801.

Table 1.

Kit Pos.	Qty	Part Number	Nomenclature	Figure
1	12	2673000101	Shield bead	14
2	12	2643000101	Shield bead	14
3	12	2661000101	Shield bead	14
4	6	2873002302	Multi-aperture core	15
5	6	2843002302	Multi-aperture core	15
6	6	2865002302	Multi-aperture core	15
7	12	2673000301	Shield bead	16
8	12	2643000301	Shield bead	16
9	12	2661000301	Shield bead	16
10	6	2873002402	Multi-aperture core	17
11	6	2843002402	Multi-aperture core	17
12	6	2865002402	Multi-aperture core	17
13	12	2673000701	Shield bead	18
14	12	2643000701	Shield bead	18
15	12	2661000701	Shield bead	18
16	4	2873000202	Multi-aperture core	19
17	4	2843000202	Multi-aperture core	19
18	4	2865000202	Multi-aperture core	19
19	6	2673021801	Shield bead	20
20	6	2643021801	Shield bead	20
21	6	2661021801	Shield bead	20
22	6	2873001802	Multi-aperture core	21
23	6	2843001802	Multi-aperture core	21
24	6	2865001802	Multi-aperture core	21
25	6	2673000801	Shield bead	22
26	6	2643000801	Shield bead	22
27	6	2673002402	Shield bead	23
28	6	2643002402	Shield bead	23
29	12	2673025301	Shield bead	24
30	12	2673903301	Shield bead	24
31	6	2643666611	6 Hole bead	25
32	12	2743001112	Bead on lead	26
33	12	2743002112	Bead on lead	26
34	6	2661666611	6 Hole bead	27

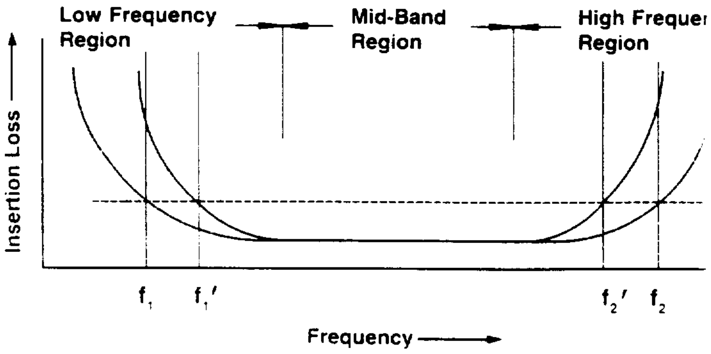

Figure 13 Typical Characteristic Curve of Insertion Loss vs. Frequency for a broadband transformer.

Table 2A.

Part Number	2643666611	Minimum Impedance (Ω)		
		10 MHz	50 MHz	100 MHz
Wound with	1½ Turns	170	320	375
	2 Turns	240	520	480
	2½ Turns	320	680	580
	3 Turns	400	800	550

Table 2B.

Part Number	2661666611	Minimum Impedance (Ω)		
		50 MHz	100 MHz	200 MHz
Wound with	1½ Turns	350	490	300
	2 Turns	575	600	300
	2½ Turns	800	575	250
	3 Turns	1050	600	250

By necessity, any engineering evaluation kit contains but a small fraction of the available Fair-Rite suppression cores. For a complete and comprehensive overview of our product line, refer to our latest Fair-Rite Soft Ferrite Catalog. Copies are available from Fair-Rite in Wallkill, NY. Contact us by phone (914) 895-2055 or FAX (914) 895-2629.

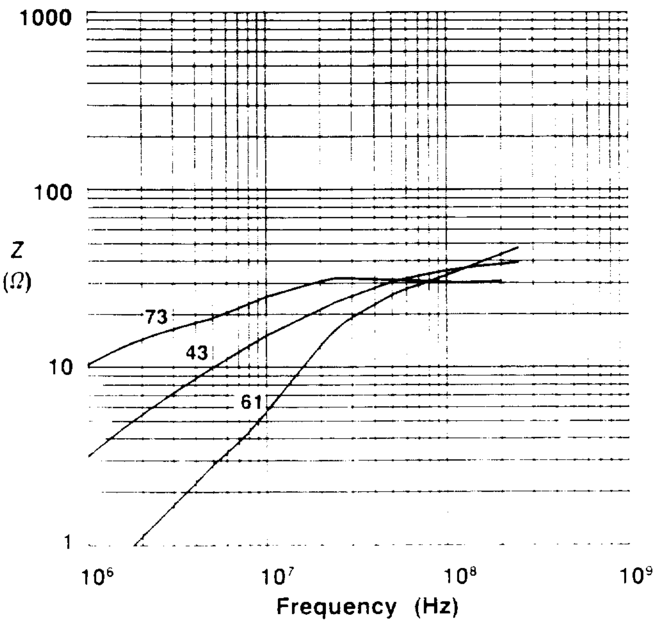

Figure 14 Impedance vs. Frequency for shield bead 26 - - 000101 in 73, 43 and 61 material.

