



**Fair-Rite Products Corp.**  
Your Signal Solution®

Fair-Rite Products Corp. PO Box J, One Commercial Row, Wallkill, NY 12589-0288  
Phone: (888) 324-7748 [www.fair-rite.com](http://www.fair-rite.com)

Fair-Rite Product's Catalog  
Part Data Sheet, 0446164181  
Printed: 2009-01-16

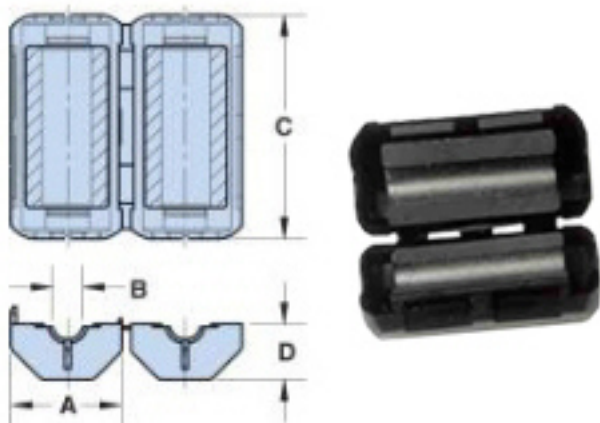


Figure 1

Part Number: 0446164181  
Frequency Range: Broadband Frequencies 25-300 MHz (Economical 46 material)  
Description: 46 ROUND CABLE CORE ASSEMBLY  
Application: Suppression Components  
Where Used: Cable Component  
Part Type: Round Cable Snap-Its  
Preferred Part: ✓

## Mechanical Specifications

Weight: 61.000 (g)

## Part Type Information

Round cable snap-its can easily accommodate round cables or bundled wires with diameters from 2.5 mm (.100") to 25.4 mm (1.000"). These assemblies are available in four ferrite material classes to suppress differential or common-mode conducted EMI from 1 MHz into the GHz region. The polypropylene cases are meeting the RoHS restrictions of hazardous substances and have a flammability rating of UL94 V-0.

-Round cable snap-it assemblies are controlled for impedances only. The impedances listed are typical values. Minimum impedance values are specified for the + marked frequencies. The minimum guaranteed impedance is the listed impedance less 20%.

-Single turn impedance tests for the 31, 43 and 44 material are performed on the 4193A Vector Impedance Analyzer. The 61 material parts are tested on the 4191A RF Impedance Analyzer. Cores are tested with the shortest practical wire length.

-Many of the snap-it parts have round core equivalents. See Round Cable EMI Suppression Cores section of our catalog.

-'B' Dimension is the core Dimension.

-Round Cable Snap-it Kits are available for each of the four suppression materials. 31 Snap-It Kit (0199000030), 43 Snap-It Kit (0199000031), 46 Core and Snap-It Kit (0199000032) and 61 Snap-It Kit (0199000033).

-Explanation of Part Numbers: Digits 1 & 2 = product class and 3 & 4 = material grade.



## Mechanical Specifications

| Dim | mm    | mm<br>tol | nominal<br>inch | inch<br>misc. |
|-----|-------|-----------|-----------------|---------------|
| A   | 31.00 | -         | 1.220           | -             |
| B   | 13.05 | -         | 0.514           | -             |
| C   | 39.40 | -         | 1.550           | -             |
| D   | 15.25 | -         | 0.600           | -             |
| E   | -     | -         | -               | -             |
| F   | -     | -         | -               | -             |
| G   | -     | -         | -               | -             |
| H   | -     | -         | -               | -             |
| J   | -     | -         | -               | -             |
| K   | -     | -         | -               | -             |

## Electrical Specifications

| Typical Impedance ( $\Omega$ ) |     |
|--------------------------------|-----|
| 10 MHz                         | 73  |
| 25 MHz                         | 115 |
| 100 MHz+                       | 205 |
| 250 MHz                        | 275 |

| Electrical Properties |  |
|-----------------------|--|
|                       |  |

## Land Patterns

| V | W<br>ref | X | Y | Z |
|---|----------|---|---|---|
| - | -        | - | - | - |
| - | -        | - | - | - |

## Winding Information

| Turns  | Wire | 1st Wire | 2nd Wire |
|--------|------|----------|----------|
| Tested | Size | Length   | Length   |
| -      | -    | -        | -        |

## Reel Information

| Tape Width<br>mm | Pitch<br>mm | Parts 7 "<br>Reel | Parts 13 "<br>Reel | Parts 14 "<br>Reel |
|------------------|-------------|-------------------|--------------------|--------------------|
| -                | -           | -                 | -                  | -                  |

## Package Size

| Pkg Size |
|----------|
| -<br>(-) |

## Connector Plate

| # Holes | # Rows |
|---------|--------|
| -       | -      |

### Legend

+ Test frequency

Preferred parts, the suggested choice for new designs, have shorter lead times and are more readily available.

