

Part Number: 3078990881  
Frequency Range: Medium Permeability, 78 ( $\mu_i=2300$ ) material  
Description: 78 ROD  
Application: Inductive Components  
Where Used: Open Magnetic Circuit  
Part Type: Antenna/RFID Rods

## Mechanical Specifications

Weight: 1.800 (g)

## Part Type Information

These rods are designed for use in antenna and RFID transponder applications. Rods are available in three materials to cover a frequency range from 50 kHz to 25 MHz. Suggested frequency ranges: 78 material < 200 kHz, 61 material 0.2 -5.0 MHz and 61 material > 5.0 MHz.

-See [www.fair-rite.com/newfair/catalog\\_rodinfo.htm](http://www.fair-rite.com/newfair/catalog_rodinfo.htm) graphs for temperature information for these rods.

-Rods can be supplied with a Parylene C coating. Parylene coated rods have a '4' as the last digit. Parylene C is RoHS compliant.

-For any rod requirement not listed here, feel free to contact our customer service group for availability and pricing.

-The Antenna/RFID Kit (part number 0199000024) contains a selection of these rods.

-Explanation of Part Numbers: Digits 1&2 = product class, 3&4 = material grade, the last digit 1 = uncoated rod and 4 = Parylene coated rod.

## Mechanical Specifications

Dim	mm	mm tol	nominal inch	inch misc.
A	4.00	±0.04	0.157	-
B	-	-	-	-
C	30.00	±0.75	1.181	-
D	-	-	-	-
E	-	-	-	-
F	-	-	-	-
G	-	-	-	-
H	-	-	-	-
J	-	-	-	-
K	-	-	-	-

## Electrical Specifications

Typical Impedance ( $\Omega$ )	
Electrical Properties	
$U_{ROD}$	31
$A_e(\text{cm}^2)$	0.12600

## Land Patterns

V	W ref	X	Y	Z
-	-	-	-	-
-	-	-	-	-

## Winding Information

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

## Reel Information

Tape Width mm	Pitch mm	Parts 7 " Reel	Parts 13 " Reel	Parts 14 " 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.



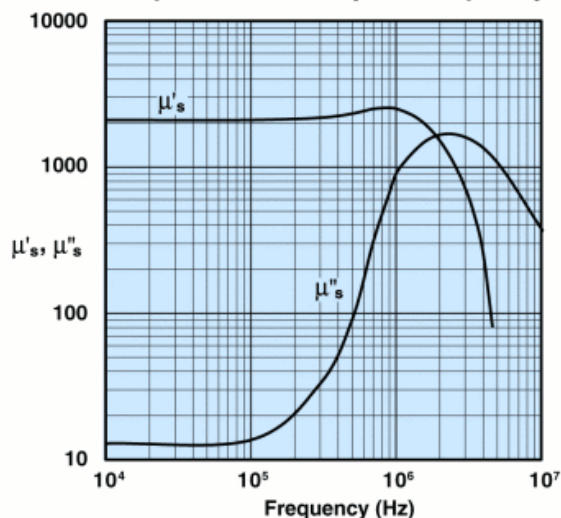
A MnZn ferrite specifically designed for power applications for frequencies up to 200 kHz.

RFID rods, toroids, U cores, and E&I cores are all available in 78 material.

## 78 Material Characteristics:

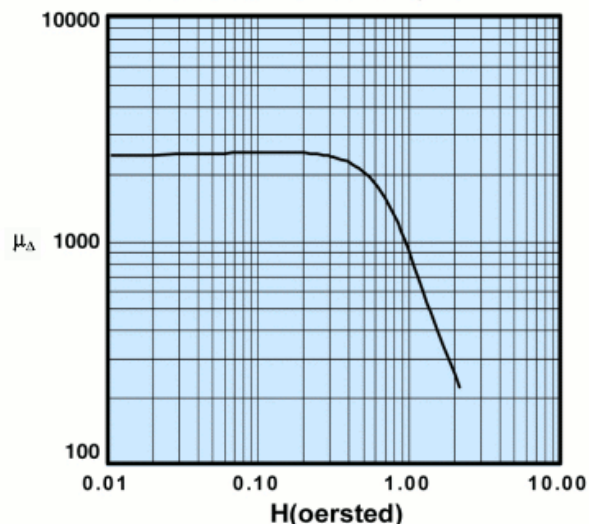
Property	Unit	Symbol	Value
Initial Permeability @ B < 10 gauss		$\mu_i$	2300
Flux Density @ Field Strength	gauss oersted	B H	4800 5
Residual Flux Density	gauss	$B_r$	1500
Coercive Force	oersted	$H_c$	0.20
Loss Factor @ Frequency	$10^{-6}$ MHz	$\tan \delta \mu_i$	4.5 0.1
Temperature Coefficient of Initial Permeability (20 -70°C)	%/°C		1.0
Curie Temperature	°C	$T_c$	>200
Resistivity	$\Omega \text{ cm}$	$\rho$	$2 \times 10^2$

**Complex Permeability vs. Frequency**

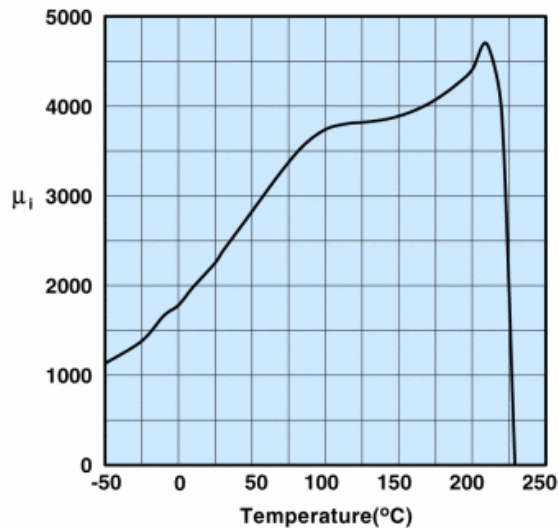


Measured on an 18/10/6mm toroid  
 using the HP 4284A and the HP 4291A.

