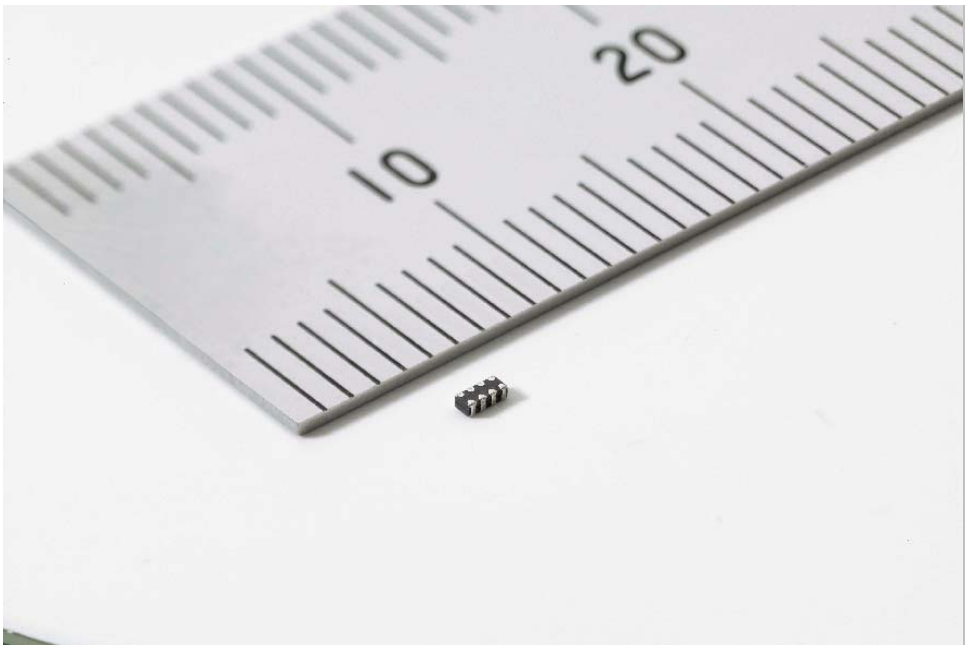
Commercialization of Small, Thin Chip Common Mode Choke Coils Arrays for High-speed Differential Transmission
-DLP1ND Series-



[Text]

Murata Manufacturing Co., Ltd. has commercialized its DLP1ND Series of chip common mode choke coils (*1) arrays—the smallest in the industry—suitable for noise suppression in high-speed differential transmission (*2) lines for compact mobile devices and similar.

This product line contributes greatly to high-density mounting of compact mobile devices, such as cellular phones and digital cameras. A 30% reduction of mounting space can be reached, in comparison to using two single-circuit components (e.g. Murata DLP0NS).

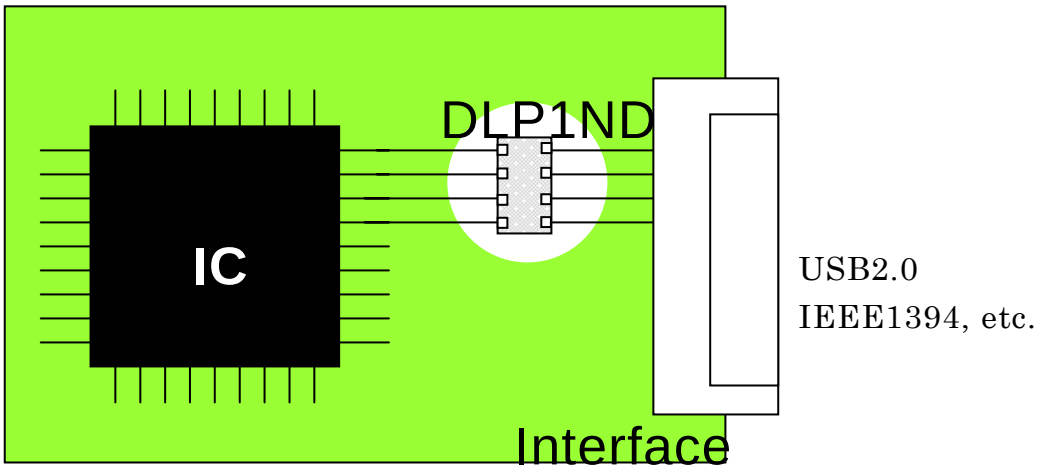
This is achieved by arraying and reducing size, thickness and weight, to 1.5 x 0.65 x 0.45 mm (LxWxT). At the same time the capability of handling high-speed signals is retained, due to advanced film micro-fabrication, ferrite materials, and circuit design technologies.

The components boast a coupling coefficient (*3) between coils to 0.98 or higher. This will ensures low values of differential mode impedance in the signal passband, which causes signal waveform distortion.