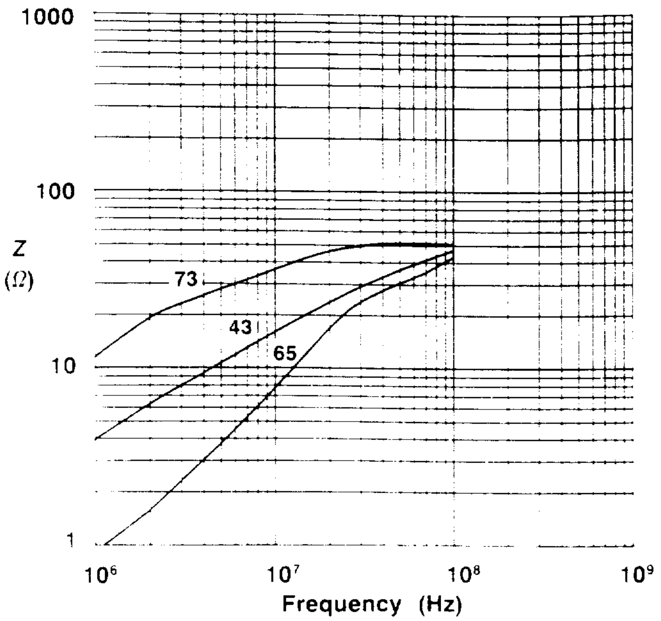

Figure 15 Impedance vs. Frequency for multi-aperture core 28 - - 002302 in 73, 43 and 65 material.

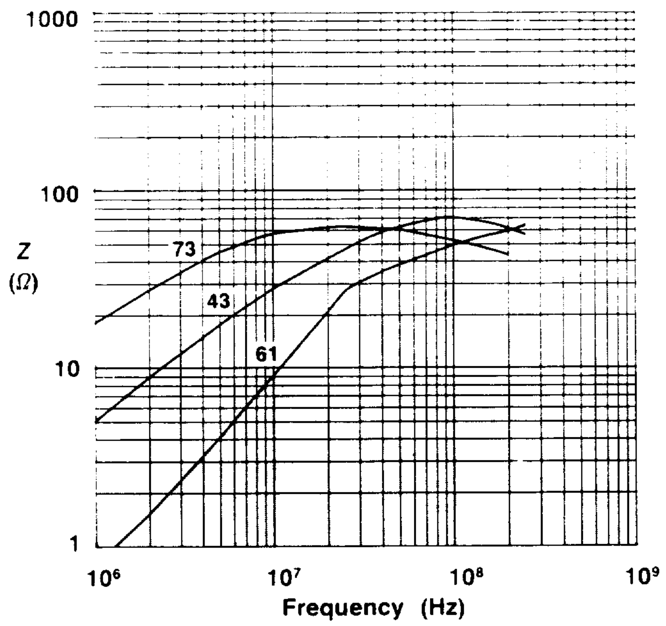

Figure 16 Impedance vs. Frequency for shield bead 26 - - 000301 in 73, 43 and 61 material.

