

# Murata's Ferrite Bead Makes for Optimal Anti-Noise Device

The company has developed a unique material and made improvements in the conventional process to achieve a chip ferrite bead with 60 percent lower DC resistance.

The increasing penetration rate of mobile phones, mobile audio players and portable game consoles has put in a lot of pressure to scale down their sizes and to implement a low-noise design, while improving performance and increasing efficiency of power usage. To meet such requirements, a host of passive components, including capacitors, resistors and electromagnetic interference (EMI) noise suppression parts have been made available on the market.

Chip ferrite beads carry simple structures, are small in size and are easy to use thus, are frequently applied to suppress EMI noise. Murata Manufacturing Co., Ltd. has started to produce in mass scale chip ferrite beads, such as the 1005-size ( $1.0 \times 0.5\text{mm}$ ) BLM15 Series and the 0603-size ( $0.6 \times 0.3\text{mm}$ ) BLM03 Series, featuring characteristics that are effective to curb EMI noise. These components have been released in the market as well. As chip ferrite beads are being downsized, the number of coil turns within the chip must be increased to achieve noise suppression characteristics at par with those of large-sized products. As this process is implemented, the levels of direct current (DC) resistance and power consumption increased, which pose as the challenges to be addressed next.

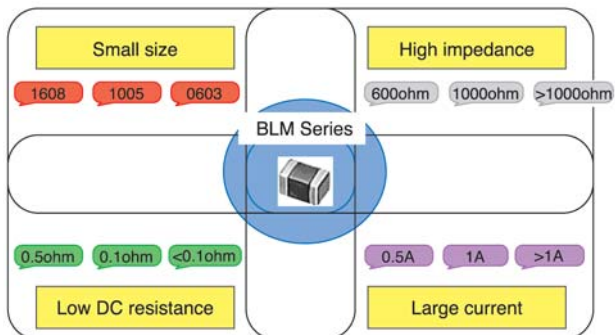


Fig. 1: The characteristics expected of chip ferrite beads

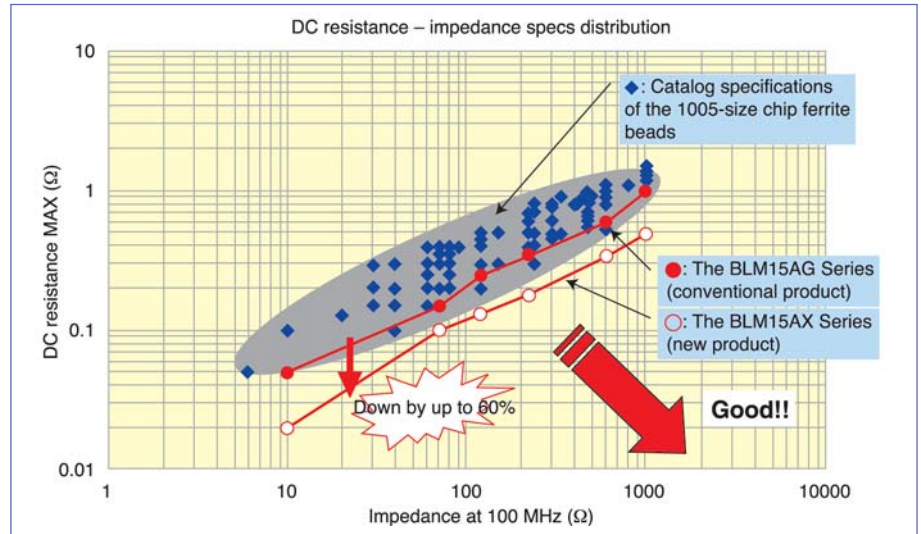


Fig. 2: Comparison of chip ferrite beads specifications

By developing new materials and implementing improvements in the process, Murata was able to release a small product with low DC resistance. The 1005-size BLM15AX Series features as much as 60 percent lower DC resistance compared with conventional products. The new chip ferrite bead series can contribute towards extending the battery life of small portable devices as well as to extend the power efficiency of their circuits.

## Standard Characteristics of Ferrite Beads

For ferrite beads to effectively serve as EMI noise suppression measure for small, portable devices, beads are expected to be small in size, to have high impedance to curb the strong EMI noise, and to consume less power. Given these specifications, Fig. 1 presents the required characteristics of ferrite beads.