The column H(Oe) gives for each bead the calculated dc bias field in oersted for 1 turn and 1 ampere direct current. The actual dc H field in the application is this value of H times the actual NI (ampere-turn) product. For the effect of the dc bias on the impedance of the bead material, see figures 18-23 in the application note How to choose Ferrite Components for EMI Suppression.

A ½ turn is defined as a single pass through a hole.

$\Sigma L/A$  - Core Constant

$A_e$  - Effective Cross-Sectional Area

$A_L$  - Inductance Factor ( $\frac{L}{N^2}$ )

N/AWG - Number of Turns/Wire Size for Test Coil

$l_e$  - Effective Path Length

$V_e$  - Effective Core Volume

NI - Value of dc Ampere-turns



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## Ferrite Material Constants

|                                       |                                          |
|---------------------------------------|------------------------------------------|
| Specific Heat .....                   | 0.25 cal/g/°C                            |
| Thermal Conductivity .....            | $10 \times 10^{-3}$ cal/sec/cm/°C        |
| Coefficient of Linear Expansion ..... | $8 - 10 \times 10^{-6}/^{\circ}\text{C}$ |
| Tensile Strength .....                | 4.9 kgf/mm <sup>2</sup>                  |
| Compressive Strength .....            | 42 kgf/mm <sup>2</sup>                   |
| Young's Modulus .....                 | $15 \times 10^3$ kgf/mm <sup>2</sup>     |
| Hardness (Knoop) .....                | 650                                      |
| Specific Gravity .....                | $\approx 4.7$ g/cm <sup>3</sup>          |

*The above quoted properties are typical for Fair-Rite MnZn and NiZn ferrites.*

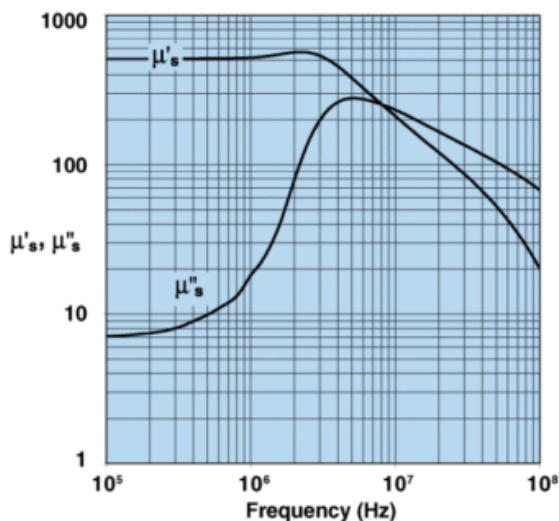
See next page for further material specifications.



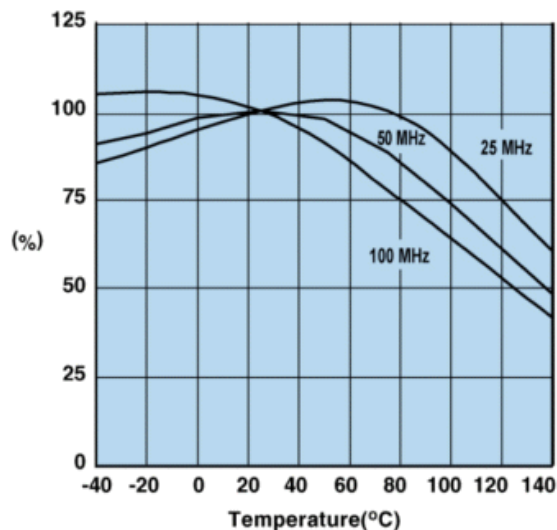
## 46 Material Characteristics:

| Property                                                       | Unit                | Symbol                | Value           |
|----------------------------------------------------------------|---------------------|-----------------------|-----------------|
| Initial Permeability<br>@ B < 10 gauss                         |                     | $\mu_i$               | 500             |
| Flux Density<br>@ Field Strength                               | gauss<br>oersted    | B<br>H                | 3000<br>10      |
| Residual Flux Density                                          | gauss               | $B_r$                 | 1900            |
| Coercive Force                                                 | oersted             | $H_c$                 | 0.40            |
| Loss Factor<br>@ Frequency                                     | $10^{-6}$<br>MHz    | $\tan \delta / \mu_i$ | 60<br>0.1       |
| Temperature Coefficient of<br>Initial Permeability (20 - 70°C) | %/°C                |                       | -----           |
| Curie Temperature                                              | °C                  | $T_c$                 | >140            |
| Resistivity                                                    | $\Omega \text{ cm}$ | $\rho$                | $1 \times 10^8$ |