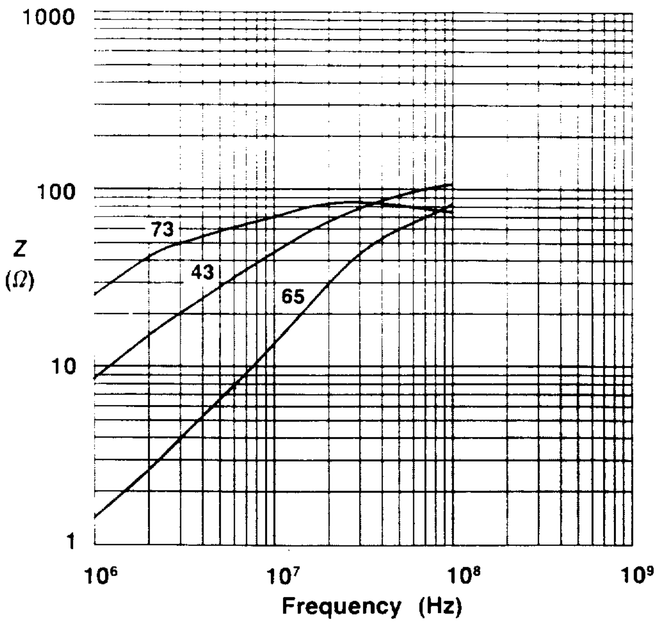

Figure 17 Impedance vs. Frequency for multi-aperture core 28 - - 002402 in 73, 43 and 65 material.

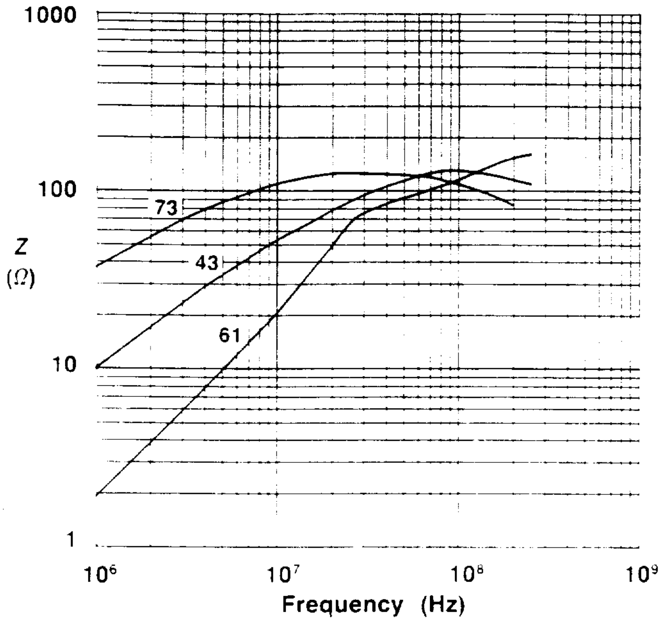

Figure 18 Impedance vs. Frequency for shield bead 26 - - 000701 in 73, 43 and 61 material.

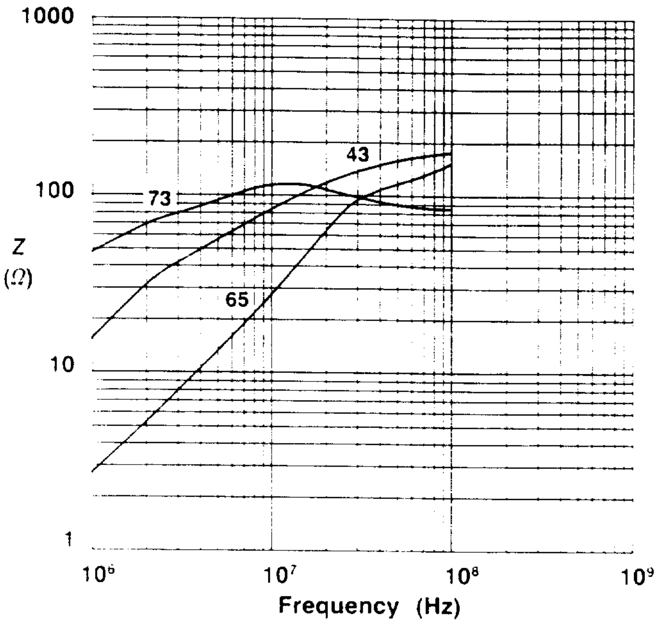

Figure 19 Impedance vs. Frequency for multi-aperture core 28 - - 000202 in 73, 43 and 65 material.

