

On-Board Type (DC) EMI Suppression Filters(EMIFIL<sup>®</sup>)



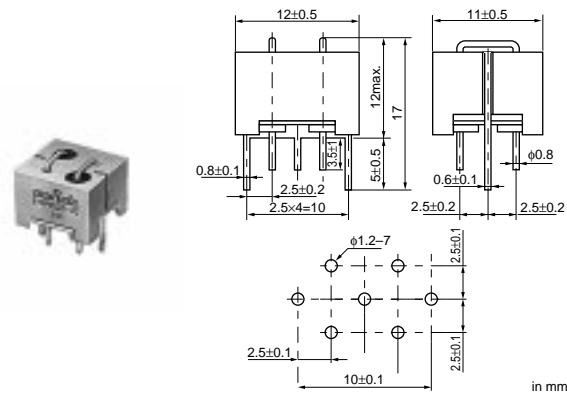
Block Type EMIFIL<sup>®</sup> BNP/BNX Series

BNP Series

- Features
1. The "EMIFIL" BNP002 incorporates through-type barrier layer capacitors and p circuits, allowing it to obtain significantly large insertion losses throughout an extremely wide frequency range from 15MHz up to 1GHz.
  2. The cut-off frequency is designed to be at several MHz, which is ideal for eliminating noise from any circuit in which the signal frequency and the noise frequency are relatively close together.
  3. Since all noise in plural signal lines can be eliminated by one filter block, the filter is extremely compact.
  4. There are no connection routes in the current circuits, thus ensuring highly reliable performance.
  5. Both the input/output terminals and the grounding terminal are aligned in the same direction, permitting fast and easy installation on any type of P.C. board.

■ Applications

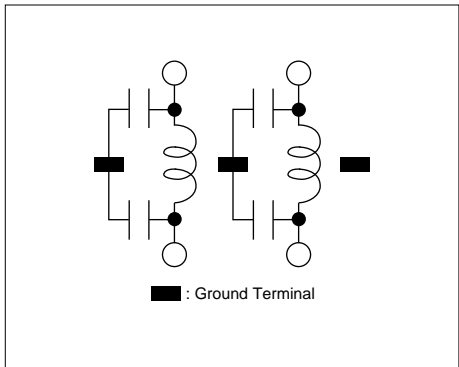
Noise elimination from signal lines and DC power sources in engine control units, digital equipment and computer terminals.



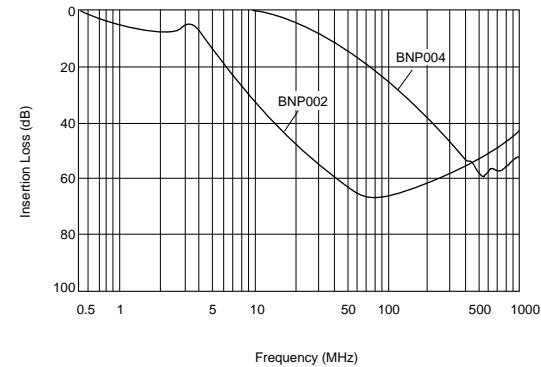
| Part Number | Rated Voltage (Vdc) | Withstand Voltage (Vdc) | Rated Current (A) | Insulation Resistance(min.) (M ohm) | DC Resistance(max.) (ohm) | Insertion Loss                          | Number of Circuit |
|-------------|---------------------|-------------------------|-------------------|-------------------------------------|---------------------------|---|-------------------|
| BNP002-02   | 50                  | 300                     | 10                | 1000                                | 0.05 (20 to 25°C)         | 20MHz to 500MHz:40dB min.(20 to 25°C)   | 2                 |
| BNP002-03   | 50                  | 300                     | 10                | 1000                                | 0.05 (20 to 25°C)         | 20MHz to 500MHz:40dB min.(20 to 25°C)   | 3                 |
| BNP004-02   | 50                  | 125                     | 10                | 1000                                | 0.05 (20 to 25°C)         | 300MHz to 1000MHz:40dB min.(20 to 25°C) | 2                 |

Operating Temperature Range : -40°C to 100°C

■ Equivalent Cirucit



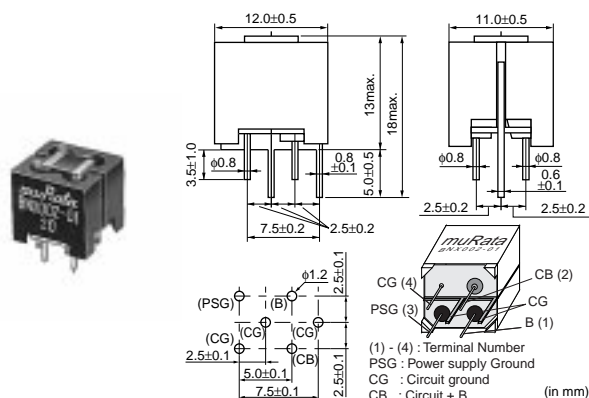
■ Insertion Loss Characteristics (Typical)



