

Figure 1

Part Number: 0431178181  
 Frequency Range: Lower & Broadband Frequencies 1-300 MHz (31 material)  
 Description: 31 SPLIT ROUND CABLE ASSY  
 Application: Suppression Components  
 Where Used: Cable Component  
 Part Type: Round Cable Snap-Its

## Mechanical Specifications

Weight: 4.200 (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. Minimum impedance values are specified for the + marked frequencies. The minimum impedance is typically the listed impedance less 20%.

-Single turn impedance tests for the 31, 43, 44 and 46 material are performed on the 4193A Vector Impedance Analyzer. The 61 material parts are tested on the 4291A 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   | 11.80 | -         | 0.465           | -             |
| B   | 4.30  | -         | 0.169           | -             |
| C   | 23.20 | -         | 0.913           | -             |
| D   | 5.60  | -         | 0.221           | -             |
| E   | -     | -         | -               | -             |
| F   | -     | -         | -               | -             |
| G   | -     | -         | -               | -             |
| H   | -     | -         | -               | -             |
| J   | -     | -         | -               | -             |
| K   | -     | -         | -               | -             |

## Electrical Specifications

| Typical Impedance ( $\Omega$ ) |     |
|--------------------------------|-----|
| 1 MHz                          | 12  |
| 5 MHz                          | 43  |
| 10 MHz+                        | 60  |
| 25 MHz+                        | 90  |
| 100 MHz+                       | 160 |
| 250 MHz                        | 183 |

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

## 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 |
|----------|
| -        |
| (-)      |

## 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 .....            | <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.



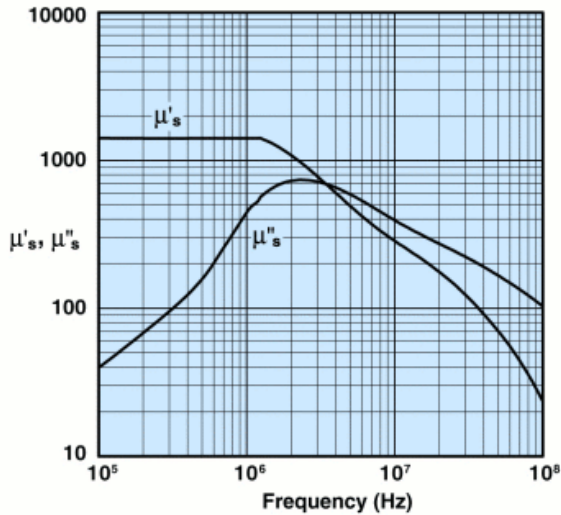
A MnZn ferrite designed specifically for EMI suppression applications from as low as 1 MHz up to 500 MHz. This material does not have the dimensional resonance limitations associated with conventional MnZn ferrite materials.

Round cable EMI suppression cores, round cable snap-its, flat cable EMI suppression cores, and flat cable snap-its are all available in 31 material.

### 31 Material Characteristics:

| Property   | Unit             | Symbol              | Value           |
|--|------------------|---------------------|-----------------|
| Initial Permeability @ B < 10 gauss                        |                  | $\mu_i$             | 1500            |
| Flux Density @ Field Strength                              | gauss<br>oersted | B<br>H              | 3400<br>5       |
| Residual Flux Density                                      | gauss            | $B_r$               | 2500            |
| Coercive Force   | oersted          | $H_c$               | 0.35            |
| Loss Factor @ Frequency                                    | $10^{-6}$<br>MHz | $\tan \delta \mu_i$ | 20<br>0.1       |
| Temperature Coefficient of Initial Permeability (20 -70°C) | %/°C             |                     | 1.6             |
| Curie Temperature  | °C               | $T_c$               | >130            |
| Resistivity  | $\Omega$ cm      | $\rho$              | $3 \times 10^9$ |

### Complex Permeability vs. Frequency



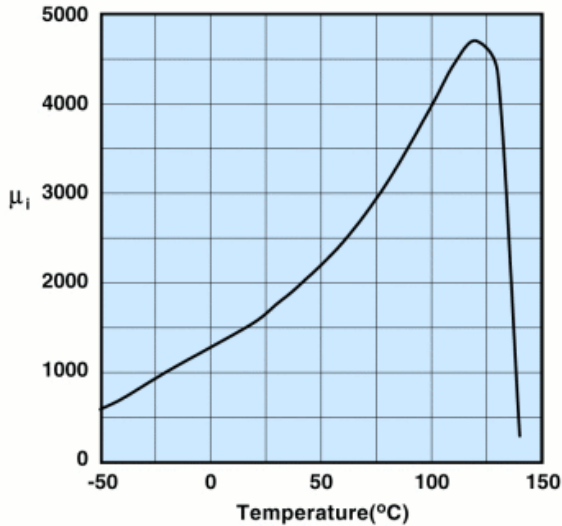
Measured on a 17/10/6mm toroid at 25°C using the HP 4284A and the HP 4291A.

