SPICE Model – LPO6013

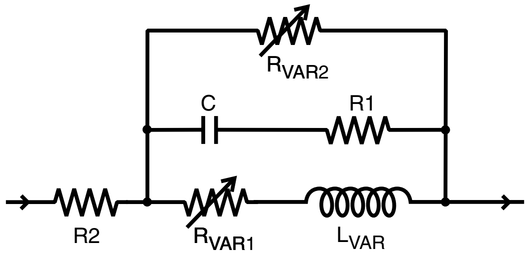
This lumped-element (SPICE) model data simulates the frequency-dependent behavior of Coilcraft power inductors within the frequency range shown in the accompanying table for each individual inductor.

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. 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 be analyzed only at the input and output ports. Conclusions based on individual lumped element values may be erroneous.



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

For some part numbers, two models are provided: one using a variable inductance element (L_{VAR}) and the other using a fixed inductance value (L). Chose the one whose frequency range best suits your application.

Note: The log function in the following equation is the natural logarithm, base e, not base 10.

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 (base e)

Disclaimer

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SPICE Model for Coilcraft LPO6013 Power Inductors

	Frequency limit of model (MHz)							L_{VAR} Coefficients			
Part number	Lower	Upper	R1 (Ω)	R2 (Ω)	C (pF)	k1	k2	k3	k4	k5	L (µH)
LPO6013-102	0.1	10	1940	0.003	10.4	4.39E-06	0.346	1.00	6.58E-04	1.32E-05	
LPO6013-152	0.1	2.5	152	0.046	5.87	8.78E-06	0.529	1.50	1.23E-02	1.11E-05	
LPO6013-152	2.5	10	5420	0.001	5.12	5.00E-07	0.494				1.46
LPO6013-222	0.1	3	20.3	0.084	2.58	1.42E-05	0.632	2.20	2.25E-02	1.05E-05	
LPO6013-222	3	10	6760	0.001	3.34	5.56E-07	0.603				2.12
LPO6013-332	0.1	6.5	23.4	0.109	1.61	1.46E-05	0.714	3.30	4.35E-02	9.53E-06	
LPO6013-332	6.5	10	5950	0.002	1.47	7.91E-07	0.725				3.12
LPO6013-392	0.1	7	26.0	0.116	1.20	1.64E-05	0.730	3.90	6.54E-02	9.47E-06	
LPO6013-392	7	10	6940	0.002	1.12	9.50E-07	0.742				3.63
LPO6013-472	0.1	7	10.0	0.065	1.08	2.01E-05	0.754	4.70	8.40E-02	9.39E-06	
LPO6013-472	7	10	585	0.004	0.918	2.75E-06	0.753				4.36
LPO6013-682	0.1	7.5	13.0	0.170	0.508	1.70E-05	1.19	6.80	9.04E-02	9.75E-06	
LPO6013-682	7.5	10	1170	0.674	0.909	2.09E-06	1.22				6.37
LPO6013-822	0.1	5	18.9	0.215	0.175	1.95E-05	1.56	8.20	1.22E-01	9.89E-06	
LPO6013-822	5	10	402	0.724	0.981	3.57E-06	1.60				7.68
LPO6013-103	0.1	4	11.3	0.280	0.324	9.36E-06	2.30	10.0	7.44E-02	1.04E-05	
LPO6013-103	4	10	649	0.001	0.786	3.73E-06	2.25				9.69
LPO6013-153	0.1	5	13.1	0.401	0.087	1.06E-05	2.65	15.0	1.58E-01	1.21E-05	
LPO6013-153	5	10	107	0.271	1.13	6.47E-06	2.66				14.2
LPO6013-223	0.1	2	10.9	0.483	0.164	1.08E-05	5.30	22.0	1.43E-01	1.04E-05	
LPO6013-223	2	10	12500	0.001	0.848	1.05E-05	5.10				21.5
LPO6013-333	0.1	1	8.6	0.966	0.220	6.13E-06	10.6	33.0	2.72E-01	1.07E-05	
LPO6013-333	1	10	7100	0.001	1.02	9.16E-06	8.53				32.4
LPO6013-393	0.1	1	11.3	1.35	0.250	6.72E-06	13.2	39.0	3.05E-01	1.01E-05	
LPO6013-393	1	10	2890	0.001	0.910	9.16E-06	10.1				38.3
LPO6013-473	0.1	1.5	11.7	1.40	0.268	7.71E-06	13.3	47.0	3.15E-01	9.90E-06	
LPO6013-473	1.5	10	4300	0.001	0.946	5.13E-06	12.0				46.1
LPO6013-683	0.1	1	4.31	2.56	0.300	2.36E-06	24.7	68.0	3.71E-01	1.05E-05	
LPO6013-683	1	10	2440	0.001	1.05	3.95E-06	18.3				67.0
LPO6013-104	0.1	0.75	4.33	3.30	0.462	1.05E-07	49.4	100	5.23E-01	9.70E-06	
LPO6013-104	0.75	10	1950	3.420	1.11	6.09E-04	56.6				98.8
LPO6013-154	0.1	0.75	1.05	5.25	0.924	1.92E-08	79.0	150	1.00E+00	1.04E-05	
LPO6013-154	0.75	10	1830	5.110	1.36	1.19E-05	78.3				148
LPO6013-224	0.1	0.6	1.27	6.76	0.842	2.14E-08	110	220	1.71E+00	1.03E-05	
LPO6013-224	0.6	8	1870	8.71	1.25	5.30E-06	147				217
LPO6013-334	0.1	0.4	0.795	9.35	1.22	1.87E-08	126	330	2.28E+00	1.04E-05	
LPO6013-334	0.4	6	1870	10.5	1.29	5.30E-06	17				327
LPO6013-474	0.1	0.4	0.491	15.70	1.18	2.92E-08	188	470	2.86E+00	1.05E-05	
LPO6013-474	0.4	5	1230	18.9	1.22	5.75E-06	260				466
LPO6013-684	0.1	4	930	18.9	1.28	5.75E-06	260				680
LPO6013-105	0.1	3	930	29.3	1.02	5.75E-06	380				999

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