LAN MAGNETICS OPERATING UNDER DC BIAS CONDITIONS

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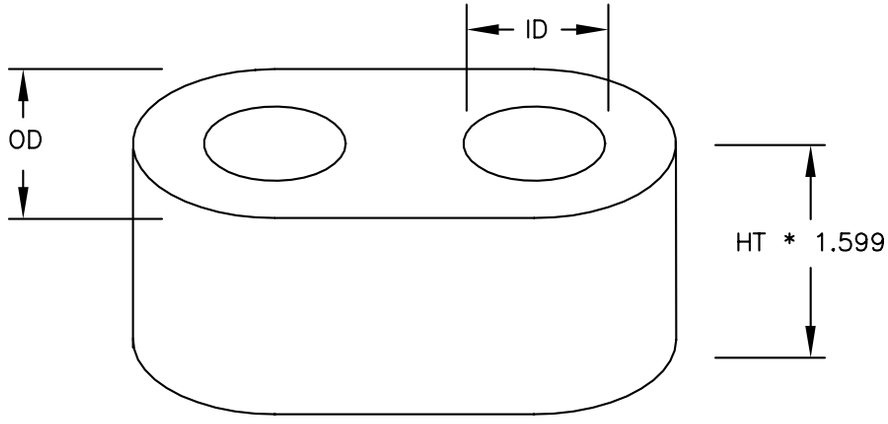
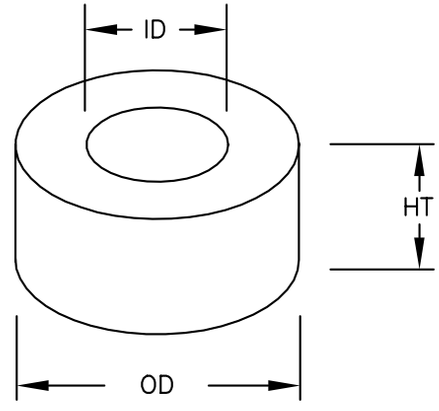


BINOCULAR BEAD



TOROID

$$\text{MAGNETIC PATH LENGTH, CORE } (l_m) = \frac{2 * PI * LN\left(\frac{OD}{ID}\right)}{\left[\left(\frac{2}{ID}\right) - \left(\frac{2}{OD}\right)\right]}$$

$$\text{EFFECTIVE LENGTH } (l_e) = l_m + (u * l_g)$$

$$\text{EFFECTIVE AREA } (A_e) = \frac{HT * LN\left(\frac{OD}{ID}\right)}{2 * PI} * l_e$$

WHERE: OD, ID, AND HT ARE IN CENTIMETERS

u = PERMEABILITY OF MAGNETIC MATERIAL

l_g = LENGTH OF AIR GAP (IF EXISTS)

PI = 3.1416

MAGNETIC DIMENSIONS

$$\text{EFFECTIVE PERMEABILITY } (u_e) = \frac{u * l_m}{l_m + (u * l_g)}$$

$$\text{INDUCTANCE FACTOR } (A_L) = 2 * u * HT * LN\left(\frac{OD}{ID}\right) = .4 * PI * u * \left(\frac{A_e}{l_e}\right) \quad (\text{HENRY}^{-9})$$

$$\text{PRIMARY INDUCTANCE } (L_P) = N * N * A_L \quad (\text{HENRY}^{-9})$$

$$\text{COERCIVE FORCE } (H) = \frac{.4 * PI * N * I}{l_e} \quad (\text{OERSTED})$$

$$\text{FLUX DENSITY } (B) = \frac{E * T}{K * N * A_e} \quad (\text{GAUSS})$$

WHERE: OD, ID, AND HT ARE IN CENTIMETERS

T (SINEWAVE) = 1/FREQUENCY (MHz)
(SQUAREWAVE) = PERIOD IN nS
(PULSE) = DURATION IN nS

K (SINEWAVE) = .0444
(SQUAREWAVE) = 20
(PULSE) = 10

PI = 3.14159

I = Current (mA DC)