Furthermore, to suppress reflection of input signals, the line impedance (*4) of the transmission line and the impedance of the common mode choke coils are designed to match. In this way, only common mode noise is effectively suppressed, without

affecting the high-speed signal waveform.
The series consists of four items, having common mode impedances of 67, 90, 120, and 160 Ω (rated values at 100 MHz), offering a wide selection for a variety of applications.
These new products are free of all substances controlled by RoHS regulations.
Mass production will start at a rate of 1 million units per month in December 2006.
Sample price is set at 30 yen per unit.

[Background]
The rising demand for increasingly compact and multifunctional mobile devices such as cellular phones and digital cameras is creating a need for high-density component mounting.
For this reason, common mode choke coils are being requested in increasingly smaller sizes. Main usage is in high-speed differential transmission signals, like USB external digital interfaces and LVDS (a signaling method used for connecting liquid crystals inside devices).
In addition, high-speed differential transmission standards such as USB2.0, IEE1394, DVI, and HDMI are being used increasingly in PCs and other devices. Main usage in this case is digital interfacing to external devices.
Due to the increasing speeds of data transfer in recent years, signal integrity is becoming more and more and issue. The possible deterioration in the quality of signal waveforms, caused by reflection of input signals, is now demanding serious attention.
In this view, noise suppression filters inserted in transmission lines, require common mode choke coils that enable noise to be suppressed without affecting signal waveforms. This is achieved by limiting the degradation of signal and waveform quality by impedance matching with the line impedance of the transmission line.



[Terminology]

(*1) Common mode choke coils

A coil consisting of two or more magnetically combined coils. It has the function of suppressing only common mode noise without affecting differential mode noise in the direction of current conduction.

(*2) Differential transmission

A method of transmitting data synchronized over a pair of signal lines, generally resistant to noise. It is suited to high-speed transmission. Since it has a structure that cancels out magnetic flux generated by differential mode current, it does not easily generate differential mode noise. For this reason, the noise in differential transmission lines is principally common mode noise.

(*3) Coupling coefficient

Expresses the degree of coupling between magnetically coupled coils. Its maximum value is 1. In common mode choke coils, the higher the value of coupling coefficient, the lower the differential mode impedance, and the less the affect on signals.

(*4) Line impedance

The impedance at an arbitrary position of a transmission line. If line impedance and load (common mode choke coils) impedance are different, reflection occurs at the load edge, making it difficult for energy (voltage, current) to be transmitted. Thus, by matching load impedance and line impedance (Line impedance (Z0)), energy can be transferred to the load without loss.

[Features]

- 2 built-in circuits (arrayed) in a micro size of 1.5 x 0.65 mm (EIA Code: 0502)
- 30% less mounting space required [compared to using 2 single-circuit components (Murata DLP0NS)]
- Thin type height: 0.45 mm (typical)
- A high coupling coefficient ($k \geq 0.98$) which enables noise suppression without affecting the signal waveforms of high-speed differential transmission lines.
- In spite of its small size, offers max. 160 Ω common mode impedance (at 100MHz)
- Matches Line impedance
- Totally free of all RoHS-regulated substances

[Applications]

- Digital still camera, Video Movie, Cellular Phone, Note PC, etc.
- Noise suppression for High-speed Differential Transmission

Ex; USB2.0, IEEE1394, LVDS, DVI, HDMI, etc

[Parts Number]