## ■ Features

1. The "EMIFIL" BNX002 incorporates a through-type barrier layer capacitor and a four-terminal capacitor which are interconnected. This combination enables the BNX002 to achieve a significantly large insertion loss throughout the extremely wide frequency range of 0.5MHz to 1GHz which covers the AM and UHF-TV broadcast frequency bands.
2. The filter is extremely compact since only one filter block is needed to completely eliminate noise from both the positive and negative lines.
3. There are no connection routes in the current circuits, thus ensuring highly reliable performance.
4. Both the input/output terminals and the grounding terminal are aligned in the same direction, permitting fast and easy installation on any type of P.C. board.
5. BNX003-01 features high dielectric constant, that is the rated voltage 150V.

Noise elimination from DC power sources in a variety of switching power sources, engine control units, digital equipment and computer terminals.



| Part Number      | Rated Voltage (Vdc) | Withstand Voltage (Vdc) | Rated Current (A) | Insulation Resistance(min.) (M ohm) | Insertion Loss   |
|------------------|---------------------|-------------------------|-------------------|-------------------------------------|--|
| <b>BNX002-01</b> | 50                  | 125                     | 10                | 100                                 | 1MHz to 1GHz:40dB min.(20 to 25°C line impedance=50 ohm) |
| <b>BNX003-01</b> | 150                 | 375                     | 10                | 100                                 | 5MHz to 1GHz:40dB min.(20 to 25°C line impedance=50 ohm) |
| <b>BNX005-01</b> | 50                  | 125                     | 15                | 100                                 | 1MHz to 1GHz:40dB min.(20 to 25°C line impedance=50 ohm) |

Operating Temperature Range : -30°C to 85°C

The diagram shows a circuit with two main horizontal lines. The top line starts with a terminal 'B' on the left, followed by an inductor 'L1'. After 'L1', the line splits: one branch goes down through a capacitor 'C1' to the bottom line, and the other continues right through an inductor 'L3'. After 'L3', the line splits again: one branch goes down through a capacitor 'C2' to the bottom line, and the other continues right to a terminal 'CB'. The bottom line starts with a terminal 'PSG' on the left, followed by an inductor 'L2'. After 'L2', the line continues right to a terminal 'CG'. All components are represented by standard electrical symbols: inductors as coiled lines and capacitors as two parallel lines.

PSG :Power Supply Ground  
CG :Circuit Ground  
CB :Circuit+B

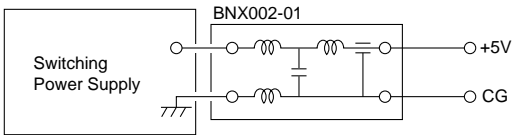
Figure 1 is a line graph showing Insertion Loss (dB) versus Frequency (MHz) for three different components: BNX002-01, BNX003-01, and BNX005-01. The y-axis represents Insertion Loss in dB, ranging from 0 to 100. The x-axis represents Frequency in MHz, ranging from 0.001 to 1000. BNX003-01 shows the lowest insertion loss across the frequency range, while BNX002-01 and BNX005-01 show higher and very similar losses.

| Frequency (MHz) | BNX002-01 (dB) | BNX003-01 (dB) | BNX005-01 (dB) |
|-----------------|----------------|----------------|----------------|
| 0.001           | 0              | 0              | 0              |
| 0.01            | 10             | 10             | 10             |
| 0.1             | 20             | 20             | 20             |
| 1               | 30             | 25             | 30             |
| 10              | 75             | 65             | 75             |
| 100             | 80             | 75             | 80             |
| 1000            | 60             | 55             | 60             |

Noise Suppression Effect of BNX Series

■Suppression of DC Side  
Ripple of the Switching Power Supply

[Testing Circuit]



| Type of Filter                 | EMI Suppression Effect                                  | Description                                   |
|--------------------------------|---|---|
| When <b>BNX002</b> is not used | <div><div>+5.0V →<br/>50μs/div<br/>0.2V/div</div></div> | High frequency noise, max. 0.5V, can be seen. |
| When <b>BNX002</b> is used     | <div><div>+5.0V →<br/>50μs/div<br/>0.2V/div</div></div> | Noise can be almost suppressed by BNX002.     |

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