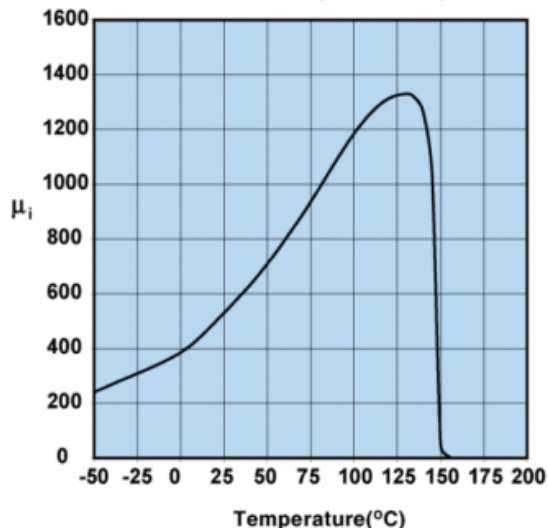
### Complex Permeability vs. Frequency



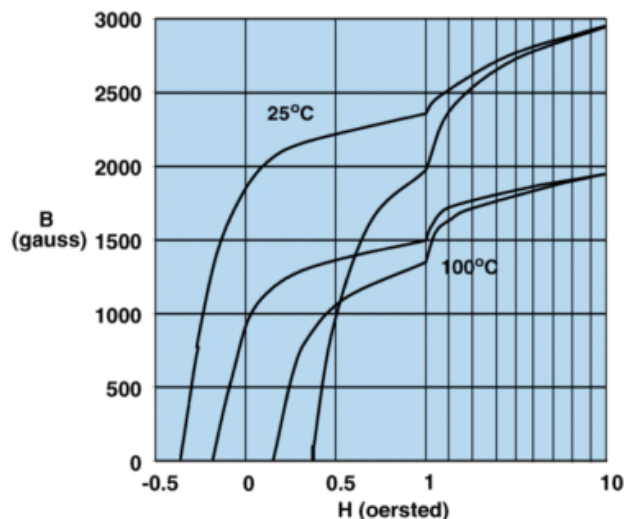
### Percent of Original Impedance vs. Temperature



### Initial Permeability vs. Temperature



### Hysteresis Loop





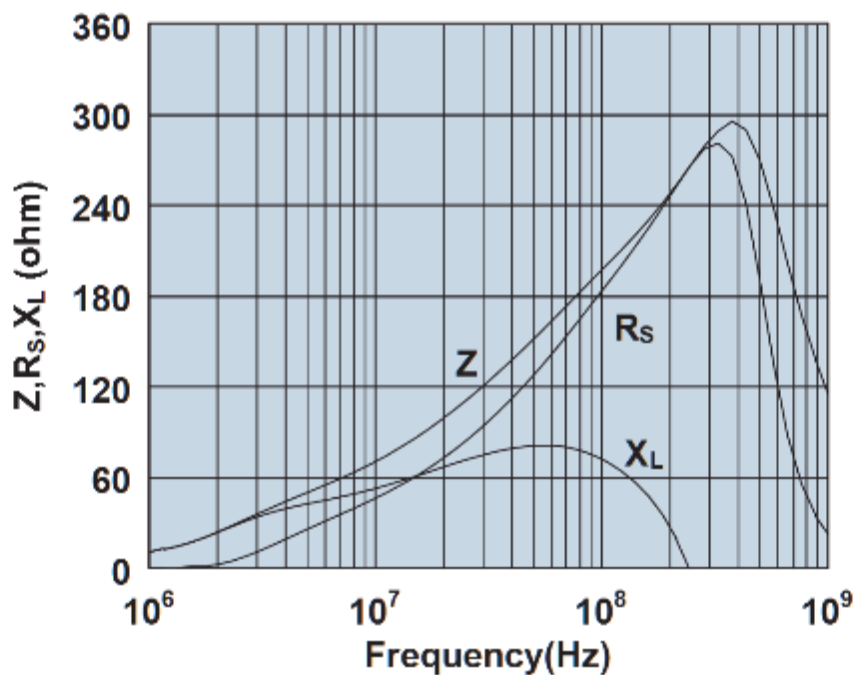
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Impedance, reactance, and resistance vs. frequency.