

Coilcraft S-Parameter Data for RF Surface Mount Inductors BCL Series Broadband Conical Inductors

Version BCL October, 2013 Coilcraft, Inc.

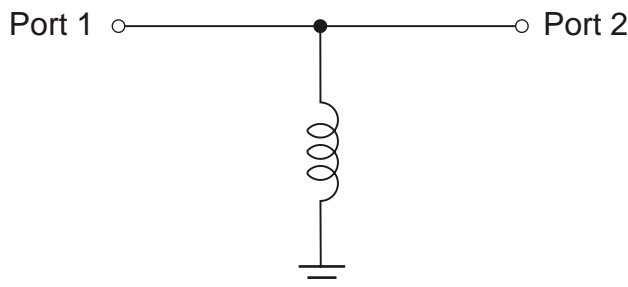
Coilcraft two-port S-parameter data files are based on empirical measurements of Coilcraft Inductors. The data files are used as "black box" descriptions, thus reducing complexity in circuit modeling.

The data files represent de-embedded measurements. Effects due to customer circuit board traces, board materials, ground planes, or interactions with other components are not included and can have a significant effect when comparing the S-parameters to measurements of the inductors using typical production verification instruments and fixtures.

Since data sheet specifications are based on typical production measurements, and the S-parameter models are based on de-embedded measurements as described below, the S-parameter model results may be different from the data sheet specifications.

S-parameter modeling method

The measurements for this series were made with the inductor mounted as shown in the bias tee configuration shown below. The valid frequency range is **50 MHz to 40 GHz**. Ports 1 and 2 are both 50 Ohms characteristic impedance.



The S-parameters were generated using a circuit simulation software program to de-embed the test fixture. This method results in s-parameters that represent as closely as possible the typical frequency-dependent behavior of the inductor within the valid frequency range.

S-parameter file description.

All of the S-parameter data files are in the TouchStone format. The following is a typical file header of a two-port file:

```
!freq-unit  param-type  data-format  keyword  impedance-ohms
# GHz      S          DB          R        50
!-----
!Freq      DBS11  AngS11  DBS21 AngS21  DBS12  AngS12  DBS22  AngS22
....
```

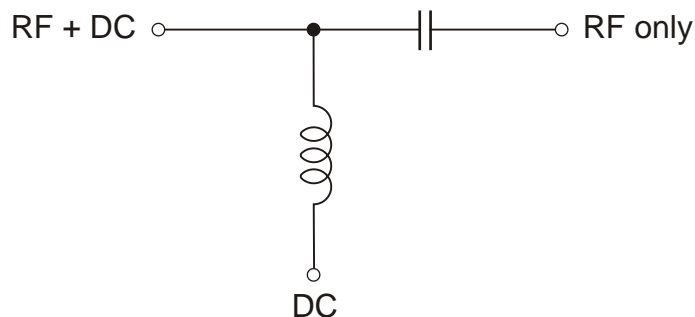
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The first line (header) describes the frequency units, parameter type, measurement format and characteristic impedance of the measurement (50 Ohms).

The first column is the frequency in GHz. The next columns are the S-parameters as described in the column headings.

Using the s-parameters in a simulation

Broadband conical inductors are typically used in a bias tee configuration (to bias an amplifier).



Equivalent circuit of a bias tee

Because the conical inductor was measured in the shunt-to-ground configuration (See S-parameter modeling method) the two port s-parameters represent an ideal (lossless, zero length) transmission line with the inductor shunted to ground. Therefore, when simulating the s-parameters, they should be connected in series as shown below.



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