u = PERMEABILITY, CORE

N = NUMBER OF TURNS

l_m = LENGTH OF MAGNETIC PATH, CORE

l_g = LENGTH OF AIR GAP

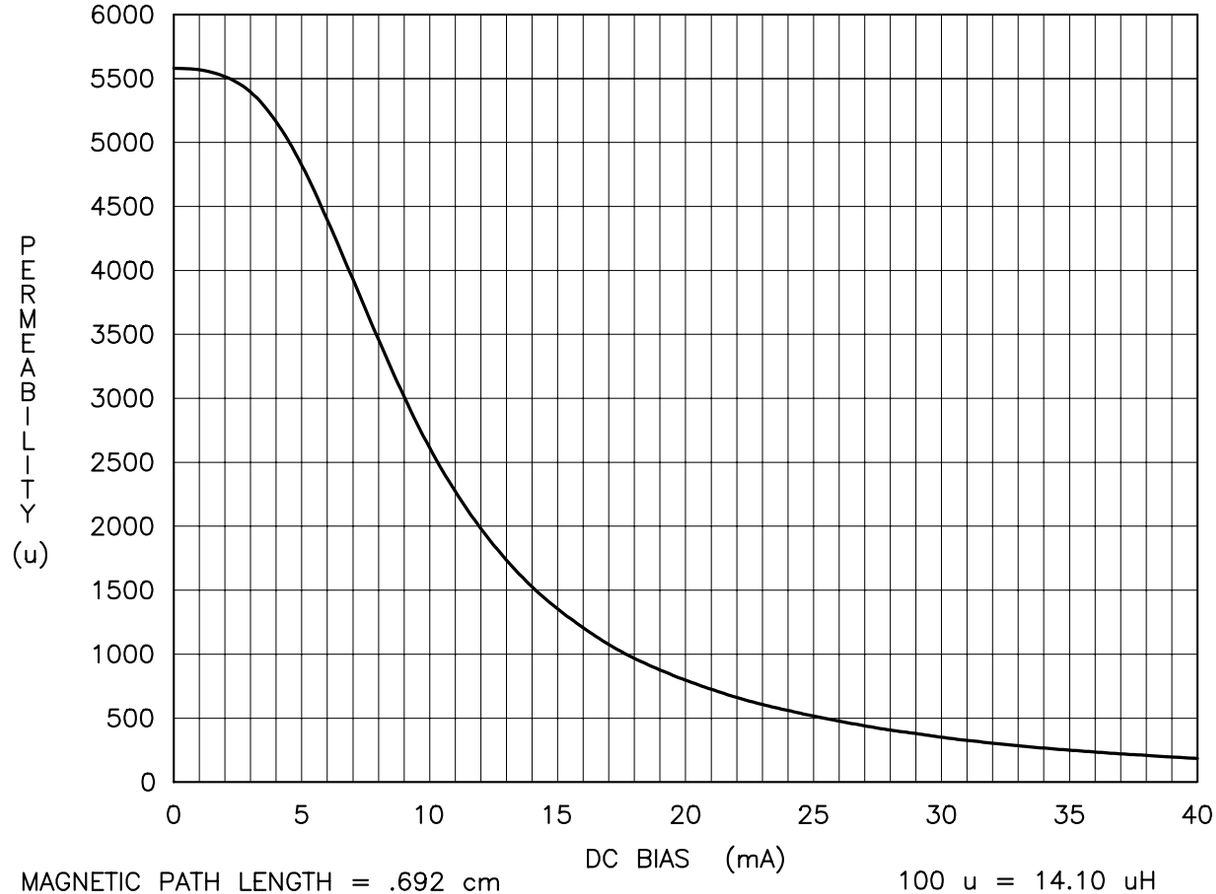
l_e = EFFECTIVE MAGNETIC PATH LENGTH

