

Coilcraft S-Parameter Data for Surface Mount Inductors WA8514-AE

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Coilcraft two-port S-parameter data files are based on empirical measurements of Coilcraft 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 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.

Table 1
Valid Frequency Range of S-parameters

Part Number	Range (MHz)
WA8514-AE	0.1-3000

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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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