

Figure 1

Part Number: 2861000202  
Frequency Range: Suppression Applications for Higher Frequencies > 250 MHz (61 material)  
Description: 61 MULTI-APERTURE CORE  
Application: Suppression Components  
Where Used: Board Component  
Part Type: Multi-Aperture cores  
Preferred Part: ✓

## Mechanical Specifications

Weight: 3.700 (g)

## Part Type Information

Multi-aperture cores are used in suppression applications and in balun (balance-unbalance) and other broadband transformers. They are also employed in airbag designs to prevent accidental activation.

-All multi-aperture cores are supplied burnished.

-Multi-aperture cores in 73 and 43 materials are controlled for impedance only. The 61 NiZn material is controlled for both impedance and AL value. The high frequency 67 material is controlled for AL value. All listed impedance values are typical values. Minimum impedance values are specified for the + marked frequencies. The minimum guaranteed impedance is the listed typical impedance less 20%.

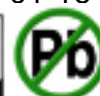
-Multi-aperture cores in 73 and 43 material are measured for impedance on the 4193A Vector Impedance Analyzer. The 61 multi-aperture cores are tested on the 4191A Impedance Analyzer. All impedance measurements are performed with a single turn to both holes, using the shortest practical wire length.

-The 61 and 67 material multi-hole beads are tested for AL value. The test frequency is 10 kHz at < 10 gauss. The test winding is five turns wound through both holes.

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

-Our 'Multi-Aperture Core Kit' (part number 0199000036) is available for proto type evaluation.

-Explanation of Part Numbers: Digits 1&2 = product class, 3&4 = material grade last digit 2 = burnished.



## Mechanical Specifications

| Dim | mm    | mm<br>tol | nominal<br>inch | inch<br>misc. |
|-----|-------|-----------|-----------------|---------------|
| A   | 13.30 | ±0.60     | 0.525           | -             |
| B   | 14.35 | ±0.50     | 0.565           | -             |
| C   | 7.50  | ±0.35     | 0.295           | -             |
| D   | -     | -         | -               | -             |
| E   | 5.70  | ±0.25     | 0.225           | -             |
| F   | -     | -         | -               | -             |
| G   | -     | -         | -               | -             |
| H   | 3.80  | ±0.25     | 0.150           | -             |
| J   | -     | -         | -               | -             |
| K   | -     | -         | -               | -             |

## Electrical Specifications

| Typical Impedance ( $\Omega$ ) |     |
|--------------------------------|-----|
| 100 MHz                        | 150 |
| 250 MHz+                       | 190 |

| Electrical Properties |         |
|-----------------------|---------|
| $A_L$ (nH)            | 320 Min |

## 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

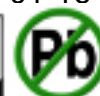
$A_L$  - Inductance Factor ( $\frac{L}{N^2}$ )

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 .....            | $10 \times 10^{-3}$ 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.



A high frequency NiZn ferrite developed for a range of inductive applications up to 25 MHz. This material is also used in EMI applications for suppression of noise frequencies above 200 MHz.

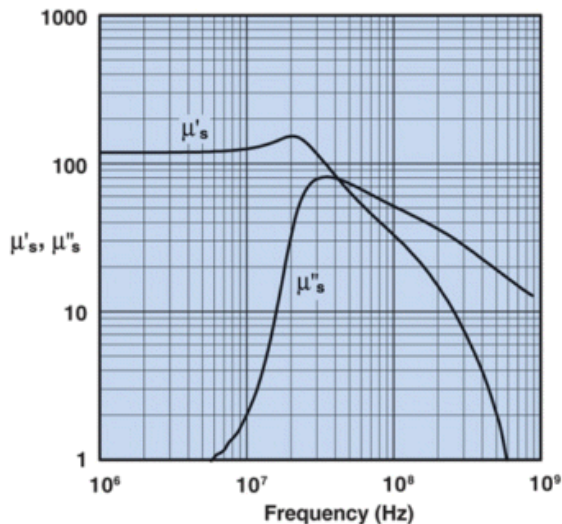
EMI suppression beads, beads on leads, SM beads, wound beads, multi-aperture cores, round cable snap-its, rods, antenna/RFID rods, and toroids are all available in 61 material.

*Strong magnetic fields or excessive mechanical stresses may result in irreversible changes in permeability and losses.*

**61 Material Characteristics:**

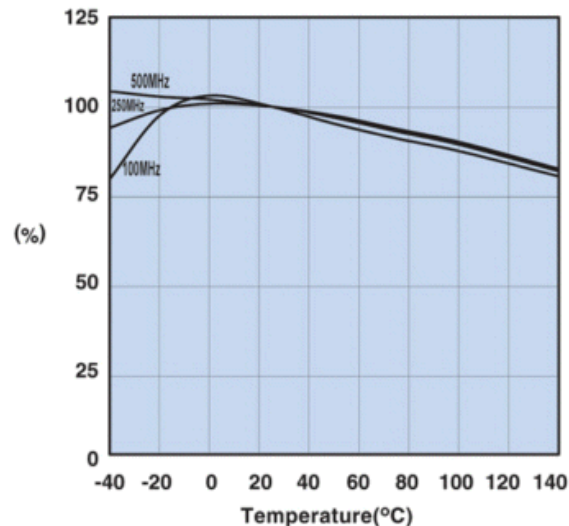
| Property   | Unit             | Symbol              | Value           |
|--|------------------|---------------------|-----------------|
| Initial Permeability @ B < 10 gauss                        |                  | $\mu_i$             | 125             |
| Flux Density @ Field Strength                              | gauss<br>oersted | B<br>H              | 2350<br>15      |
| Residual Flux Density                                      | gauss            | $B_r$               | 1200            |
| Coercive Force   | oersted          | $H_c$               | 1.8             |
| Loss Factor @ Frequency                                    | $10^{-6}$<br>MHz | $\tan \delta \mu_i$ | 30<br>1.0       |
| Temperature Coefficient of Initial Permeability (20 -70°C) | %/°C             |                     | 0.10            |
| Curie Temperature  | °C               | $T_c$               | >300            |
| Resistivity  | $\Omega$ cm      | $\rho$              | $1 \times 10^8$ |

