

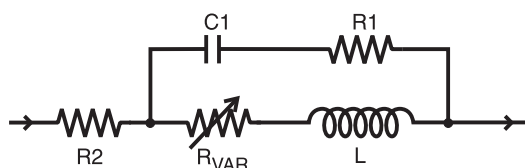
SPICE Model – 1008LS

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.

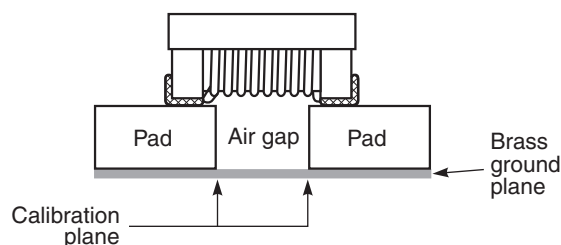


Figure 1. Test Setup

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 1008LS Chip Inductors

Part number	R1 (Ω)	R2 (Ω)	C (pF)	L (nH)	k	Upper limit (MHz)
1008LS-102	150	0.62	0.21	1000	7.00E-04	1000
1008LS-122	369	0.60	0.158	1200	7.41E-04	500
1008LS-152	369	0.70	0.185	1500	7.61E-04	400
1008LS-182	384	0.80	0.186	1800	8.40E-04	400
1008LS-222	384	1.10	0.168	2200	9.40E-04	400
1008LS-272	426	1.20	0.181	2700	1.25E-03	300
1008LS-332	261	1.40	0.309	3300	1.45E-03	200
1008LS-392	252	1.50	0.349	3900	1.47E-03	170
1008LS-432	100	1.70	0.350	4300	1.20E-02	200
1008LS-472	273	1.60	0.285	4700	1.79E-03	170
1008LS-502	125	2.20	0.300	5000	1.80E-02	200
1008LS-562	179	1.80	0.370	5600	2.06E-03	140
1008LS-622	100	2.50	0.390	6200	1.00E-02	200
1008LS-682	242	2.00	0.345	6800	2.82E-03	130
1008LS-822	224	2.60	0.445	8200	3.47E-03	110
1008LS-912	60	2.90	1.10	9100	2.30E-02	200
1008LS-103	300	2.90	0.385	10000	3.89E-03	100
1008LS-123	100	3.30	0.620	12000	2.20E-02	200
1008LS-153	90	3.70	0.820	15000	3.40E-02	200
1008LS-183	50	4.00	2.00	18000	3.20E-02	200
1008LS-223	80	6.14	0.960	22000	3.70E-02	100
1008LS-273	60	6.45	3.80	27000	3.50E-02	80
1008LS-333	125	7.00	0.800	33000	5.50E-02	100
1008LS-393	150	10.0	0.520	39000	6.00E-02	100
1008LS-473	75	10.7	2.70	47000	4.50E-02	100
1008LS-563	50	10.0	5.10	56000	5.00E-02	50
1008LS-683	75	13.5	4.20	68000	7.00E-02	50
1008LS-104	60	20.5	7.50	100000	6.30E-02	50



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