Coilcraft S-Parameter Data for RF Surface Mount Inductors
016008C Series Chip Inductors

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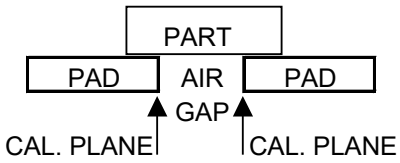
Coilcraft two-port S-parameter data files are based on empirical measurements of Coilcraft RF Surface Mount Inductors. The data files are used as "black box" descriptions, thus reducing complexity in circuit modeling. For one-port applications, simply connect one terminal of the component to ground in your circuit simulator software.

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.

Typically, the Self Resonant Frequency (SRF) of the component model will be higher than the measurement of the component mounted on a circuit board. The parasitic reactive elements of a circuit board or fixture will effectively lower the circuit resonant frequency, especially for very small inductance values. 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 each component centered over a 0.0055” wide air gap, as illustrated below. The test pads were (50 Ohm) 30 mil wide traces of tinned gold over 25 mil thick alumina. The TRL* calibration plane is also illustrated below.



The S-parameters were generated by matching a simulation model as closely as possible to an average of the original measurements. The model was then used to create the final S-parameters. This method results in a model that represents as closely as possible the typical frequency-dependent behavior of the component up to a frequency just above the self-resonant frequency of the model. The valid frequency range for each part is specified in Table 1 below.

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Table 1
Valid Frequency Range of S-parameters

Part Number	Range (MHz)		Part Number	Range (MHz)		Part Number	Range (MHz)
016008C-N45	1-26500		016008C-3N6	1-14000		016008C-6N2	1-12000
016008C-N50	1-26500		016008C-3N8	1-14000		016008C-6N8	1-11000
016008C-1N1	1-24000		016008C-3N9	1-14000		016008C-6N9	1-11000
016008C-1N2	1-23000		016008C-4N3	1-13000		016008C-7N8	1-10000
016008C-1N3	1-23000		016008C-4N7	1-13000		016008C-8N2	1-10000
016008C-2N0	1-18000		016008C-5N1	1-12000		016008C-8N8	1-10000
016008C-2N2	1-18000		016008C-5N3	1-12000		016008C-10N	1-9000
016008C-2N4	1-16000		016008C-5N8	1-12000		016008C-13N	1-8000
016008C-3N3	1-14000		016008C-6N0	1-12000		016008C-15N	1-8000

How to use the files

The chip inductor data file names have the format `XXXXYY-ZZZ.SP2`:

`XXXX` = the first four digits of the inductor part number
`YY` = the specific inductor series (CS, DC, HP, etc)
`ZZZ` = the nominal inductance value stated on the data sheet

For example, if you were interested in a Coilcraft 0603DC chip inductor with an inductance of 5.1 nH, the file you would choose is 0603DC-5N1.s2p.

S-parameter file description.

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

```
# MHZ  S  MA  R 50
!Freq    MagS11   AngS11   MagS21   AngS21   MagS12   AngS12   MagS22   AngS22
1        0.001    59.879   1.000    -0.036   1.000    -0.036   0.001    59.879
22.19    0.014    83.698   0.999    -0.798   0.999    -0.798   0.014    83.698
43.38    0.027    84.582   0.998    -1.558   0.998    -1.558   0.027    84.582
....
```

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

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

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