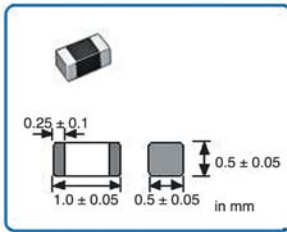
Meanwhile, Fig. 2 represents the DC resistance and impedance distribution of chip ferrite beads based on catalog specifications. Future ferrite beads are required to carry much lower DC resistance and higher impedance characteristics as indicated by the wide arrow in the figure. For the new BLM15AX Series, Murata has attained one of the industry's best specifications, surpassing the features of the conventional 1005-size BLM15AG Series chip ferrite beads and the preceding products.

## Wide Impedance at Low DC Resistance

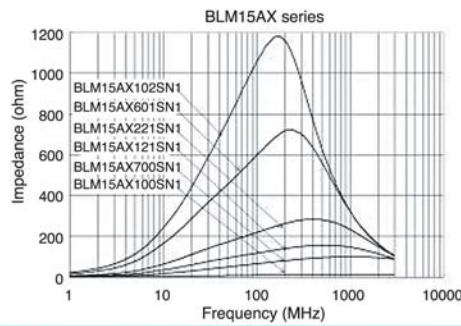
Murata was able to manufacture the 1005-size BLM15AX Series chip ferrite beads for the commercial market by crafting new materials, as well as by enhancing the processes involved in the development of conventional chip ferrite beads. Fig. 3 presents the specifications of the BLM15AX Series. Among the highlight features of the new product series include large impedance ranging from 10 to 1,000Ω at 100MHz, and a lower DC cur-

**Products for EMC Control**

■ External appearance and dimensional outline drawing



■ Impedance frequency characteristics

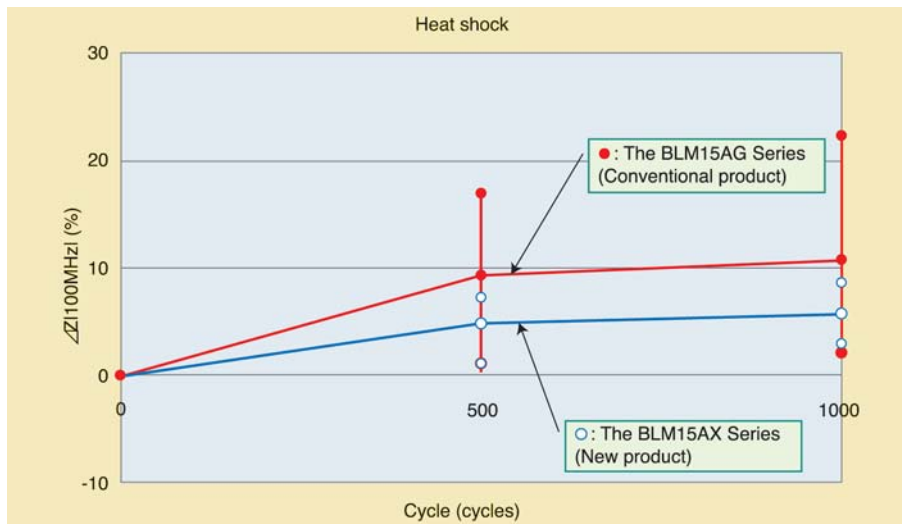


■ Impedance frequency characteristics

Item number	Impedance (at 100MHz)	DC resistance MAX (ohm)	Rated current (mA)
BLM15AX100SN1	120Ω ± 25%	0.020	1740
BLM15AX700SN1	220Ω ± 25%	0.100	780
BLM15AX121SN1	120Ω ± 25%	0.130	680
BLM15AX221SN1	220Ω ± 25%	0.180	580
BLM15AX601SN1	600Ω ± 25%	0.340	420
BLM15AX102SN1	1000Ω ± 25%	0.490	350

Operating temperature range: -55°C ~ +125°C

**Fig. 3: Specifications of the BLM15AX Series**



**Fig. 4: Impedance changes in reliability testing**

rent of up to 60 percent over the preceding product.

After the BLM15AX Series chip ferrite beads were subjected to reliability tests, such as high temperature load and heat shock, they manifested small fluctuations in impedance (See Fig. 4).

**Future Steps**

Demand for small-sized chip ferrite beads is expected to continue to grow in the small, portable device market down the road. To address the noise suppression measures required in this market, Murata will consider extending the gains it made

in reducing the DC resistance of small-sized products. The company will also work on scaling down further the size of these products, as well as to increase their performance and promote power efficiency.

**About This Article:**

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