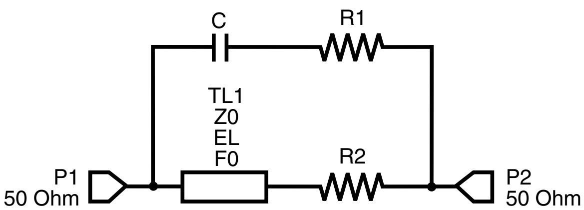
Transmission Line Model

0806SQ, 0807SQ, 0908SQ
Air Core Inductors

These transmission line models accurately simulate the frequency-dependent behavior of Coilcraft surface mount “Spring” 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.

The model schematic, shown below, combines an ideal transmission line model with lumped elements. Each model should be analyzed only as a whole at the input and output ports. Conclusions based on individual lumped element values may be erroneous. The individual element values R1, R2, C, Z0, EL, and F0 are listed in the table for each individual spring inductor.



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

Typically, the Self-Resonant Frequency (SRF) of the inductor model will be higher than a 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. Data sheet specifications are based on typical production measurements. These models are based on de-embedded 2-port measurements as described below, so the model results may be different from the data sheet specifications.

Lumped Element Modeling Method

The measurements were made over a brass ground plane with each component centered over an air gap, as illustrated in Figure 1. The gap width for each of the parts is shown in the following table. 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.

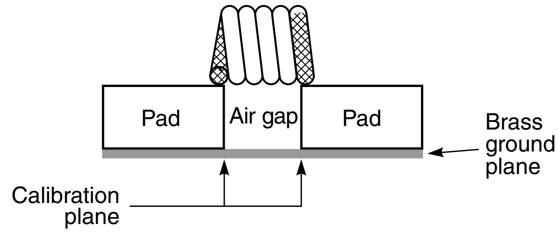


Figure 1. Test Setup

Part number	Air gap (inches /mm)	Part number	Air gap (inches /mm)
0806SQ-5N5	0.026 / 0.660	0807SQ-17N	0.060 / 1.524
0806SQ-6N0	0.026 / 0.660	0807SQ-22N	0.060 / 1.524
0806SQ-8N9	0.026 / 0.660	0908SQ-8N1	0.026 / 0.660
0806SQ-12N	0.040 / 1.016	0908SQ-12N	0.040 / 1.016
0806SQ-16N	0.060 / 1.524	0908SQ-14N	0.040 / 1.016
0806SQ-19N	0.060 / 1.524	0908SQ-17N	0.060 / 1.524
0807SQ-6N9	0.026 / 0.660	0908SQ-22N	0.060 / 1.524
0807SQ-10N	0.040 / 1.016	0908SQ-23N	0.060 / 1.524
0807SQ-11N	0.040 / 1.016	0908SQ-25N	0.060 / 1.524
0807SQ-14N	0.040 / 1.016	0908SQ-27N	0.060 / 1.524

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 specified frequency limits of the model. The lumped element models were used to generate our 2-port S-parameters and therefore give identical results with the same number of simulation frequency points. The S-parameters are available on our web site at **http://www.coilcraft.com/models.cfm**.

Disclaimer

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Transmission Line Model for Coilcraft 0806SQ, 0807SQ, 0908SQ

Part number	Frequency limit of Model (MHz)		R1 (Ω)	R2 (Ω)	C (pF)	TL1		
	Lower	Upper				Z0 (Ω)	EL (degrees)	F0 (MHz)
0608SQ-5N5	100	10000	8.240	0.2300	0.0791	341	1.81	312
0608SQ-6N0	100	10000	5.600	0.2448	0.0711	371	1.81	312
0806SQ-8N9	100	10000	3.840	0.2478	0.0661	556	1.81	312
0806SQ-12N	100	7500	43.78	0.3408	0.0474	755	1.81	312
0608SQ-16N	100	6500	260.4	0.4258	0.0509	965	1.81	312
0608SQ-19N	100	5500	874.8	0.5218	0.0253	1185	1.81	312
0807SQ-6N9	100	9000	5.240	0.1721	0.0711	425	1.81	312
0807SQ-10N	100	7500	4.280	0.2561	0.0618	632	1.81	312
0807SQ-11N	100	7000	4.940	0.3041	0.0573	680	1.81	312
0807SQ-14N	100	7000	8.160	0.3371	0.0519	848	1.81	312
0807SQ-17N	100	6000	200.0	0.4191	0.0335	1060	1.81	312
0807SQ-22N	100	5000	200.0	0.5491	0.0175	1360	1.81	312
0908SQ-8N1	100	7500	3.020	0.1571	0.0799	505	1.81	312
0908SQ-12N	100	7000	6.040	0.2411	0.0759	758	1.81	312
0908SQ-14N	100	6000	8.920	0.3921	0.0669	865	1.81	312
0908SQ-17N	100	5500	5.950	0.3281	0.0560	1068	1.81	312
0908SQ-22N	100	5000	224.0	0.4121	0.0424	1328	1.81	312
0908SQ-23N	100	4400	305.0	0.4721	0.0316	1420	1.81	312
0908SQ-25N	100	4000	265.0	0.4800	0.0158	1545	1.81	312
0908SQ-27N	100	4000	448.0	0.5261	0.0268	1678	1.81	312

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