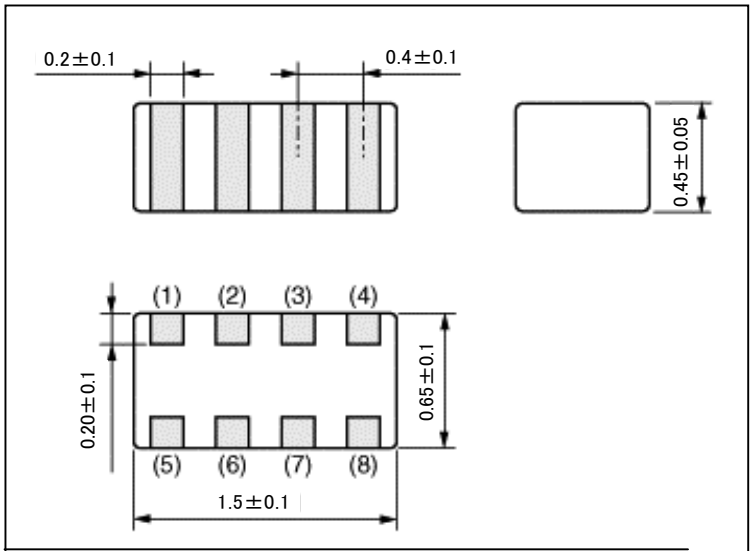
DLP1NDN670HL4

DLP1NDN900HL4

DLP1NDN121HL4

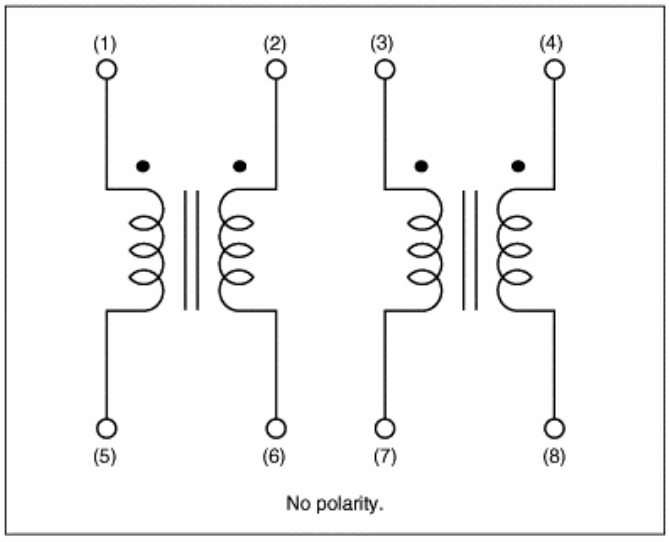
DLP1NDN161HL4

[External Dimensional Diagram]



(in mm)

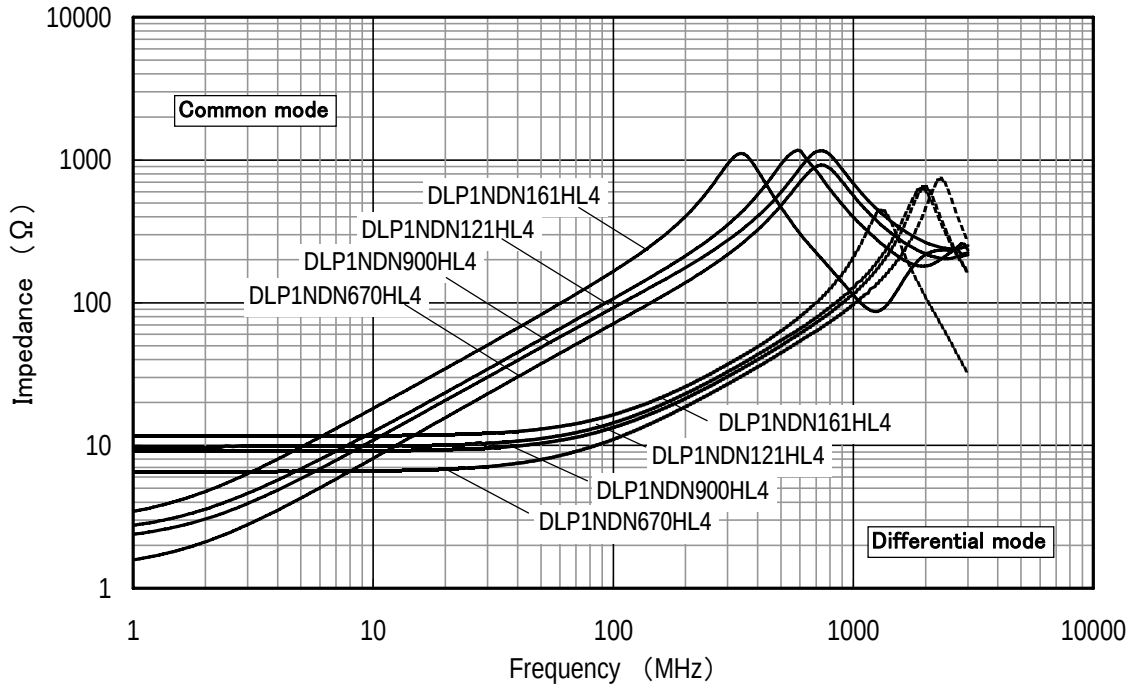
[Equivalent Circuit]



[Part Number and Specification]

Part Number	Common Mode Impedance (at100MHz/20℃) (Ω)	Rated Current (mA)	Rated Voltage (Vdc)	Insulation Resistance (min.) (MΩ)	Withstand Voltage (Vdc)	DC Resistance (Ω)
DLP1NDN670HL4	67±20%	80	5	100	12.5	3.0±25%
DLP1NDN900HL4	90±20%	70	5	100	12.5	4.2±25%
DLP1NDN121HL4	120±20%	60	5	100	12.5	5.0±25%
DLP1NDN161HL4	160±20%	60	5	100	12.5	5.6±25%

[Impedance-Frequency Characteristics]



[Sample Price]

・30YEN per unit

[Production]

・1 million units per month in December 2006

・3 million units per month in April 2007

[Patents]

・One patent pending