

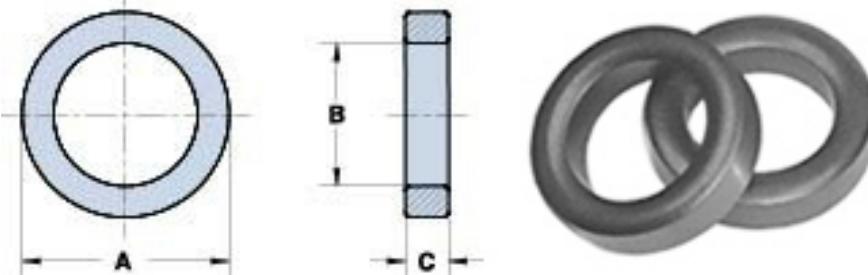


# Fair-Rite Products Corp. Your Signal Solution®

Ferrite Components for the Electronics Industry

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, 5952020701  
Printed: 2013-07-03



Part Number: 5952020701

Frequency Range: Low-Medium Permeability, 52 (ui=250) material

Description: 52 TOROID

Application: Inductive Components

Where Used: Closed Magnetic Circuit

Part Type: Toroids

## Mechanical Specifications

Weight: 14.810 (g)

## Part Type Information

A ring configuration provides the ultimate utilization of the intrinsic ferrite material properties. Toroidal cores are used in a wide variety of applications such as power input filters, ground-fault interrupters, common-mode filters and in pulse and broadband transformers.

-Toroids are listed by initial permeability classes and increasing dimension of the inside diameter.

-All toroidal cores are supplied burnished to break sharp edges.

-Toroids are tested for AL values at 10 kHz.

-Toroids with an outside diameter of 9.5mm (.375") or smaller can be supplied Parylene C coated. The Parylene coating will increase the 'A' and 'C' dimensions and decrease the 'B' dimension a maximum of 0.038mm (.0015"). The ninth digit of a Parylene coated toroid part number is a '1'. See the material characteristics of Parylene C in our online catalog.

-Toroids with an outside diameter of 9.5mm (.375") or larger can be supplied with a uniform coating of thermo-set plastic coating. This coating will increase the 'A' and 'C' dimensions and decrease the 'B' dimension a maximum of 0.5mm (.020"). The 9th digit of the thermo-set plastic coated toroid part number is a '2'. Thermo-set plastic coating is RoHS compliant.

-Thermo-set plastic coated parts can withstand a minimum breakdown voltage of 1000 Vrms, uniformly applied across the 'C' dimension of the toroid.

-The "C" dimension may be modified to suit specific applications.

-For any toroidal core requirement not listed in the catalog, please contact our customer service department for availability and pricing.

-Explanation of Part Numbers: Digits 1&2 = product class, 3&4 = material grade, 9th digit 1 = Parylene coating, 2 = thermo-set plastic coating.



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RoHS  
Material Declaration

### Mechanical Specifications

| Dim | mm    | mm<br>tol  | nominal<br>inch | inch<br>misc. |
|-----|-------|------------|-----------------|---------------|
| A   | 28.80 | $\pm 0.65$ | 1.134           | -             |
| B   | 18.70 | $\pm 0.50$ | 0.736           | -             |
| C   | 7.50  | $\pm 0.25$ | 0.250           | -             |
| D   | -     | -          | -               | -             |
| E   | -     | -          | -               | -             |
| F   | -     | -          | -               | -             |
| G   | -     | -          | -               | -             |
| H   | -     | -          | -               | -             |
| J   | -     | -          | -               | -             |
| K   | -     | -          | -               | -             |

### Electrical Specifications

| Typical Impedance ( $\Omega$ ) |                |
|--------------------------------|----------------|
|                                |                |
| Electrical Properties          |                |
| $A_L$ (nH)                     | 162 $\pm 25\%$ |
| $A_e$ (cm $^2$ )               | 0.37400        |
| $\sum I/A$ (cm $^{-1}$ )       | 19.34          |
| $l_e$ (cm)                     | 7.23           |
| $V_e$ (cm $^3$ )               | 2.70200        |

### Land Patterns

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

### Winding Information

| Turns<br>Tested | Wire<br>Size | 1st Wire<br>Length | 2nd Wire<br>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 1/2 turn is defined as a single pass through a hole.

$\sum I/A$  - 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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RoHS  
Material  
Declaration

## Ferrite Material Constants

|                                       |  |
|---------------------------------------|--|
| Specific Heat .....                   | 0.25 cal/g/°C                          |
| Thermal Conductivity .....            | <b>3.5 - 4.5 mW/cm - °C</b>            |
| Coefficient of Linear Expansion ..... | 8 - 10x10 <sup>-6</sup> /°C            |
| Tensile Strength .....                | 4.9 kgf/mm <sup>2</sup>                |
| Compressive Strength .....            | 42 kgf/mm <sup>2</sup>                 |
| Young's Modulus .....                 | 15x10 <sup>3</sup> kgf/mm <sup>2</sup> |
| Hardness (Knoop) .....                | 650                                    |
| Specific Gravity .....                | ≈ 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.



