SPICE Model–0603LS

This lumped-element (SPICE) model data simulates the frequency-dependent behavior of Coilcraft ferrite surface mount inductors within the frequency range shown in the accompanying table.

The equivalent lumped element model schematic is shown below. The element values R1, R2, C, L, k1 and k2 are listed in the table for each component value. The value of the frequency-dependent variable resistor R_{VAR1} relates to the skin effect and is calculated from:

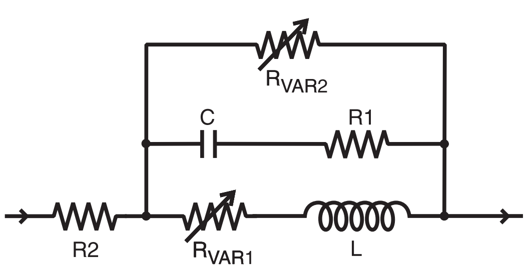
$$R_{VAR1} = k1 * \sqrt{f}$$

- k1 is shown for each value in the accompanying table.
- f is the frequency in Hz

The value of the frequency-dependent variable resistor R_{VAR2} relates to core losses and is calculated from:

$$R_{VAR2} = k2 * \sqrt{f}$$

- k2 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

Measurements were made using a 50 Ohm Agilent/HP 4291A impedance analyzer with an Agilent/HP 16193 test fixture. Calibration was performed using open/short/load/air capacitor (phase) standards. Fixture compensation was performed using open and short standards.

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 within the model frequency range.

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 0603LS RF Inductors

Part number	Frequency limit of model (MHz) Lower	Upper	R1 (Ohms)	R2 (Ohms)	C (pF)	L (nH)	k1	k2
0603LS-47N	5	500	490	0.001	10.6	46.3	2.87E-05	0.06
0603LS-51N	1	500	550	0.050	10.9	51.0	2.87E-05	0.03
0603LS-72N	5	500	872	0.001	11.5	70.0	5.07E-05	0.17
0603LS-101	5	500	1264	0.001	7.50	95.0	7.34E-05	0.15
0603LS-121	5	500	1706	0.001	7.30	117	7.34E-05	0.15
0603LS-151	5	500	2756	0.002	2.00	149	9.20E-05	0.15
0603LS-181	5	500	3546	0.005	0.90	179	9.54E-05	0.16
0603LS-241	5	350	4025	0.002	0.17	232	1.21E-04	0.21
0603LS-271	5	300	3518	0.002	0.11	261	1.15E-04	0.22
0603LS-331	5	300	3330	0.002	0.12	325	1.30E-04	0.24
0603LS-391	5	300	2920	0.095	0.14	379	1.44E-04	0.37
0603LS-471	5	300	1886	0.432	0.13	455	3.80E-05	0.35
0603LS-561	5	300	1676	0.319	0.13	535	3.94E-05	0.39
0603LS-681	5	200	893	0.365	0.28	677	7.97E-05	0.51
0603LS-781	5	200	3800	0.532	0.10	765	3.83E-05	0.54
0603LS-821	1	150	2740	0.669	0.15	799	5.70E-05	0.63
0603LS-102	1	100	1180	0.666	0.33	997	1.45E-04	0.79
0603LS-122	1	80	690	0.666	0.35	1180	8.08E-05	0.78
0603LS-152	1	80	242	0.956	1.26	1500	3.39E-05	0.94
0603LS-182	1	65	27.8	1.51	1.56	1760	8.42E-05	1.06
0603LS-222	1	60	33.5	1.10	1.73	2140	7.23E-05	1.31
0603LS-272	1	50	36.1	1.37	1.59	2620	5.76E-05	1.71
0603LS-332	1	37	80.4	1.49	2.68	3290	2.17E-05	1.98
0603LS-392	1	36	91.5	1.89	2.69	3810	2.33E-05	2.10
0603LS-472	1	30	76.1	3.14	3.49	4660	1.71E-05	2.59
0603LS-562	1	28	63.5	5.63	3.14	5390	1.31E-05	2.76
0603LS-682	1	200	16.0	3.10	2.43	6800	2.87E-05	2.90
0603LS-782	1	25	90.4	3.58	3.05	7370	2.04E-05	4.46
0603LS-822	1	23	108	3.48	3.22	7800	2.04E-05	4.99
0603LS-103	1	200	19.0	4.80	1.36	10000	1.00E-06	4.20
0603LS-153	1	80	22.0	7.10	2.10	15000	1.00E-06	6.50
0603LS-183	1	80	22.0	7.60	2.20	18000	1.00E-06	6.20
0603LS-223	1	30	72.6	8.81	2.43	20900	3.30E-06	14.9

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