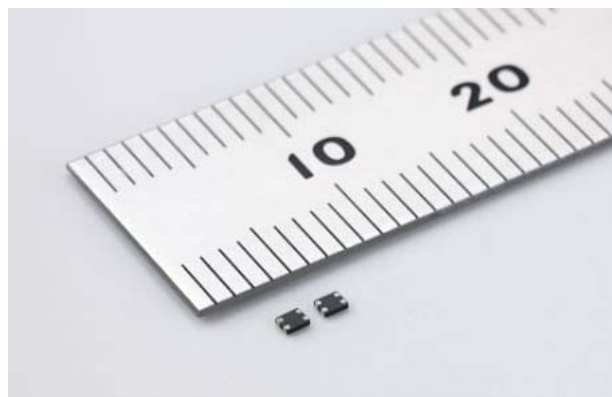


Chip Common Mode Choke Coils Supporting USB3.0 SuperSpeed Signals

June 25, 2010

Murata Manufacturing Co., Ltd.
 President/ Statutory Representative Director: Tsuneo Murata



Overview

Murata Manufacturing Co., Ltd. has now launched the DLP11TB series of 1210 size chip-type common mode choke coils, which are designed to reduce undesirable radiation noise in electronic products and equipment.

The company's unique high-precision film inductor forming technology was utilized to successfully attain an improved cut-off frequency*1 in the transmission characteristics of these new choke coils compared with previous series and support USB*2 3.0 SuperSpeed signals.

Background

In the field of USB interfaces, which connect peripheral devices to personal computers, chip common mode choke coils have been frequently used at the bases of connectors to minimize the noise which is radiated from the cables used in these connections.

The recent debut of SSD*3 and other high-speed peripheral devices has led to the formulation of the USB3.0 standard under which the data transmission speed is increased from the 480 Mbps of its predecessor, the USB2.0 standard. The new USB3.0 standard has added the SuperSpeed mode, enabling data to be transmitted at speeds up to 5 Gbps, representing a 10-fold increase over the speed provided by the previous standard.

However, along with the increased data transmission speed provided by USB3.0, the frequencies of the signals transmitted to the signal lines have now become higher such that the common mode choke coils used in the past now find it difficult to deal with noise issues while maintaining a satisfactory signal quality.

In order to resolve this issue, Murata Manufacturing developed the DLP11TB series of chip common mode choke coils that support the SuperSpeed mode of the USB3.0 standard. By utilizing its micromachining technology using thin film processes, the company successfully boosted the cut-off frequency in the transmission characteristics (Sdd21) of the choke coils from the cut-off frequency featured by previous series to a high 8 GHz or more, enabling SuperSpeed signals to be transmitted.

Features

Small size of 1.25 x 1.0 mm is optimally suited to mobile devices

cut-off frequency in the transmission characteristics (Sdd21) boosted to 8 GHz or more to reduce the effects of noise on the signals

High common mode impedance (80Ω at 100 MHz)

Matches characteristic impedance*4 of 90Ω of the USB3.0 standard

Minimal conversion characteristics (Scd21) from differential mode*5 to common mode*6, minimizing the noise outflow due to mode conversion*7 (mode conversion characteristics: -40 dB at 2.5 GHz).

Applications

USB3.0 connectors featured in personal computers
 USB3.0 connectors featured in PC peripheral devices

