

Coilcraft S-Parameter Data for RF Surface Mount Inductors 0402HP Series Chip Inductors

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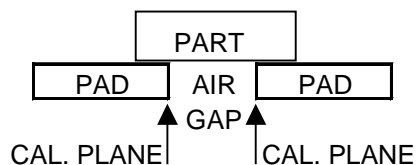
Coilcraft two-port S-parameter data files are based on empirical measurements of Coilcraft RF Surface Mount Inductors. The data files are used as "black box" descriptions, thus reducing complexity in circuit modeling. For one-port applications, simply connect one terminal of the component to ground in 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 0.0165" 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.

**Coilcraft S-Parameter Data for RF Surface Mount Inductors
0402HP Series Chip Inductors**

Table 1
Valid Frequency Range of S-parameters

Part Number	Max Freq (MHz)	Part Number	Max Freq (MHz)	Part Number	Max Freq (MHz)
0402HP-1N0	20000	0402HP-9N0	10000	0402HP-33N	7000
0402HP-2N0	20000	0402HP-9N5	10000	0402HP-36N	7000
0402HP-2N2	20000	0402HP-10N	10000	0402HP-37N	7000
0402HP-2N4	20000	0402HP-11N	10000	0402HP-39N	6000
0402HP-2N7	20000	0402HP-12N	10000	0402HP-40N	6000
0402HP-3N3	20000	0402HP-13N	9000	0402HP-43N	6000
0402HP-3N6	20000	0402HP-15N	9000	0402HP-47N	6000
0402HP-3N9	14000	0402HP-16N	8000	0402HP-51N	6000
0402HP-4N3	12000	0402HP-18N	8000	0402HPH-56N	5000
0402HP-4N7	12000	0402HP-19N	7000	0402HPH-68N	5000
0402HP-5N1	12000	0402HP-20N	7000	0402HPH-82N	4000
0402HP-5N6	12000	0402HP-22N	7000	0402HPH-R10	4000
0402HP-6N2	12000	0402HP-23N	7000	0402HPH-R12	3000
0402HP-6N8	12000	0402HP-24N	7000	0402HPH-R15	3000
0402HP-7N5	10000	0402HP-27N	7000	0402HPH-R18	3000
0402HP-8N2	10000	0402HP-30N	7000	0402HPH-R22	3000
0402HP-8N7	10000				

How to use the files

The chip inductor data file names have the format XXWWZZZ.S2P:

- XX = the first two digits of the inductor part number
- WW = the specific inductor series (CS, HS, PS, CT, HT, LS)
- ZZZ = the nominal inductance value stated on the data sheet

For example, if you were interested in a Coilcraft 0402HP chip inductor with an inductance of 5.1 nH, the file you would choose is 04HP5N1.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
....
```

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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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