Linear Models for Diode Surface Mount Packages

Application Note 1124

Introduction

When linear or non-linear analyses are performed on diode circuits, both the diode chip and its package must be accurately modeled. The diode chip or die itself may be modeled using SPICE parameters, or by a three element linear model as shown in Figure 1.

The three-lead SOT-23 and SOT-323 packages may be modeled as shown in Figure 2. The element values are given in Table 1.

The four-lead SOT-143 package is modeled as shown in Figure 3, with circuit element values given in Table 1.

The six-lead SOT-363 package is described in Figure 4 with element values specified in Table 1.

Note that two package linear equivalent circuits exist for the SOT-3x3 packages. One provides accurate modeling from DC to 3 GHz, while the other can be used at frequencies as high as 6 GHz.

These data are subject to change without notice. Please contact your Avago Technologies Component salesperson for the latest revision of this application note.

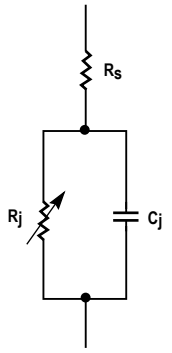

Figure 1. Linear model of a diode chip

Table 1.

	Element:	L_L	C_L	C_P	C_C	L_B
	Description:	Leadframe Inductance	Leadframe Capacitance	Package Capacitance	Coupling Capacitance	Bondwire Inductance
	Units:	nH	pF	pF	pF	nH
SOT-23/SOT-143	to 3 GHz	0.50	0	0.080	0.060	1.0
SOT-3x3	to 3 GHz	0.40	0	0.030	0.035	0.70
SOT-3x3	to 6 GHz	0.80	0.050	0.030	0.035	0.70