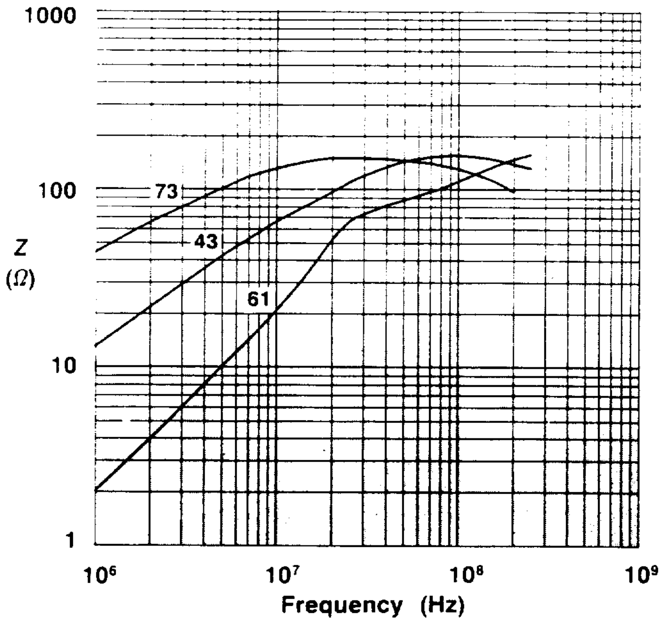

Figure 20 Impedance vs. Frequency for shield bead 26 - - 021801 in 73, 43 and 61 material.

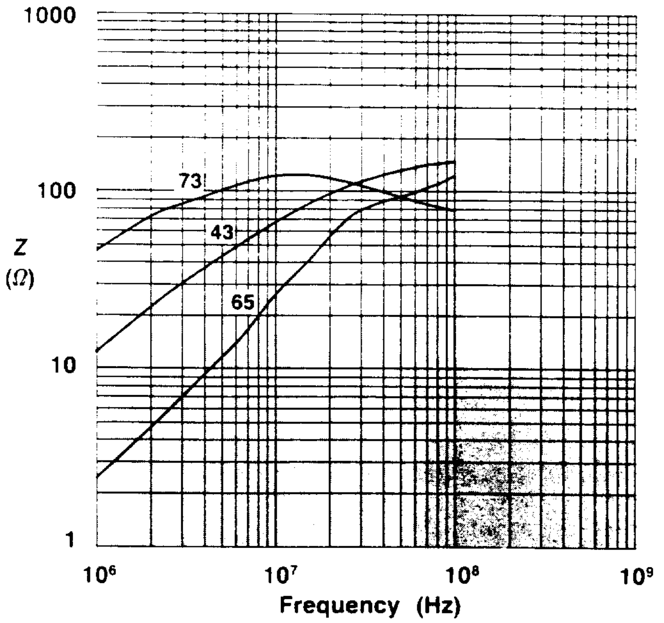

Figure 21 Impedance vs. Frequency for multi-aperture core 28 - - 001802 in 73, 43 and 65 material.

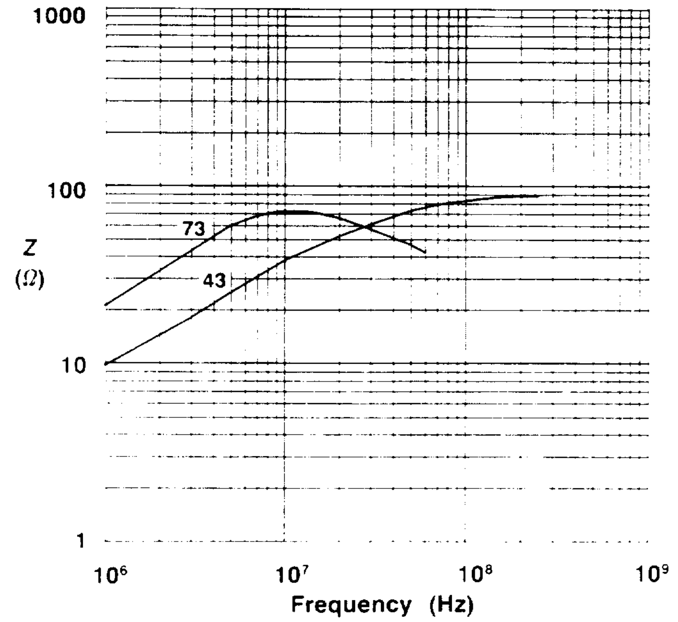

Figure 22 Impedance vs. Frequency for shield bead 26 - - 000801 in 73 and 43 material.