A_e = EFFECTIVE AREA, CORE

E (SINEWAVE) = VRMS
(SQUAREWAVE) = AVERAGE PEAK–PEAK VOLTAGE
(PULSE) = AVERAGE VOLTAGE OVER PULSE WIDTH

MAGNETIC FORMULAE

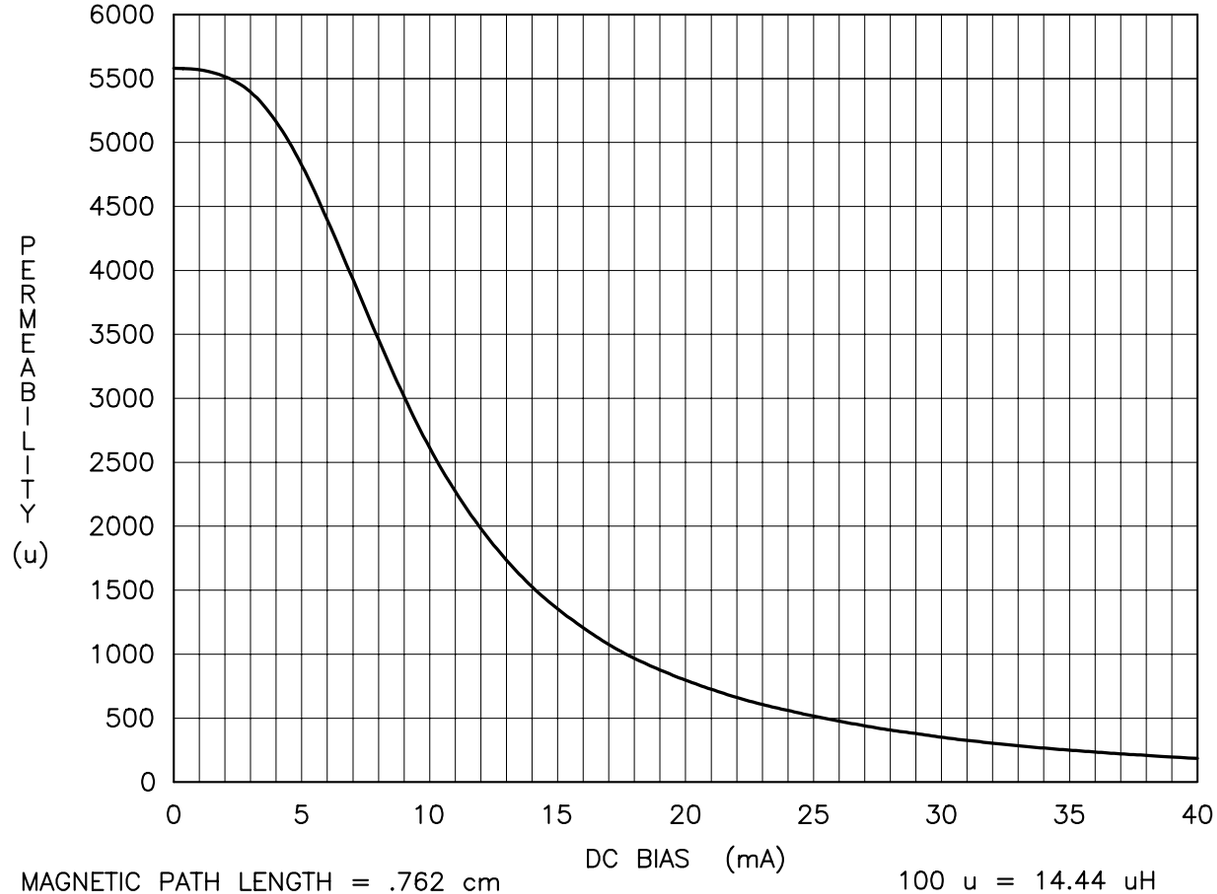
