

Part Number: 9498111002  
Frequency Range: Dimensions  
Description: 98 E CORE  
Application: Inductive Components  
Where Used: Closed Magnetic Circuit  
Part Type: E Cores  
Generic Name: E33/13

## Mechanical Specifications

Weight: 40.200 (g) per Set

## Part Type Information

EF12.6, EF16, E 187, EF20, EF25, EF32, E33/13, E 375, E42/15, E42/20, E55/21, E65/27

The E core geometry offers an economical design approach for inductive applications in a variety of power designs.

-E cores can be supplied with the center post gapped to a mechanical dimension or an AL value.

-AL value is measured at 1 kHz,  $B < 10$  gauss.

-Weight indicated is per pair or set.

## Mechanical Specifications

Dim	mm	mm tol	nominal inch	inch misc.
A	33.00	±0.6	1.299	-
B	14.00	±0.3	0.551	-
C	12.70	±0.3	0.500	-
D	9.60	±0.3	0.378	-
E	22.80	min	0.898	min
F	9.70	±0.3	0.382	-
G	-	-	-	-
H	-	-	-	-
J	-	-	-	-
K	-	-	-	-

## Electrical Specifications

Typical Impedance ( $\Omega$ )	

Electrical Properties	
$A_L$ (nH)	4200 ±25%
$A_e$ (cm <sup>2</sup> )	1.19000
$\Sigma I/A$ (cm <sup>-1</sup> )	5.60
$l_e$ (cm)	6.65
$V_e$ (cm <sup>3</sup> )	7.90000
$A_{min}$ (cm <sup>2</sup> )	1.120

## 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.

$\Sigma I/A$  - 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



## 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 low loss MnZn ferrite material for power applications up to 200 kHz.

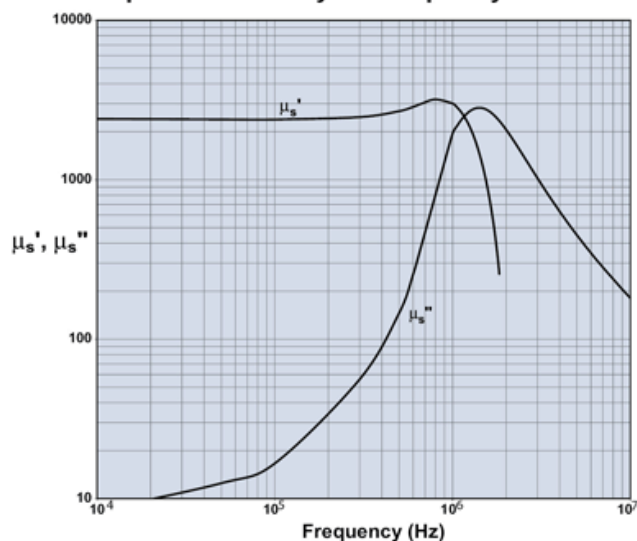
New type 98 Material is an improved version of Fair-Rite's 78 Material, this material supplies, lower power loss at 100°C at moderate flux densities for operation below 200 kHz.

Shapes available in 98 material are Toroids, U Cores, E & I Cores, Pot Cores, RM, PQ, ETD, EFD, EP, EER.

## 98 Material Characteristics

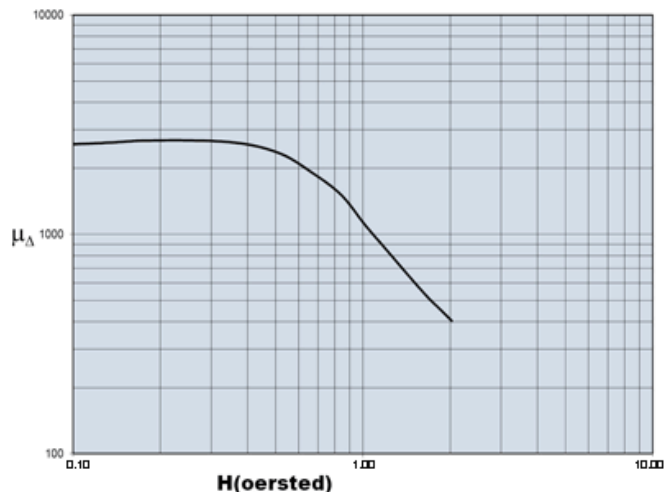
Property	Unit	Symbol	Value
Initial Permeability @ B < 10gauss		$\mu_i$	2400
Flux Density @ Field Strength	gauss oersted	B H	5000 5
Residual Flux Density	gauss	$B_r$	1800
Coercive Force	oersted	$H_c$	0.17
Loss Factor @ Frequency	$10^{-6}$ MHz	$\tan\delta/\mu_i$	3.5 0.1
Temperature Coefficient of Initial Permeability (20 - 70°C)	% / °C		1.5
Curie Temperature	°C	$T_c$	> 215
Resistivity	ohm-cm	$\rho$	200

