SPICE Model – 0603AF

This lumped-element (SPICE) model data simulates the frequency-dependent behavior of Coilcraft RF inductors within the frequency range shown in the accompanying table for each individual inductor.

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 other production verification instruments and fixtures.

Lumped Element Modeling Method

Measurements were made using a 50 Ohm impedance analyzer. Fixture compensation was performed to remove fixture effects. No DC bias current was applied in any of the measurements.

Measurements were also taken on a network analyzer over a brass ground plane with the component centered over an air gap with a width of 0.060 inch (1.524 mm), as illustrated in Figure 1. The test pads were 30 mil (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.

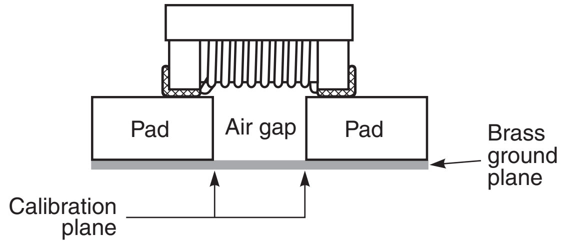
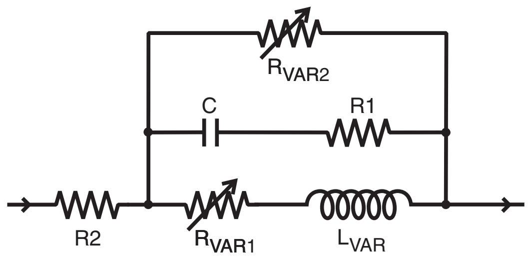


Figure 1. Test Setup

The lumped element values were determined by optimizing 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 equivalent lumped element model schematic is shown below. 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.



The value of the frequency-dependent variable resistor R_{VAR1} is calculated from:

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

- k1 is shown for each value in the accompanying table.
- f is the frequency in Hz
- R_{VAR1} is the resistance in Ohms

The value of the frequency-dependent variable resistor R_{VAR2} is calculated from:

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

- k2 is shown for each value in the accompanying table.
- f is the frequency in Hz
- R_{VAR2} is the resistance in Ohms

The value of the frequency-dependent inductance L_{VAR} is calculated from:

$$L_{VAR} = k3 - k4 * LOG\ (k5 * f)$$

- k3, k4, and k5 are shown in the accompanying table.
- f is the frequency in Hz
- L_{VAR} is the inductance in µH
- LOG is the natural LOG (basee)

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SPICE Model for Coilcraft 0603AF RF Inductors

	Frequency limit of model (MHz)							L_{VAR} Coefficients		
Part number	Lower	Upper	R1 (Ω)	R2 (Ω)	C (pF)	k1	k2	k3	k4	k5
0603AF-15N	1	2000	270	0.023	0.345	5.00E-06	0.011	0.02	3.60E-04	1.00E-01
0603AF-33N	1	2000	370	0.028	0.132	4.00E-05	0.02	0.043	7.10E-04	1.00E-01
0603AF-39N	1	2000	220	0.115	0.120	1.00E-06	0.022	0.049	7.10E-04	1.00E-01
0603AF-47N	1	2000	300	0.052	0.089	1.00E-06	0.021	0.062	1.07E-03	1.00E-01
0603AF-50N	1	2000	200	0.052	0.087	1.00E-06	0.017	0.050	1.00E-04	1.00E-01
0603AF-68N	1	2000	130	0.150	0.140	1.00E-06	0.042	0.085	1.27E-03	1.00E-01
0603AF-72N	1	2000	180	0.065	0.133	8.00E-05	0.050	0.091	1.40E-03	1.00E-01
0603AF-85N	1	2000	110	0.065	0.092	1.00E-06	0.039	0.085	5.10E-04	1.00E-01
0603AF-111	1	2000	75	0.060	0.101	2.00E-05	0.061	0.147	2.68E-03	1.00E-01
0603AF-121	1	2000	80	0.089	0.116	1.00E-05	0.064	0.159	2.86E-03	1.00E-01
0603AF-151	1	2000	85	0.093	0.089	3.00E-05	0.077	0.220	5.15E-03	1.00E-01
0603AF-201	1	1600	30	0.115	0.103	3.00E-05	0.110	0.290	6.57E-03	1.00E-01
0603AF-241	1	1600	25	0.120	0.089	3.00E-05	0.128	0.356	8.54E-03	1.00E-01
0603AF-271	1	1500	35	0.220	0.096	1.00E-05	0.142	0.388	8.64E-03	1.00E-01
0603AF-361	1	1200	35	0.210	0.117	1.00E-05	0.170	0.482	8.64E-03	1.00E-01
0603AF-391	1	1200	160	0.300	0.087	2.00E-04	0.255	0.564	1.30E-02	1.00E-01
0603AF-421	1	1200	35	0.330	0.106	1.00E-05	0.200	0.540	8.64E-03	1.00E-01
0603AF-471	1	1200	40	0.370	0.096	4.00E-05	0.268	0.661	1.40E-02	1.00E-01
0603AF-561	1	1000	15	0.490	0.099	4.00E-05	0.34	0.778	1.60E-02	1.00E-01
0603AF-601	1	1000	12	0.552	0.074	1.00E-06	0.258	0.600	3.54E-03	1.00E-01
0603AF-681	1	1000	10	0.460	0.082	9.00E-05	0.36	0.980	2.20E-02	1.00E-01
0603AF-821	1	500	10	0.580	0.326	1.30E-04	0.42	1.215	2.90E-02	1.00E-01
0603AF-102	1	800	10	0.840	0.085	6.00E-05	0.55	1.368	2.70E-02	1.00E-01
0603AF-152	1	800	10	1.3	0.103	6.00E-05	0.80	1.870	2.70E-02	1.00E-01
0603AF-222	1	150	10	1.1	1.67	1.50E-04	0.87	2.932	5.50E-02	1.00E-01
0603AF-472	1	100	14	1.5	2.97	6.50E-04	1.7	6.093	1.13E-01	1.00E-01
0603AF-103	1	80	35	4.5	1.76	1.50E-03	4.8	14.442	3.60E-01	1.00E-01

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