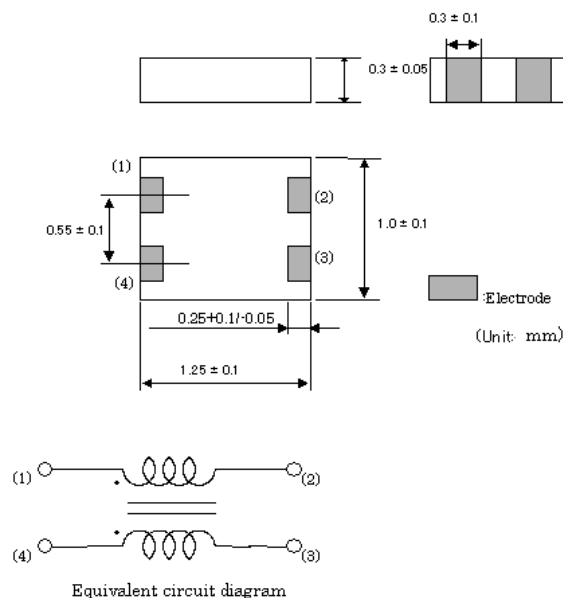
Terminology

*1 cut-off frequency:	The frequency that forms a boundary in the signal frequencies between signals with the frequencies allowed by pass through and signals with frequencies that are cut off. All signals at frequencies above the cut-off level are cut off.
*2 USB:	A general-purpose interface used to connect peripheral devices to personal computers with a maximum transmission speed under the USB2.0 standard of 480 Mbps. The USB3.0 standard has an even higher speed mode called SuperSpeed with maximum transmission speed of 5 Gbps.
*3 SSD:	Stands for "Solid State Disk," and refers to an HDD-compatible memory device that uses a flash memory as its recording medium. It enables data to be read at a speed higher than that of an HDD.
*4 Characteristic impedance:	The impedance that is a property of high-frequency transmission lines. If components whose characteristic impedance do not match are inserted along the lines, signal reflection and other problems arise.
*5 Differential mode:	This refers to a path along which the current will flow out from one line of a pair of signal lines and return from the other line. In differential transmission lines such as USB lines, the signal current flows in the differential mode.
*6 Common mode:	Unlike the differential mode, this refers to a path along which flow currents parallel to and in the same direction as a pair of signal lines. In differential transmission lines such as USB lines, the noise current flows in the common mode in many cases.
*7 Mode conversion:	In common mode choke coils, very faint leakage magnetic flux and other effects result in mode conversion from the differential mode to the common mode. In order to prevent noise outflow, this mode conversion must be reduced to the absolute minimum.

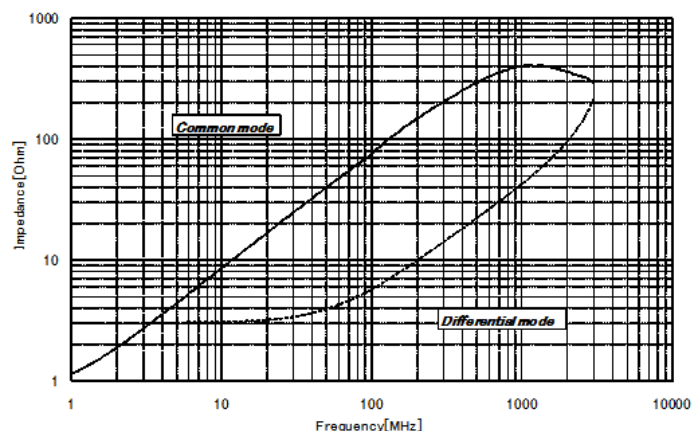
Part Number

DLP111TB800UL2

External Size



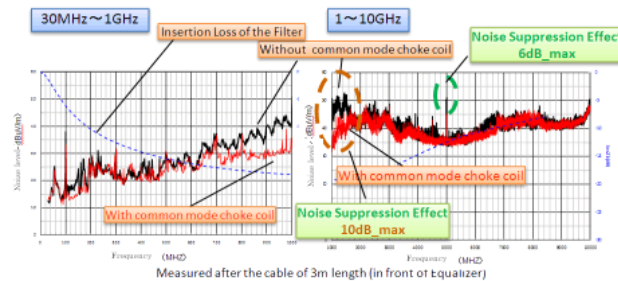
Impedance-Frequency Characteristics



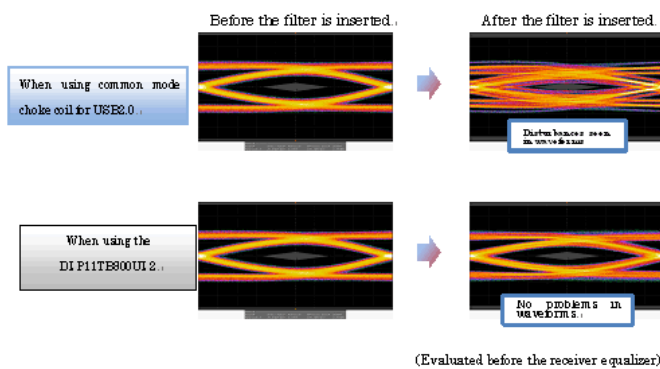
Ratings

Model	DLP11TB800UL2
Impedance at 100 MHz	80Ω±25%
Rated current	100mA
Operating Temperature Range	-40°C to 85°C

Noise suppression effect



Signal transmission characteristics



Production

Mass production of up to 3 million units a month scheduled to start in July 2010

Sample Price

12 yen per unit

Patents

12 patents pending

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