

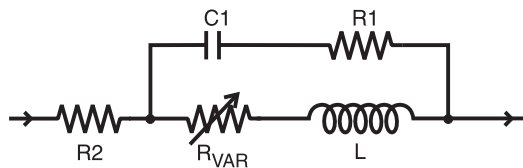
SPICE Model – 0805HP

This lumped-element (SPICE) model data simulates the frequency-dependent behavior of Coilcraft RF surface mount inductors from 1 MHz to the upper frequency limit shown in the accompanying table.

The equivalent lumped element model schematic is shown below. The element values R1, R2, C, and L are listed for each component value. The value of the frequency-dependent variable resistor R_{VAR} relates to the skin effect and is calculated from:

$$R_{VAR} = k * \sqrt{f}$$

- k is shown for each value in the accompanying table.
- f is the frequency in Hz



The data represents de-embedded measurements, as described below. Effects due to different 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 simulation to measurements of the inductors using typical production verification instruments and fixtures.

Each model should only be analyzed at the input and output ports. Individual elements of the model are not determined by parameter measurement. The elements are determined by the overall performance of the lumped element model compared to the measurements taken of the component.

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 SPICE models are based on de-embedded measurements as described below, the model results may be different from the data sheet specifications.

Lumped Element Modeling Method

The measurements were made over a brass ground plane with each component centered over an air gap, as illustrated in Figure 1. The gap width for each size component is given in Table 1. The test pads were 30 mil

Table 1. Test Gap

Size	Gap Width (inch / mm)
0302	0.017 / 0.432
0402,0403	0.017 / 0.432
0603	0.026 / 0.660
0805	0.040 / 1.016
1008	0.060 / 1.524
1206	0.080 / 2.032
1812	0.120 / 3.048

(50 Ohm) wide traces of tinned gold over 25 mil thick alumina, and were not included in the gap. The TRL* calibration plane is also illustrated in Figure 1.

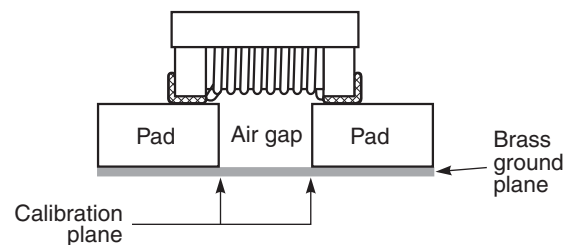


Figure 1. Test Setup

The lumped element values were determined by matching the simulation model to an average of the measurements. 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 lumped element models were used to generate our 2-port S-parameters and therefore give identical results. The S-parameters are available on our web site at <http://www.coilcraft.com/models.cfm>.

Disclaimer

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SPICE Model for Coilcraft 0805HP Chip Inductors

Part number	R1 (Ω)	R2 (Ω)	C (pF)	L (nH)	k	Upper limit (MHz)	Part number	R1 (Ω)	R2 (Ω)	C (pF)	L (nH)	k	Upper limit (MHz)
0805HP-2N6	5.00	0.0150	0.1080	2.598	5.700E-06	10000	0805HP-121	4.12	0.2930	0.1350	118.3	1.224E-04	2000
0805HP-6N2	5.00	0.0270	0.0790	6.193	1.070E-05	10000	0805HP-151	10.0	0.2880	0.1350	148.8	1.554E-04	2000
0805HP-6N8	10.0	0.0660	0.1040	6.788	1.230E-05	10000	0805HP-181	9.10	0.3740	0.1350	178.3	1.914E-04	2000
0805HP-11N	10.0	0.0390	0.1025	10.97	1.460E-05	10000	0805HP-221	12.8	0.4260	0.1345	217.5	2.374E-04	2000
0805HP-12N	20.0	0.0390	0.1085	11.96	1.640E-05	10000	0805HP-271	15.0	0.7540	0.1380	266.1	1.454E-04	1000
0805HP-13N	20.0	0.0390	0.1170	12.95	1.780E-05	10000	0805HP-331	16.6	1.004	0.1315	324.4	2.734E-04	1000
0805HP-18N	20.0	0.0500	0.1050	17.92	2.350E-05	10000	0805HP-391	9.80	1.110	0.1350	382.1	3.374E-04	1000
0805HP-33N	8.00	0.0870	0.1300	32.65	4.180E-05	5000	0805HP-471	14.6	1.559	0.1310	467.2	3.874E-04	1000
0805HP-47N	3.20	0.0930	0.1155	46.60	5.440E-05	5000	0805HP-561	26.0	2.067	0.1500	558.8	5.374E-04	1000
0805HP-56N	8.00	0.1220	0.1400	55.32	6.480E-05	5000	0805HP-681	17.6	2.355	0.1300	678.5	6.654E-04	1000
0805HP-82N	9.10	0.1680	0.1350	81.20	8.640E-05	2000	0805HP-821	28.8	3.945	0.1300	817.8	6.114E-04	1000
0805HP-101	7.40	0.2200	0.1310	98.85	1.064E-04	2000							



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