10/100 TRANSFORMER, .115 x .067 x .095



MAGNETIC PATH LENGTH = .692 cm
MAGNETIC AREA = .01437 cm^2

100 u = 14.10 uH
1 mA = .0472 oertseds

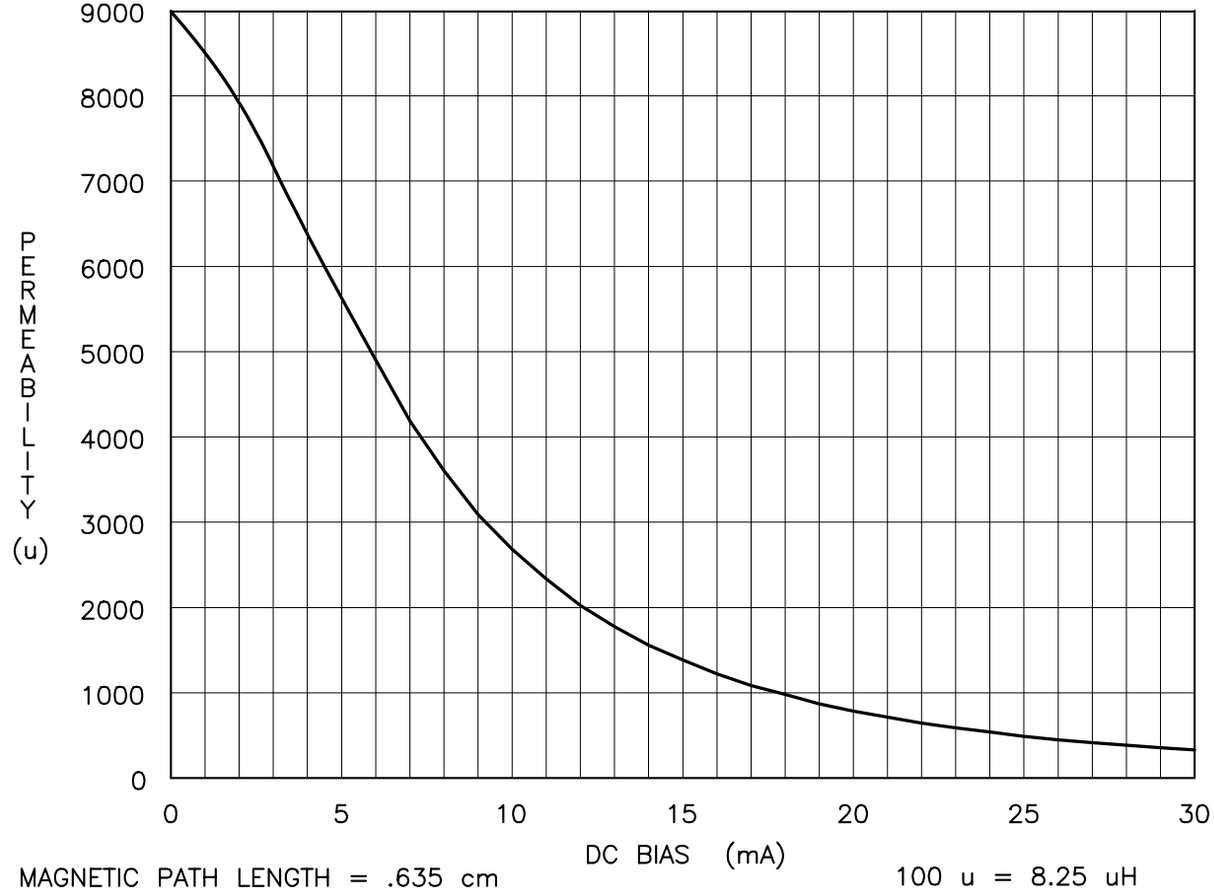
10/100 TRANSFORMER, .135 x .070 x .080



