

Part Number: 9478114002  
 Frequency Range: Dimensions  
 Description: 78 E CORE  
 Application: Inductive Components  
 Where Used: Closed Magnetic Circuit  
 Part Type: E Cores  
 Generic Name: E42/15

## Mechanical Specifications

Weight: 88.000 (g)

## Part Type Information

The E core geometry offers an economical design approach for a wide range of inductive applications. The 77 and 78 materials are used in a variety power designs.

-Part number is for a single core.

-E cores can be supplied with the center post gapped to a mechanical dimension. E cores can also be gapped to an AI value. These cores will be supplied as sets. For any gapped E core requirement contact our customer service group.

-AI value is measured at 1 kHz, < 10 gauss.

-See [www.fair-rite.com/newfair/pdf/Directcurrent.pdf](http://www.fair-rite.com/newfair/pdf/Directcurrent.pdf) for document 'The Effect of Direct Current on the Inductance of a Ferrite Core', Figure 4 for information on AI vs. gap length.

-Fair-Rite equivalents to lamination sizes:

E2829	9477019002	E375	9477375002
E187	9477016002	E21	9477500002
E2425	9477015002	E625	9477625002, 9478625002

-Explanation of Part Numbers: Digits 1&2 = product class and 3&4 = material grade.



## Mechanical Specifications

Dim	mm	mm tol	nominal inch	inch misc.
A	42.00	±0.7	1.654	-
B	21.20	±0.3	0.835	-
C	14.90	±0.3	0.587	-
D	15.15	±0.3	0.596	-
E	29.50	min	1.161	min
F	11.90	±0.3	0.469	-
G	-	-	-	-
H	-	-	-	-
J	-	-	-	-
K	-	-	-	-

## Electrical Specifications

Typical Impedance ( $\Omega$ )	

Electrical Properties	
$A_L$ (nH)	4300 ±25%
$A_e$ (cm <sup>2</sup> )	1.77000
$\sum I/A$ (cm <sup>-1</sup> )	5.53
$l_e$ (cm)	9.79
$V_e$ (cm <sup>3</sup> )	17.30000
$A_{min}$ (cm <sup>2</sup> )	1.740

### 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.

$\sum I/A$  - 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

## Land Patterns

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

## Winding Information

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



## 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.



### 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	$\Omega$ 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.



# Fair-Rite Products Corp. Your Signal Solution®

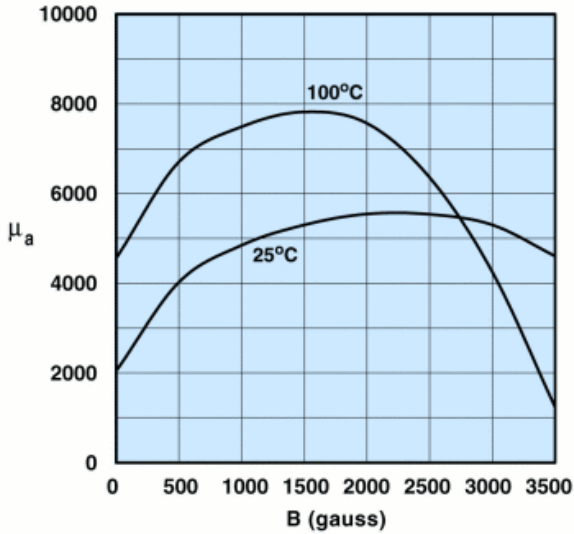
Ferrite Components for the Electronics Industry

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## Amplitude Permeability vs. Flux Density



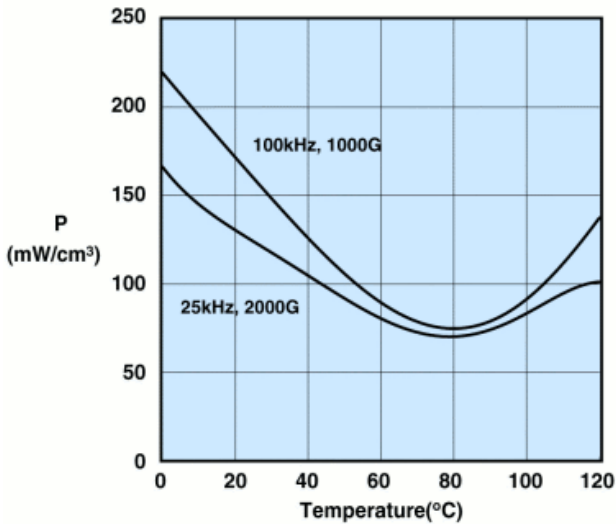
Measured on an 18/10/6mm toroid at 10kHz.

## Power Loss Density vs. Flux Density



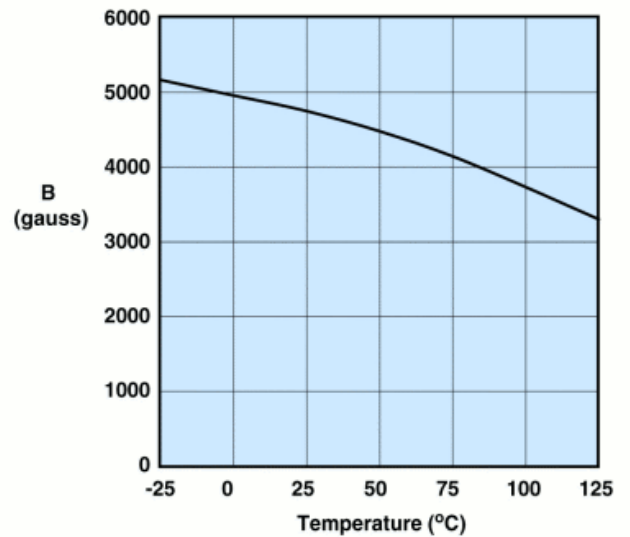
Measured on an 18/10/6mm toroid using the Clarke Hess 258 VAW at 100°C

## 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.