## Complex Permeability vs. Frequency

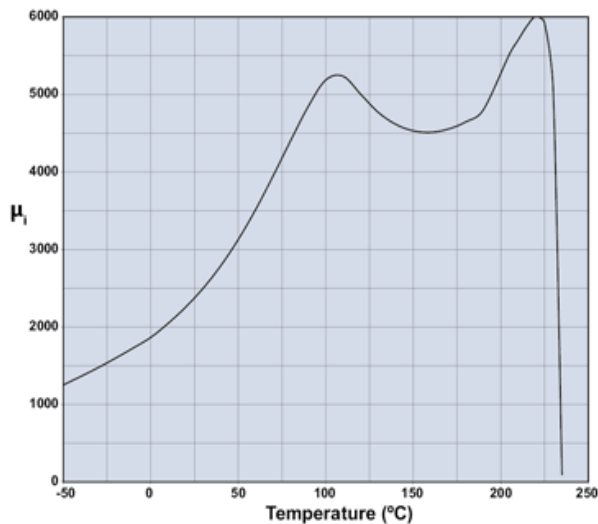


Measured on an 18/10/6mm toroid using HP 4284A and HP4291A.

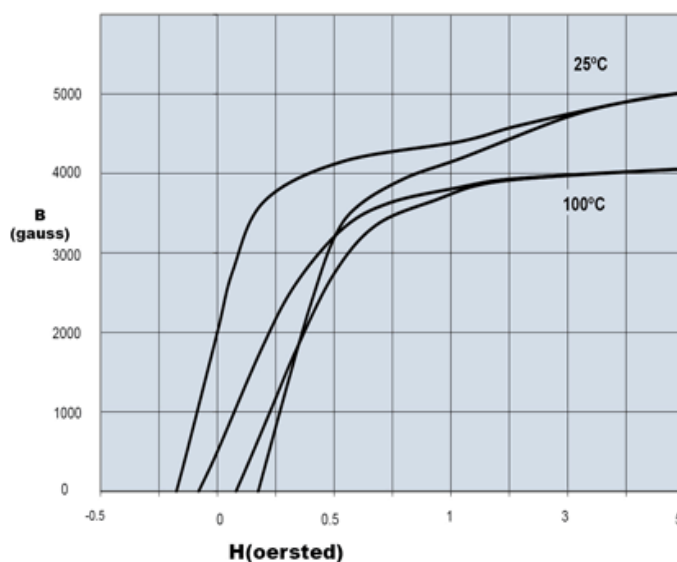
## Incremental Permeability vs. H



## Initial Permeability vs. Temperature

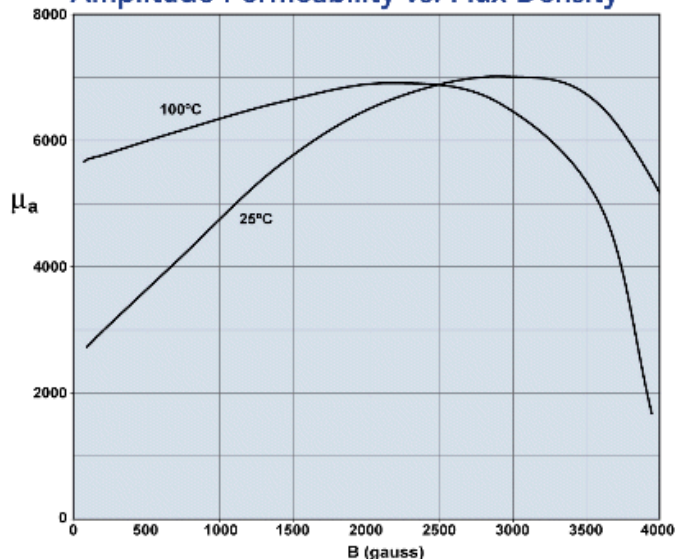


## Hysteresis Loop



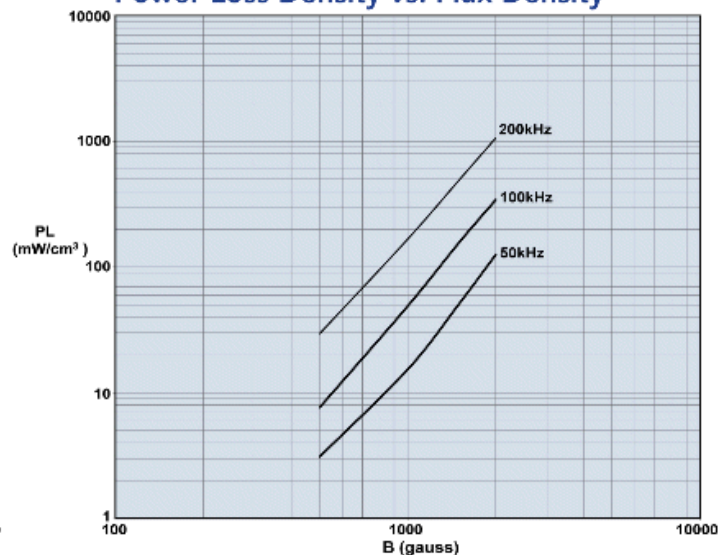
A low loss MnZn ferrite material for power applications up to 200kHz.

