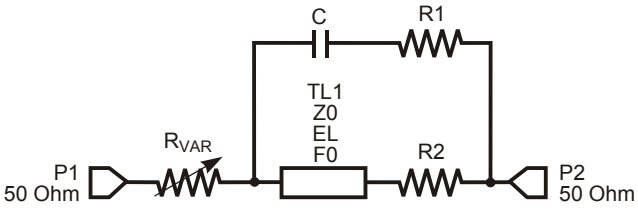
SPICE Model xxxxVS Series

These transmission line models simulate the frequency-dependent behavior of Coilcraft VS series surface mount air core inductors within the frequency limits shown in the accompanying table for each individual inductor. They are based on empirical measurements using a 1-port impedance analyzer (HP4991 with a 16193A test fixture).

Effects due to various circuit board traces, board materials, ground planes or interactions with other components are not included. They may have a significant effect when comparing the simulation to measurements of the individual inductors using other production verification instruments and fixtures.

The model schematic, shown below, combines an ideal transmission line model with lumped elements. The individual element values k, R1, R2, C, Z0, EL, and F0 are listed in the table for each spring inductor.



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 of the component.

The value of the frequency-dependent variable resistor R_{VAR} relates to the skin effect and is calculated from:

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

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

Lumped Element Modeling Method

The models were created by matching a simulation model as closely as possible to a 1-port measurement of a typical inductor using an impedance analyzer. The model was then used to create the final 2-port s-parameters. This method results in a model that represents as closely as possible the typical frequency-dependent behavior of the component within the specified frequency limits.

Because our simulation models were used to generate our 2-port s-parameters, they give identical results with the same number of simulation frequency points. The simulation models are available on our web site at http://www.coilcraft.com/models.cfm.

Disclaimer

Coilcraft makes every attempt to provide accurate measurement data and software, representative of our components, in a usable format. Coilcraft, however, disclaims all warrants relating to the use of its data and software, whether expressed or implied, including without limitation any implied warranties of merchantability or fitness for a particular purpose. Coilcraft cannot and will not be liable for any special, incidental, consequential, indirect or similar damages occurring with the use of the data and/or software.

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SPICE Model for Coilcraft xxxxVS Series Air Core Inductors

Part number	Frequency limit of model (MHz) Lower	Upper	R1 (Ohm)	R2 (Ohm)	C(pF)	Z0 (Ohm)	EL (Deg.)	F0 (MHz)	k
1010VS-23N	1	1200	158.0	0.0285	0.104	98.0	1.97	23.8	1.06E-05
1010VS-46N	1	700	10.48	0.0015	1.231	187.5	1.97	22.9	1.62E-05
1010VS-79N	1	700	10.48	0.0020	1.281	303.5	1.97	22.9	2.38E-05
1010VS-111	1	420	76.28	0.0026	0.574	192.0	1.97	10.0	3.07E-05
1010VS-141	1	400	45.38	0.0030	0.874	258.0	1.97	10.0	4.44E-05
1212VS-22N	1	1200	11.84	0.0111	0.938	99.0	1.97	23.8	6.03E-06
1212VS-42N	1	700	17.60	0.0007	1.388	182.0	1.97	23.8	9.33E-06
1212VS-66N	1	600	16.80	0.0009	1.548	287.0	1.97	23.8	1.44E-05
1212VS-90N	1	520	14.40	0.0013	1.708	390.0	1.97	23.8	2.18E-05
1212VS-111	1	480	23.00	0.0012	1.488	490.0	1.97	23.5	2.87E-05
2014VS-33N	1	800	48.14	0.0007	1.308	142.0	1.97	23.8	7.47E-06
2014VS-66N	1	550	14.77	0.0007	3.048	270.0	1.97	23.8	1.29E-05
2014VS-111	1	480	7.80	0.0188	2.278	434.0	1.97	23.5	1.87E-05
2014VS-151	1	400	9.30	0.0015	2.578	602.0	1.97	23.5	2.95E-05
2014VS-201	1	330	10.60	0.0017	2.128	824.0	1.97	23.5	4.22E-05
2014VS-251	1	240	30.98	0.0020	1.888	420.0	1.97	10.0	3.80E-05

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