

Part Number: 2673002402  
 Frequency Range: Lower Frequencies < 50 MHz (73 material)  
 Description: 73 SHIELD BEAD  
 Application: Suppression Components  
 Where Used: Board Component  
 Part Type: EMI Suppression Beads  
 Preferred Part: ✓

## Mechanical Specifications

Weight: 1.200 (g)

## Part Type Information

Fair-Rite offers a broad selection of ferrite EMI suppression beads with guaranteed minimum impedance specifications.

-Beads with a '1' as the last digit of the part number are not burnished. Parts that are burnished to break the sharp edges have a '2' as the last digit.

-Upon request beads can be supplied with a Parylene coating. The last digit of the Parylene coated part is a '4'. The minimum coating thickness beads is 0.005 mm (.0002").

-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 [www.fair-rite.com/newfair/pdf/CUP%20Paper.pdf](http://www.fair-rite.com/newfair/pdf/CUP%20Paper.pdf) document for 'How to choose Ferrite Components for EMI Suppression.

-Suppression beads 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 typical impedance less 20%.

-Single turn impedance tests for 73 and 43 material beads are performed on the 4193A Vector Impedance Analyzer. The 61 material beads are tested on the 4191A RF Impedance Analyzer. Beads are tested with the shortest practical wire length.

-Preferred beads are the suggested choice for new designs. Samples are readily available and orders have typically shorter lead times than other beads. For any EMI suppression bead requirement not listed here, feel free to contact our customer service for availability and pricing.

-The 'C' dimension, the bead length, can be modified to suit specific applications.

-Our 'Shield Bead Kit' (part number 0199000019) contains a selection of these beads.

-Explanation of Part Numbers: Digits 1&2 = product class, 3&4 = material grade and last digit 1= not burnished, 2 = burnished and 4 = Parylene coated.



## Mechanical Specifications

| Dim | mm   | mm<br>tol | nominal<br>inch | inch<br>misc. |
|-----|------|-----------|-----------------|---------------|
| A   | 9.65 | ±0.25     | 0.380           | -             |
| B   | 5.00 | ±0.20     | 0.197           | -             |
| C   | 5.05 | -0.45     | 0.190           | -             |
| D   | -    | -         | -               | -             |
| E   | -    | -         | -               | -             |
| F   | -    | -         | -               | -             |
| G   | -    | -         | -               | -             |
| H   | -    | -         | -               | -             |
| J   | -    | -         | -               | -             |
| K   | -    | -         | -               | -             |

## Electrical Specifications

| Typical Impedance ( $\Omega$ ) |     |
|--------------------------------|-----|
| 1 MHz                          | 7.9 |
| 5 MHz                          | 19  |
| 10 MHz+                        | 19  |
| 25 MHz+                        | 15  |

| Electrical Properties |     |
|-----------------------|-----|
| H(Oe)                 | .59 |

## 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 | Pitch | Parts 7 " | Parts 13 " | Parts 14 " |
|------------|-------|-----------|------------|------------|
| mm         | mm    | Reel      | Reel       | 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



## Ferrite Material Constants

|                                       |  |
|---------------------------------------|--|
| Specific Heat .....                   | 0.25 cal/g/°C                          |
| Thermal Conductivity .....            | 10x10 <sup>-3</sup> cal/sec/cm/°C      |
| 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.



### 73 Material Characteristics:

| Property   | Unit             | Symbol                | Value              |
|--|------------------|-----------------------|--------------------|
| Initial Permeability @ B < 10 gauss                        |                  | $\mu_i$               | 2500               |
| Flux Density @ Field Strength                              | gauss<br>oersted | B<br>H                | 3900<br>5          |
| Residual Flux Density                                      | gauss            | $B_r$                 | 1500               |
| Coercive Force   | oersted          | $H_c$                 | 0.24               |
| Loss Factor @ Frequency                                    | $10^{-6}$<br>MHz | $\tan \delta / \mu_i$ | 10<br>0.1          |
| Temperature Coefficient of Initial Permeability (20 -70°C) | %/°C             |                       | 0.65               |
| Curie Temperature  | °C               | $T_c$                 | >160               |
| Resistivity  | $\Omega$ cm      | $\rho$                | $1 \times 10^{-2}$ |

### Complex Permeability vs. Frequency



Measured on a 2673000301 bead using the HP 4284A and the HP 4291A.

### Percent of Original Impedance vs. Temperature



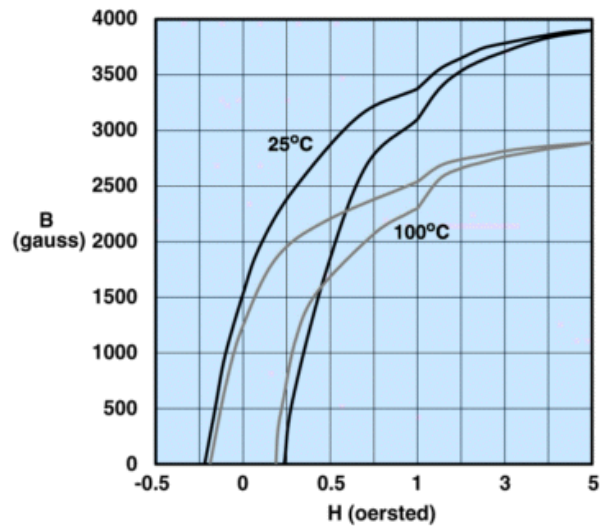
Measured on a 2673000301 using the HP4291A.

### Initial Permeability vs. Temperature



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

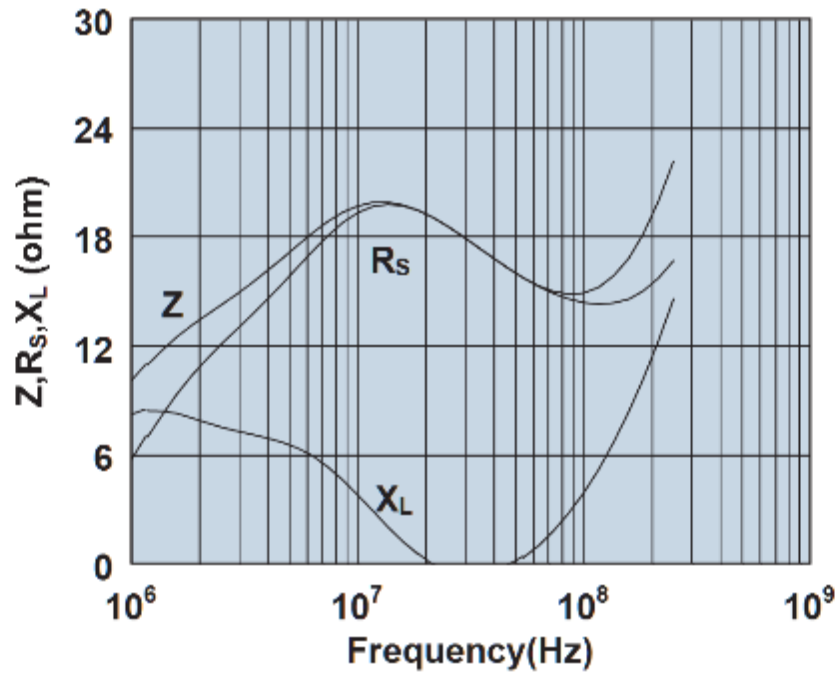
### Hysteresis Loop



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



**2673002402**



Impedance, reactance, and resistance vs. frequency.