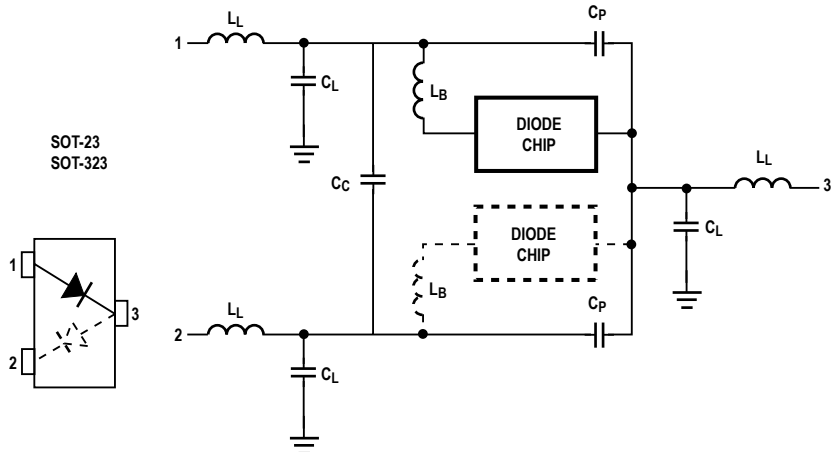

Figure 2. Model of the SOT-23 and SOT-323 Packages

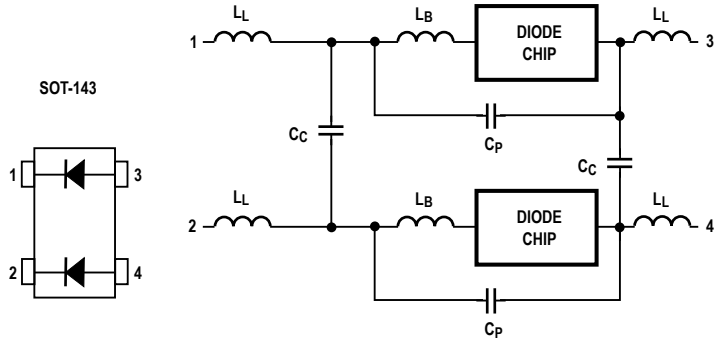

Figure 3. Model of the SOT-143 Package

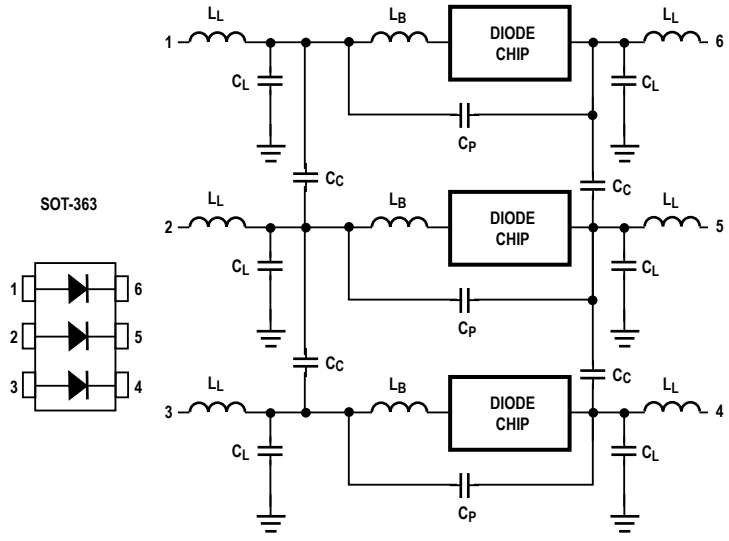

Figure 4. Model of the SOT-363 Package

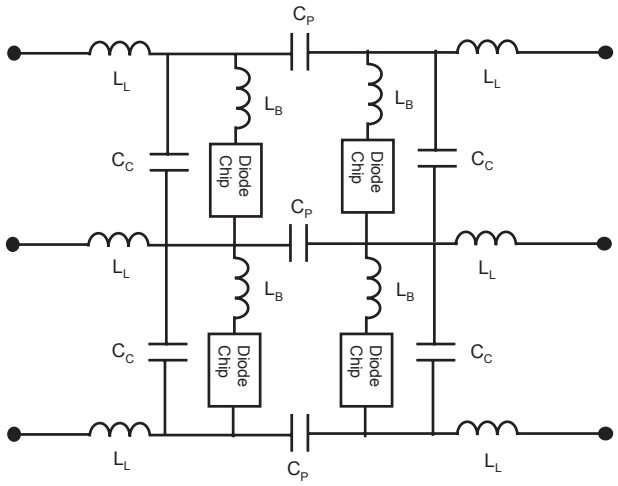

Figure 5. HSMS-28XP Package Model

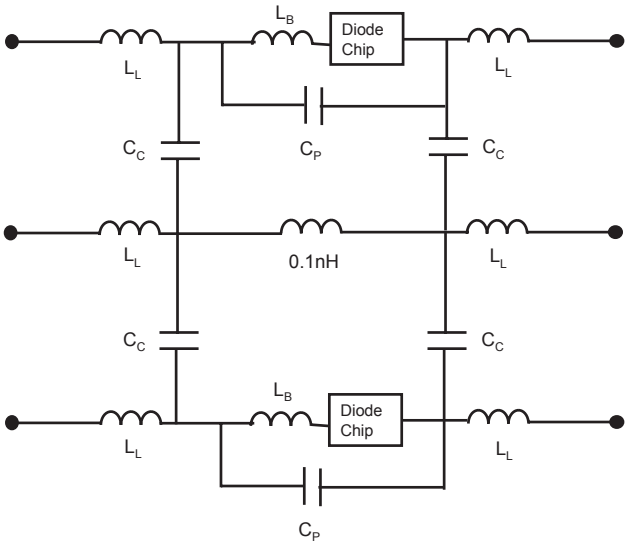

Figure 6. HSMS-28XK Package Model

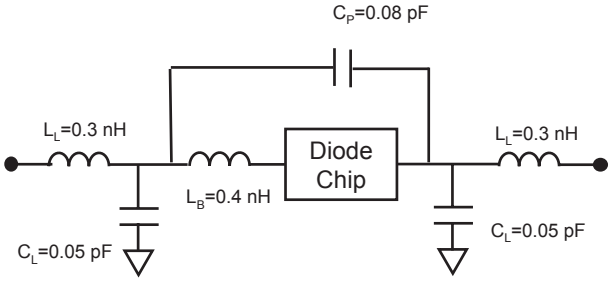

Figure 7. SOD-523 Package Model

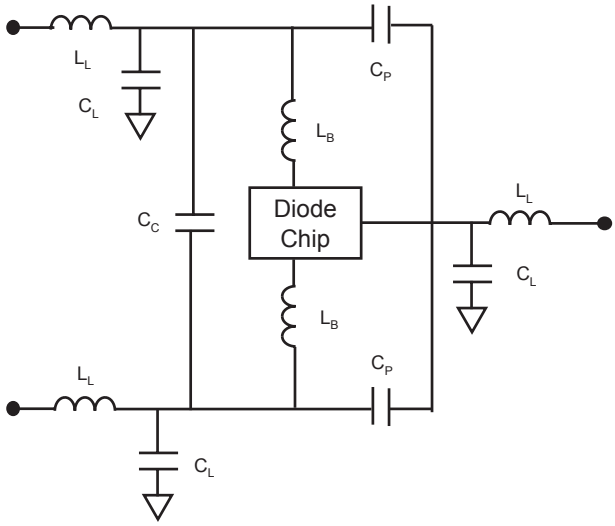

Figure 8. HSMX-48XB Package Model

For 1-mil gold wirebonds, inductance of the bond wire in nanohenries (nH) is roughly equal to its length in millimeters: 0.4mm of bond wire is equal to 0.4 nH of inductance, a 1 mil of bond wire is equal to 25 1 nH. of inductance, and 40 mils of bondwire is equal to 1 nH.

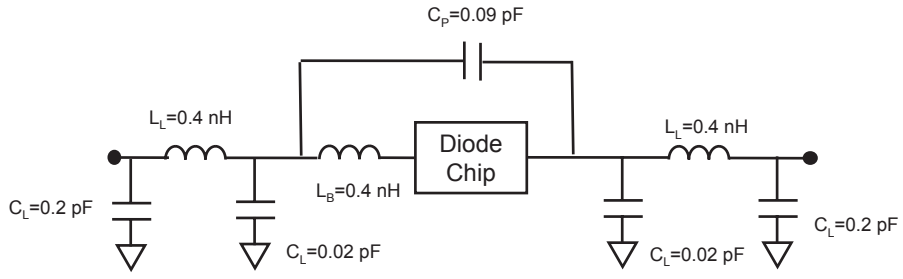

Figure 9. SOD-323 Package Model

For product information and a complete list of distributors, please go to our web site: **www.avagotech.com**

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