**Complex Permeability vs. Frequency**



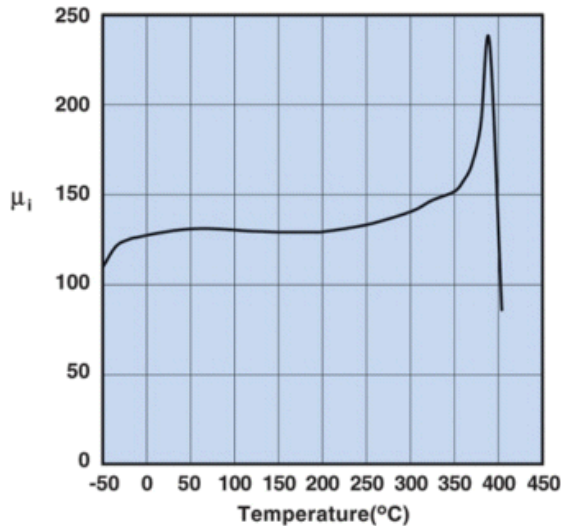
Measured on a 19/10/6mm toroid using the HP 4284A and the HP 4291A.

**Percent of Original Impedance vs. Temperature**



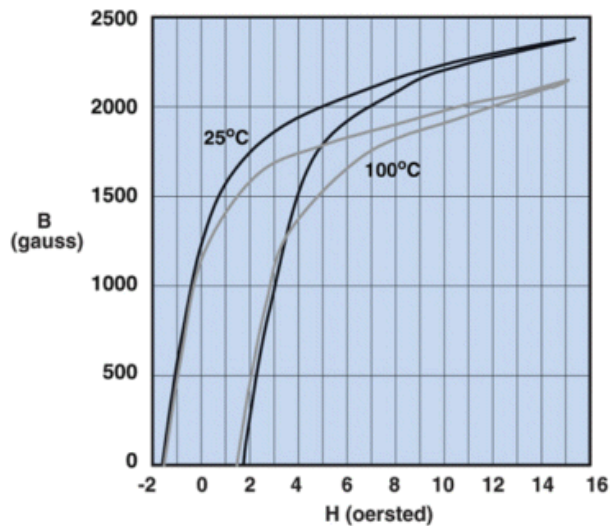
Measured on a 2661000301 using the HP4291A.

**Initial Permeability vs. Temperature**



Measured on a 19/10/6mm toroid at 100kHz.

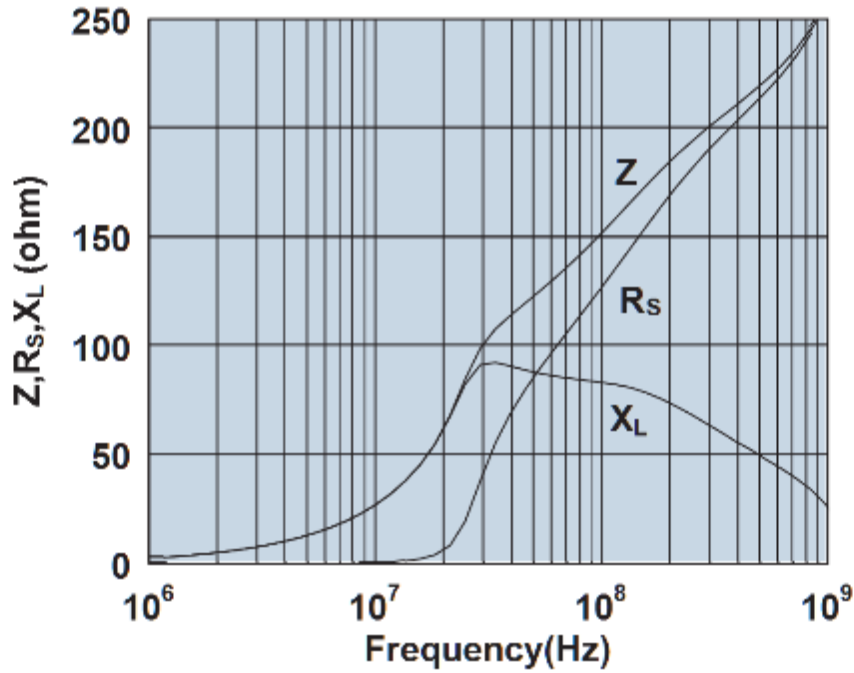
**Hysteresis Loop**



Measured on a 19/10/6mm toroid at 10kHz.



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Impedance, reactance, and resistance vs. frequency.