### Percent of Original Impedance vs. Temperature



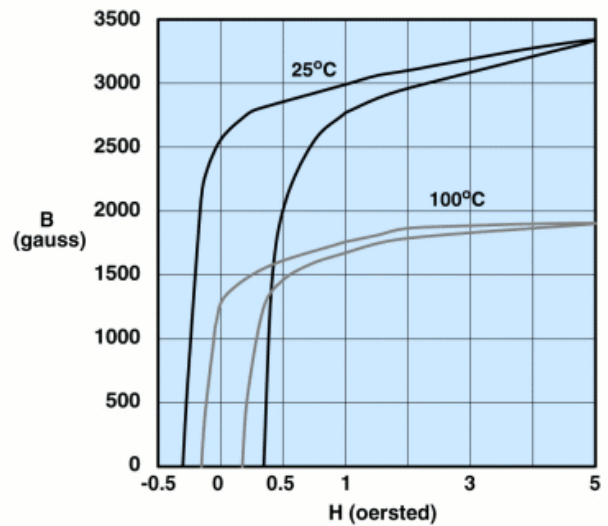
Measured on a 2631000301 using the HP4291A.

### Initial Permeability vs. Temperature



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

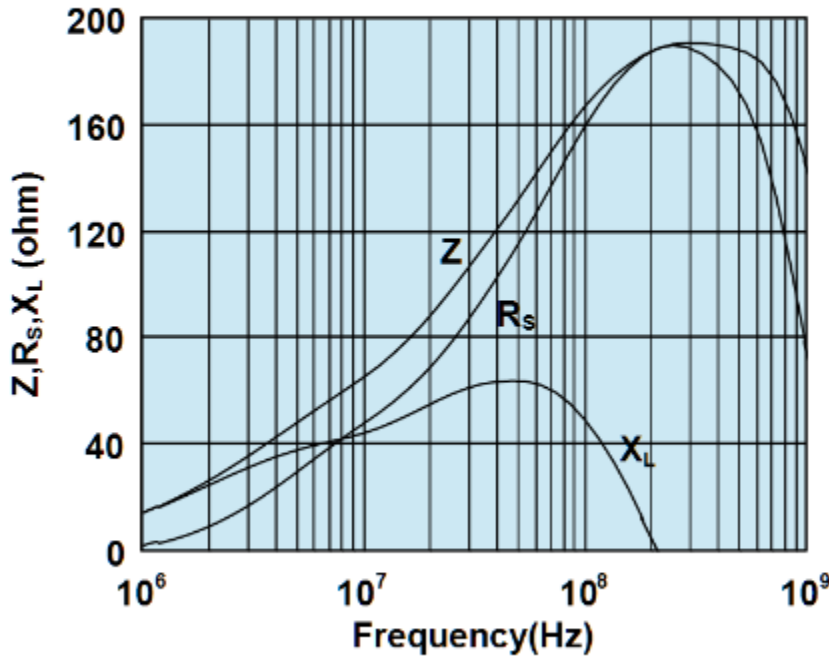
### Hysteresis Loop



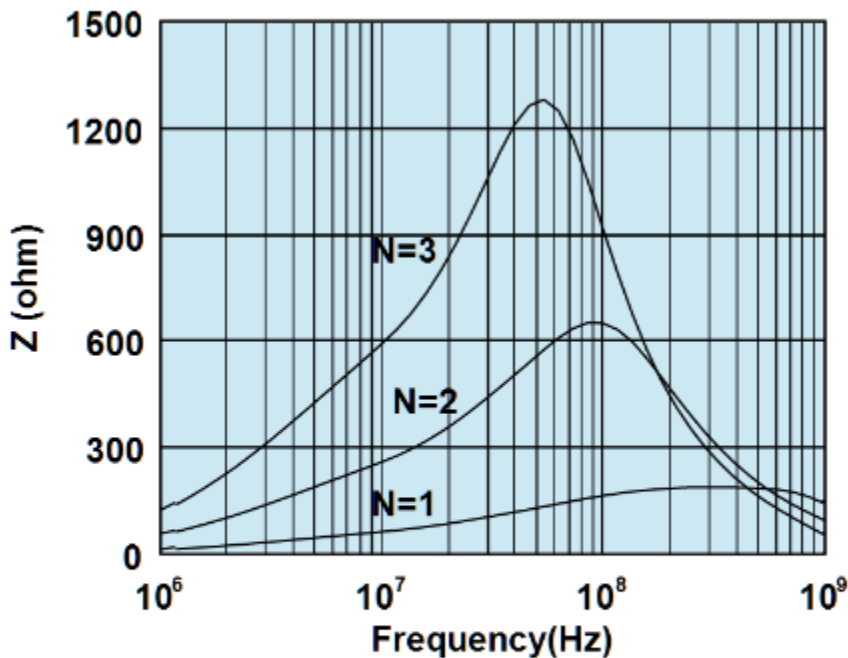
Measured on a 17/10/6mm toroid at 10kHz.



**0431178181**



Impedance, reactance, and resistance vs. frequency.



Impedance vs. frequency with one, two, and three turns.

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### Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: [info@moschip.ru](mailto:info@moschip.ru)

Skype отдела продаж:

moschip.ru

moschip.ru\_4

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