**Amplitude Permeability vs. Flux Density**



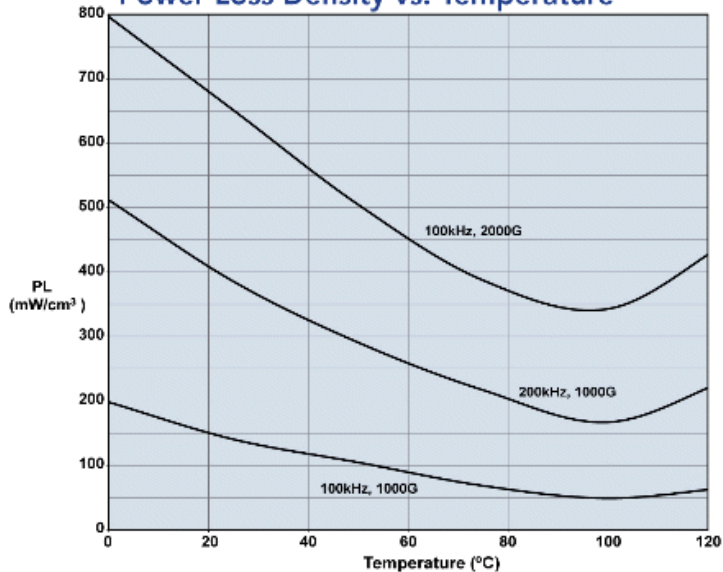
Measured on an 18/10/6mm toroid at 10kHz.

**Power Loss Density vs. Flux Density**



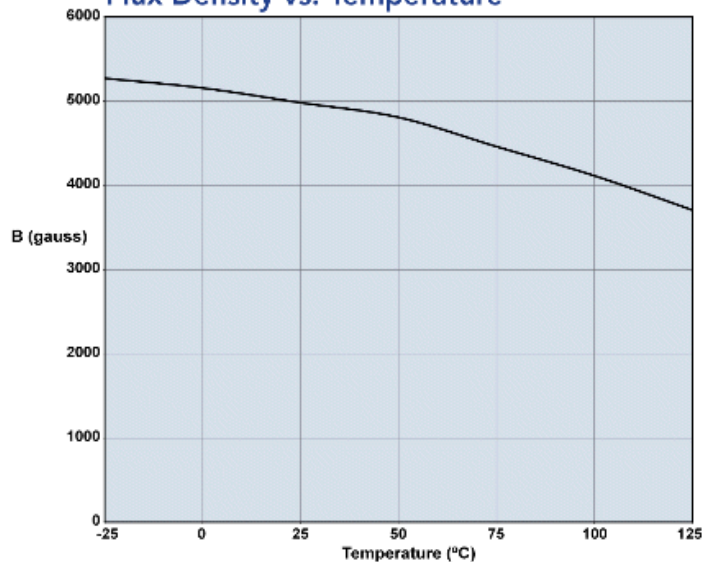
Measured on an 18/10/6mm toroid using the Clarke Hess 258 VAW at 100°C.

**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 18/10/6mm toroid at 10kHz and H=5 oersted.