

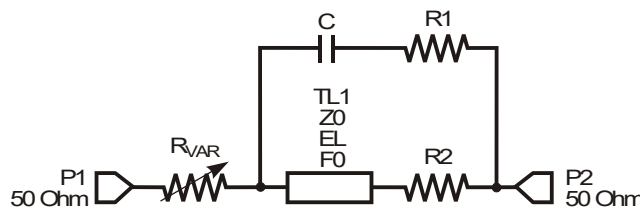
SPICE Model

1512SP / 2712SP Air Core Inductors

These transmission line models accurately simulate the frequency-dependent behavior of Coilcraft surface mount mini air core inductors within the frequency limits shown in the accompanying table for each individual inductor. They are based on de-embedded measurements using a 2-port network analyzer.

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 <https://www.coilcraft.com/en-us/models/spice/>.

Disclaimer

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SPICE Model for Coilcraft 1512SP / 2712SP Air Core Inductors

Part Number	Frequency limit of model (MHz)		R1 (Ohm)	R2 (Ohm)	C(pF)	Z0 (Ohm)	EL (Deg.)	F0 (MHz)	k
	Lower	Upper							
1512SP-2N5	1	14000	4.5	1.00E-03	0.210	275	6.54	2000	2.20E-06
1512SP-2N7	1	12000	12.4	3.00E-03	0.110	275	6.36	1800	2.20E-06
1512SP-4N7	1	10000	4.5	2.00E-03	0.220	275	11.0	1800	3.55E-06
1512SP-5N6	1	8000	3.8	3.20E-03	0.200	275	12.4	1700	4.25E-06
1512SP-6N8	1	8000	4.3	2.10E-03	0.210	275	15.1	1700	4.50E-06
1512SP-8N2	1	7000	8.5	2.90E-03	0.180	275	18.2	1700	5.88E-06
1512SP-10N	1	5000	5.7	2.50E-03	0.300	275	22.2	1700	7.60E-06
1512SP-12N	1	4000	10.6	3.50E-03	0.280	275	25.0	1600	8.70E-06
1512SP-15N	1	3000	17.6	5.00E-03	0.210	275	31.2	1600	9.70E-06
1512SP-18N	1	3000	20.2	9.30E-03	0.140	275	37.6	1600	1.16E-05
1512SP-22N	1	3000	25.9	5.30E-03	0.150	275	43.0	1500	1.34E-05
1512SP-27N	1	3000	68.7	1.06E-02	0.093	275	52.8	1500	2.50E-05
1512SP-33N	1	3000	88.4	8.60E-03	0.063	275	64.4	1500	2.07E-05
1512SP-43N	1	2600	105	1.06E-02	0.088	275	94.6	1700	2.76E-05
1512SP-51N	1	2000	500	1.45E-02	0.042	275	132	2000	3.00E-05
1512SP-62N	1	2000	400	1.55E-02	0.053	350	145	2300	3.40E-05
2712SP-10N	1	5000	5.5	3.10E-03	0.232	270	29.0	2200	7.70E-06
2712SP-12N	1	4000	10.0	3.40E-03	0.250	270	30.5	1900	9.90E-06
2712SP-15N	1	4000	11.5	3.30E-03	0.190	270	31.8	1600	9.70E-06
2712SP-18N	1	4000	5.7	3.50E-03	0.178	270	35.8	1500	1.21E-05
2712SP-22N	1	4000	2.8	4.50E-03	0.190	270	40.8	1400	1.48E-05
2712SP-27N	1	3000	7.6	5.00E-03	0.148	270	47.0	1300	1.90E-05
2712SP-33N	1	3000	11.3	7.40E-03	0.100	250	55.2	1200	1.90E-05
2712SP-39N	1	3000	30.7	6.80E-03	0.110	240	63.3	1100	2.48E-05
2712SP-47N	1	2000	125	8.00E-03	0.061	240	76.3	1100	3.11E-05
2712SP-51N	1	3000	140	9.30E-03	0.052	516	73.7	2100	2.83E-05
2712SP-56N	1	3000	110	1.55E-02	0.039	632	66.7	2100	3.71E-05
2712SP-68N	1	3000	130	1.60E-02	0.053	650	82.7	2200	3.56E-05
2712SP-82N	1	2000	85.0	1.47E-02	0.095	650	89.8	2000	4.81E-05
2712SP-101	1	2000	250	1.90E-02	0.082	650	101	1850	6.07E-05
2712SP-121	1	2000	150	2.65E-02	0.070	810	108	2050	6.52E-05
2712SP-151	1	1500	120	2.90E-02	0.080	900	124	2100	9.94E-05



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Document 1144-3 Revised 10/18/21

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