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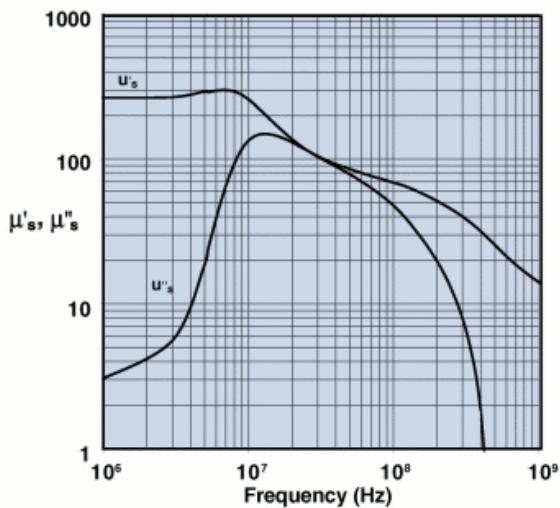
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### 52 Material Specifications:

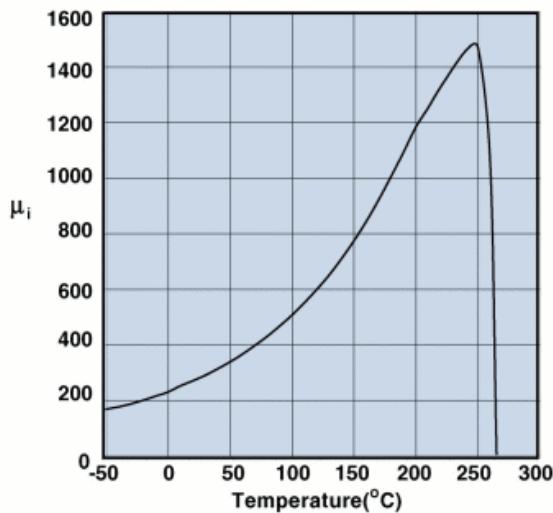
| Property   | Unit             | Symbol                | Value           |
|--|------------------|-----------------------|-----------------|
| Initial Permeability @ $B < 10$ gauss                      |                  | $\mu_i$               | 250             |
| Flux Density @ Field Strength                              | gauss<br>oersted | B<br>H                | 4200<br>10      |
| Residual Flux Density                                      | gauss            | $B_r$                 | 2900            |
| Coercive Force   | oersted          | $H_c$                 | 0.60            |
| Loss Factor @ Frequency                                    | $10^{-6}$<br>MHz | $\tan \delta / \mu_i$ | 45<br>1.0       |
| Temperature Coefficient of Initial Permeability (20 -70°C) | %/°C             |                       | 1.0             |
| Curie Temperature  | °C               | $T_c$                 | >250            |
| Resistivity  | $\Omega$ cm      | $\rho$                | $1 \times 10^9$ |

### Complex Permeability vs. Frequency



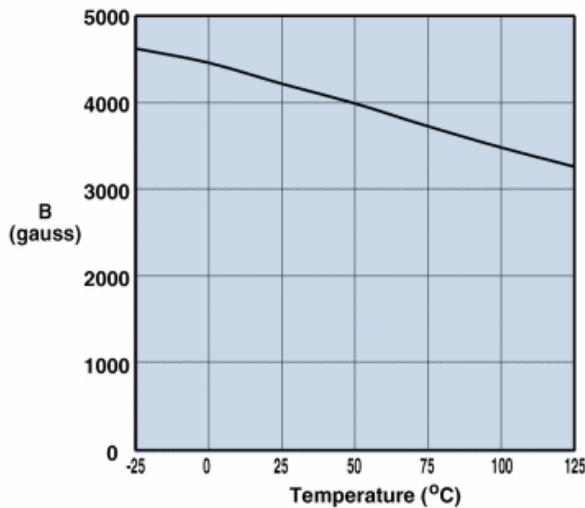
Measured on a 17/10/6mm toroid using the HP 4284A and the HP 4291A.

### Initial Permeability vs. Temperature



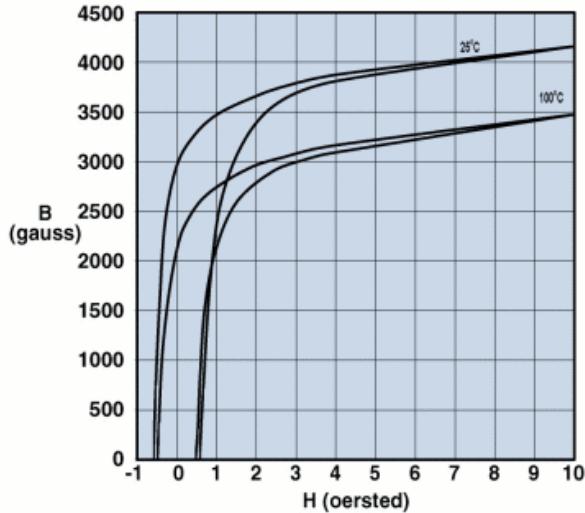
Measured on a 17/10/6mm toroid at 100kHz.

### Flux Density vs. Temperature



Measured on a 17/10/6mm toroid at 10kHz, and H=10 oersted.

### Hysteresis Loop



Measured on a 17/10/6mm toroid at 10kHz.