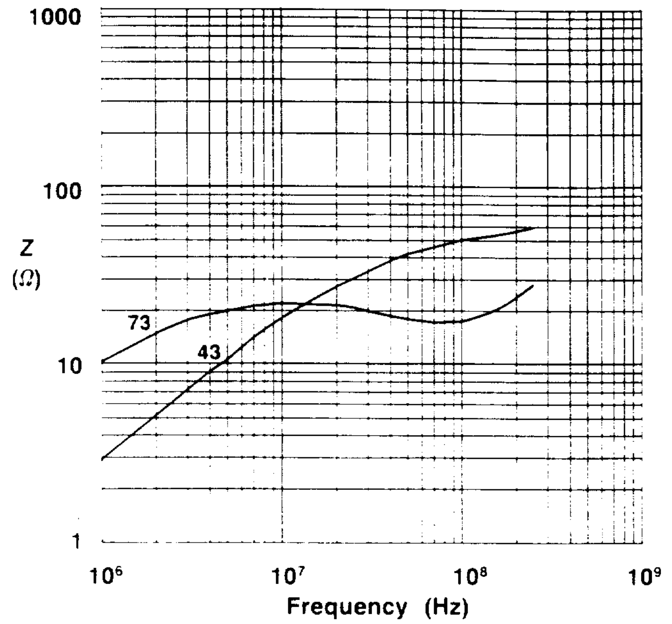

Figure 23 Impedance vs. Frequency for shield bead 26 - - 002402 in 73 and 43 material.

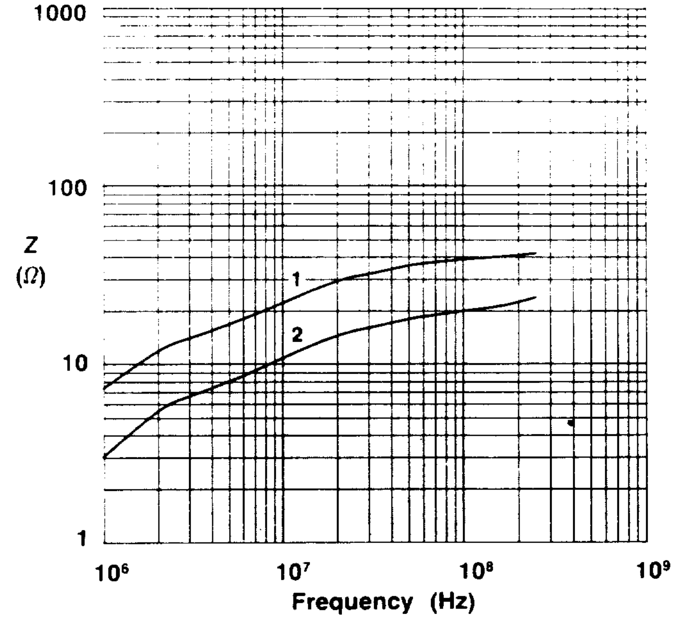

Figure 24 Impedance vs. Frequency for shield beads.

1 2673903301
2 2673025301

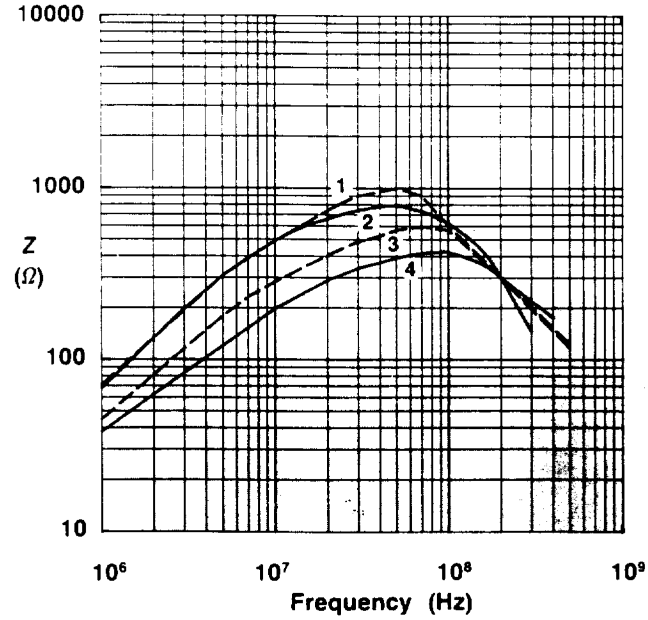

Figure 25 Impedance vs. Frequency for wound six hole beads in 43 material.