MAGNETIC PATH LENGTH = .762 cm
MAGNETIC AREA = .01619 cm^2

100 u = 14.44 uH
1 mA = .0429 oertseds

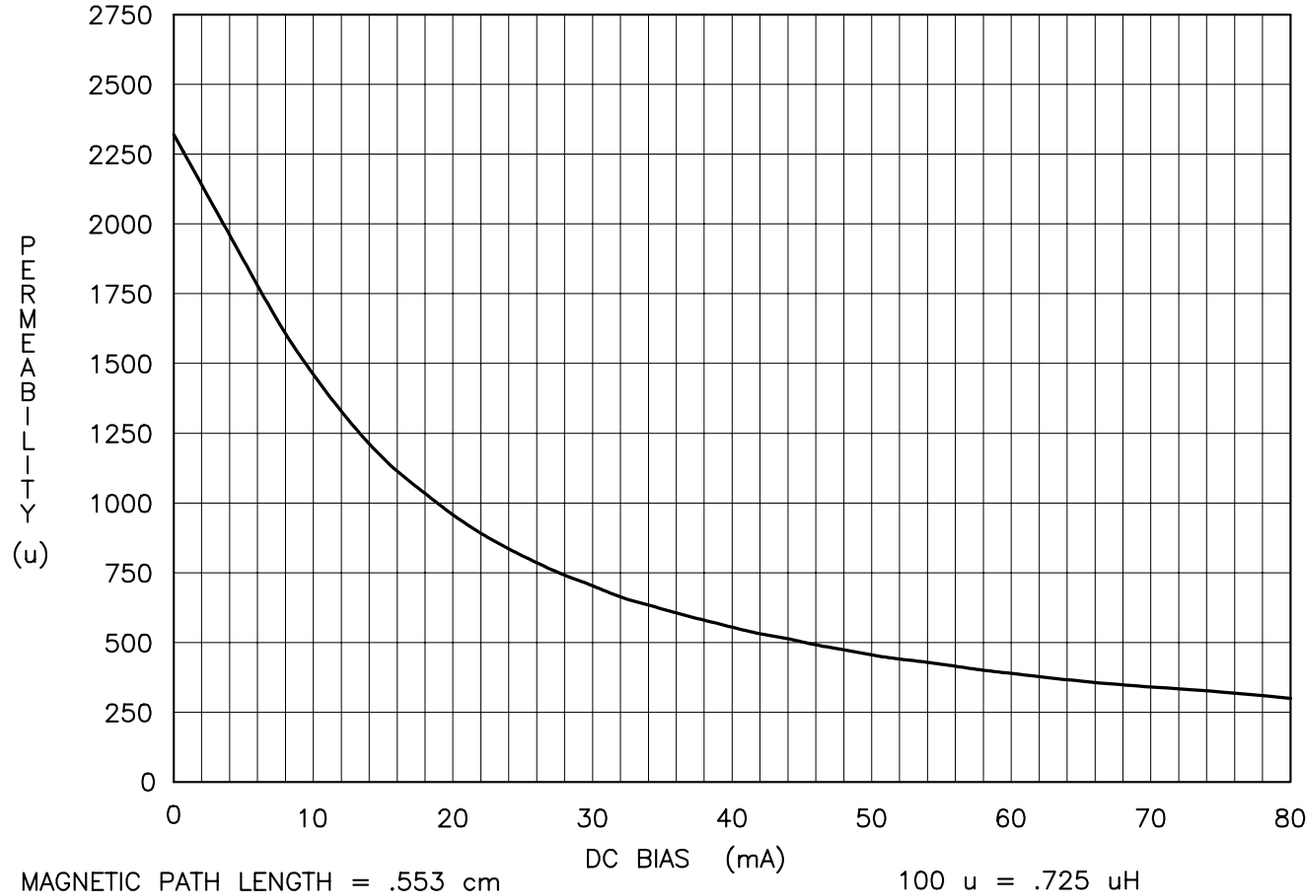
SHUNT INDUCTOR, .138 x .050 x .050