**Incremental Permeability vs. H**

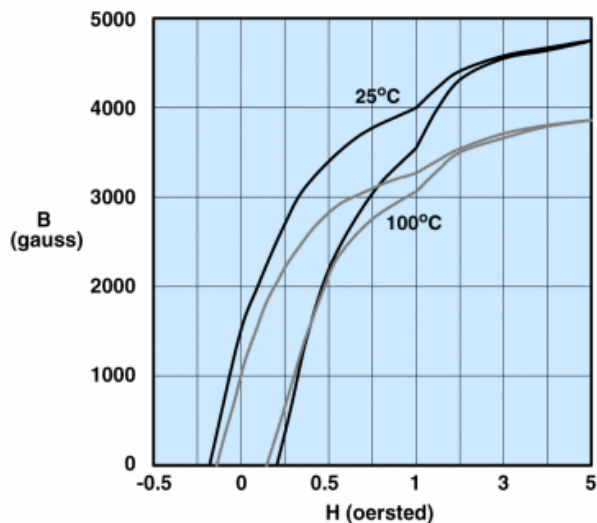


**Initial Permeability vs. Temperature**



Measured on an 18/10/6mm toroid at 100kHz.

**Hysteresis Loop**



Measured on an 18/10/6mm toroid at 10kHz.

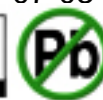


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Fair-Rite Product's Catalog  
Part Data Sheet, 3078990881  
Printed: 2013-07-03

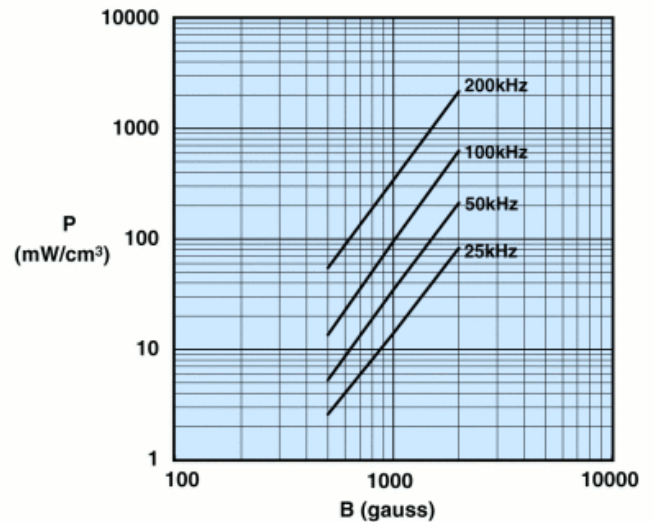


## Amplitude Permeability vs. Flux Density



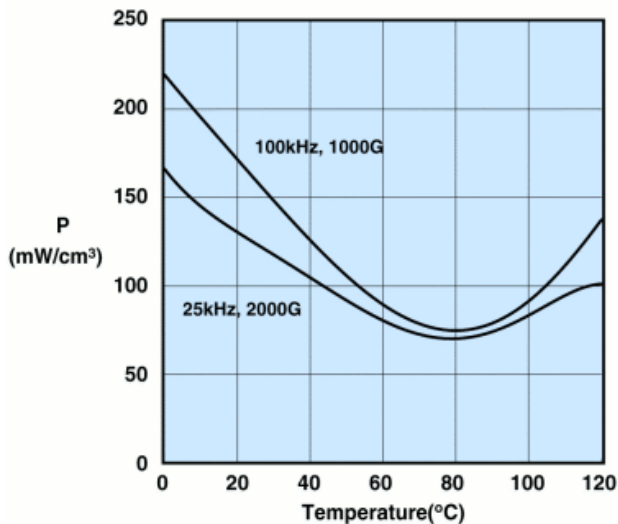
Measured on an 18/10/6mm toroid at 10kHz.

## Power Loss Density vs. Flux Density



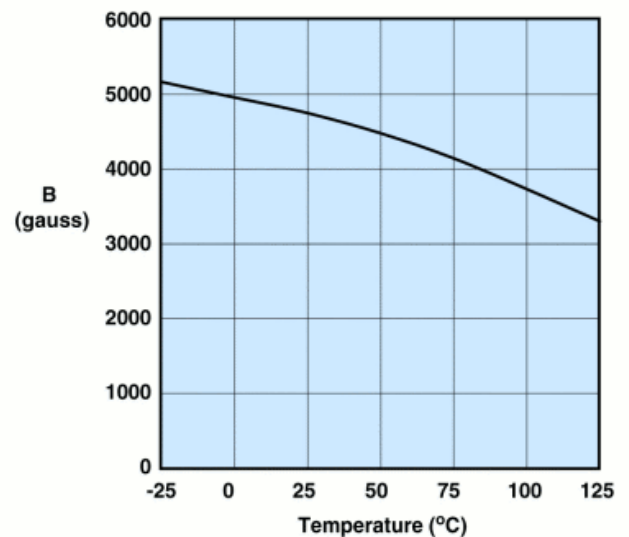
Measured on an 18/10/6mm toroid using the Clarke Hess 258 VAW at 100°C

## Power Loss Density vs. Temperature



Measured on an 18/10/6mm toroid using the Clarke Hess 258 VAW.

## Flux Density vs. Temperature



Measured on an 18/10/6 mm toroid at 10kHz and H=5 oersted.