1 3 Turns
2 2½ Turns
3 2 Turns
4 1½ Turns

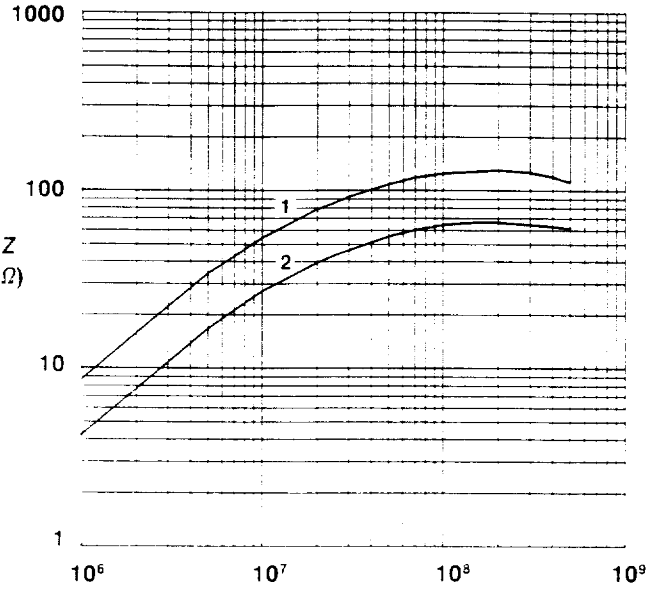

Figure 26 Impedance vs. Frequency for beads on leads.

1 2743002112 2 2743001112

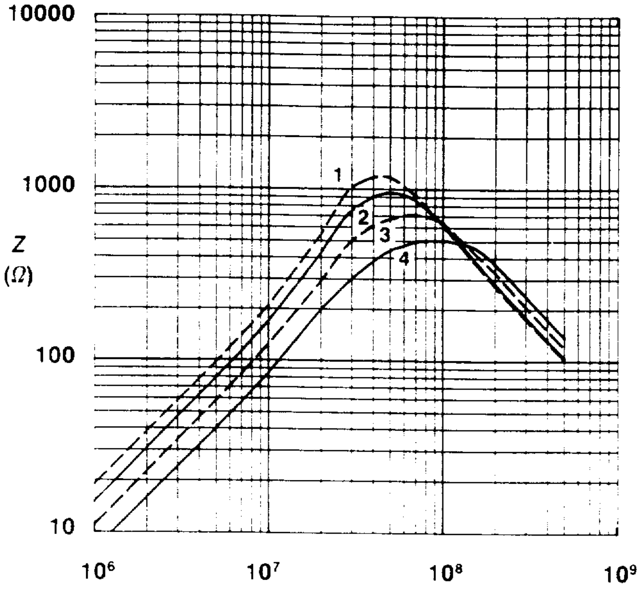

Figure 27 Impedance vs. Frequency for wound six hole beads in 61 material.

1	3 Turns	3	2 Turns
2	2½ Turns	4	1½ Turns

Additional Fair-Rite Engineering Evaluation Kits

To aid the designer concerned with EMI suppression. Fair-Rite has these additional evaluation kits:

The **Expanded Bead-on-Lead EMI Suppressor Kit**, has an assortment of twenty-four wired beads in three Fair-Rite suppressor materials. The part number for this kit is 0199000010.

The **Expanded Cable and Connector EMI Suppressor Kit**, part number 0199000005, contains a variety of shield beads, one and two piece cable suppressor cores and multi-hole suppressor plates for connectors. Cores are supplied in 43 material, chosen for its high impedance over a wide frequency range. Nylon cases and steel clips, for assembly of the split cable suppressor cores, are included in this kit.

The **Fair-Rite EMI Suppressor Retro Kit**, part number 0199000008. This recently introduced kit holds ten different split cable suppression cores in 43 material for EMI suppression applications in systems that use round or flat cables. Also included are the nylon cases for proper assembly of these split cable suppression cores.

The **Fair-Rite Surface-Mount Bead Kit**, part number 0199000009, is the latest addition to our engineering evaluation kits. It contains a sampling of single and multi-turn advance technology beads in 43 material, for either surface-mount or through-hole printed circuit board applications.

Each engineering kit comes with its own Engineering Bulletin, which describes and identifies the contents of the kit. It also provides application information on the use of these components in solving EMI problems.

All evaluation kits are available from our distributor, the Magnetic Materials Division of The Dexter Corporation. See the back cover of this bulletin for your closest Dexter stocking location.