MAGNETIC PATH LENGTH = .635 cm
MAGNETIC AREA = .01304 cm^2

100 u = 8.25 uH
1 mA = .0396 oertseds

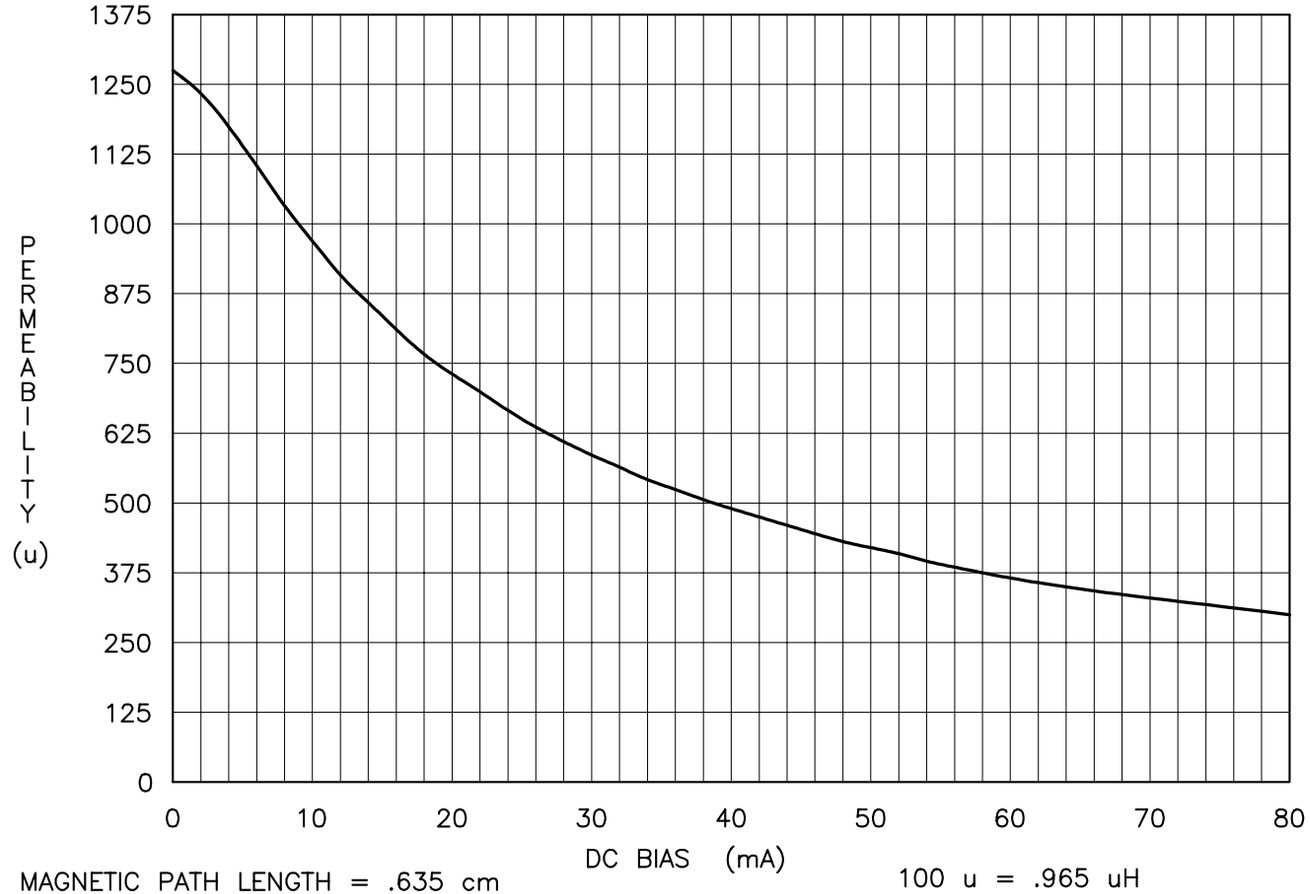
COMMON MODE CHOKE, .100 x .050 x .050, 1K perm



MAGNETIC PATH LENGTH = .553 cm
MAGNETIC AREA = .007753 cm^2

100 u = .725 uH
1 mA = .0227 oertseds

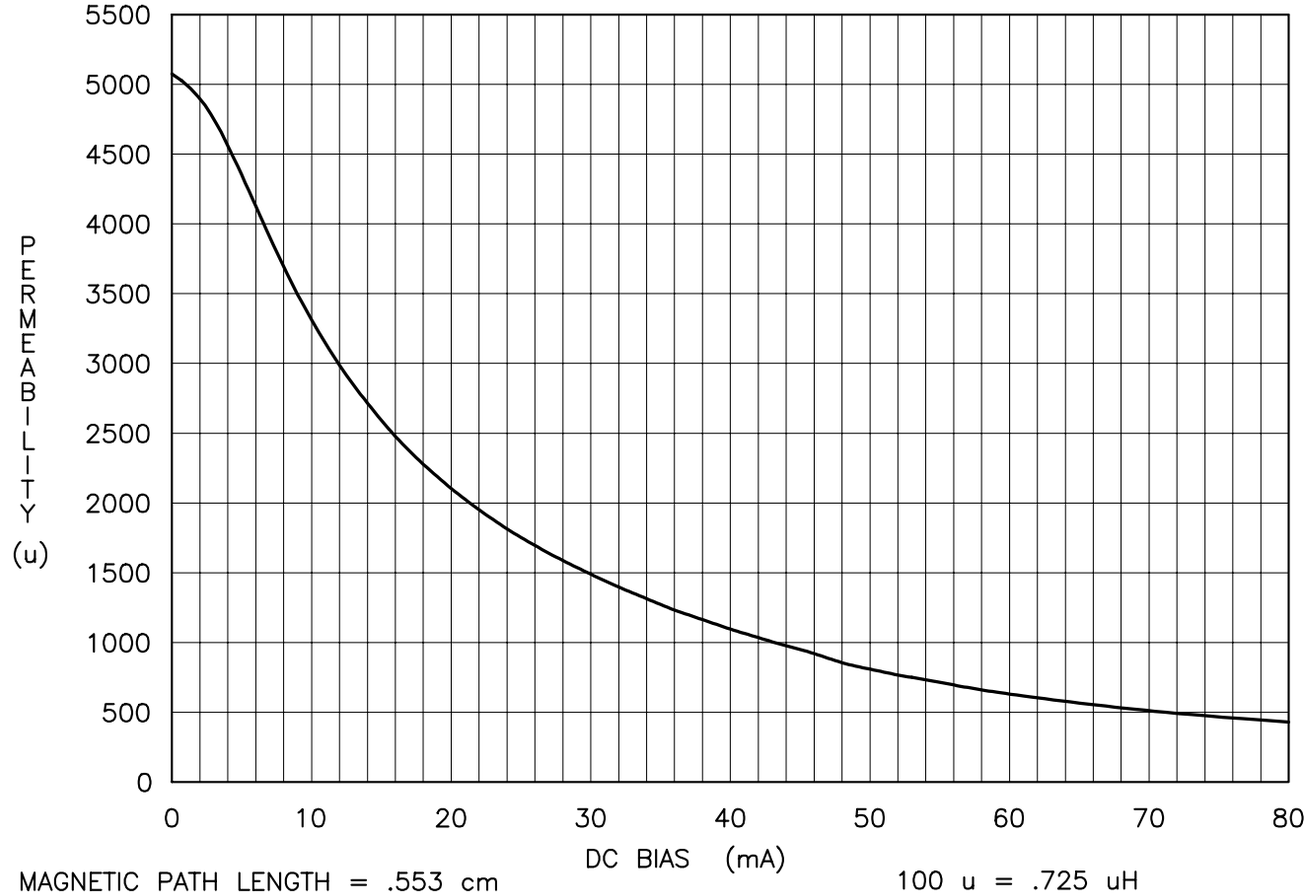
COMMON MODE CHOKE, .138 x .070 x .035



MAGNETIC PATH LENGTH = .635 cm
MAGNETIC AREA = .009129 cm^2

100 u = .965 uH
1 mA = .0198 oertseds

COMMON MODE CHOKE, .100 x .050 x .050, 5K perm



MAGNETIC PATH LENGTH = .553 cm
MAGNETIC AREA = .007753 cm^2
1 mA = .0227 oerseds

100 u = .725 uH
1 mA = .0227 oertseds

LAN MAGNETICS OPERATING UNDER DC BIAS CONDITIONS

SUMMARY

- DC current arising from magnetic/circuit imbalances will degrade performance.
- Permit magnetics to occupy largest area possible.