Diplexer design notes

Rick Karlquist, Nov. 13, 2002

Standard diplexer design is based on singly-terminated Butterworth filters. If the low pass and high pass ports are terminated in R_0, then the input impedance of composite port will be R_0 at all frequencies. The transfer functions to the ports will be standard Butterworth responses.

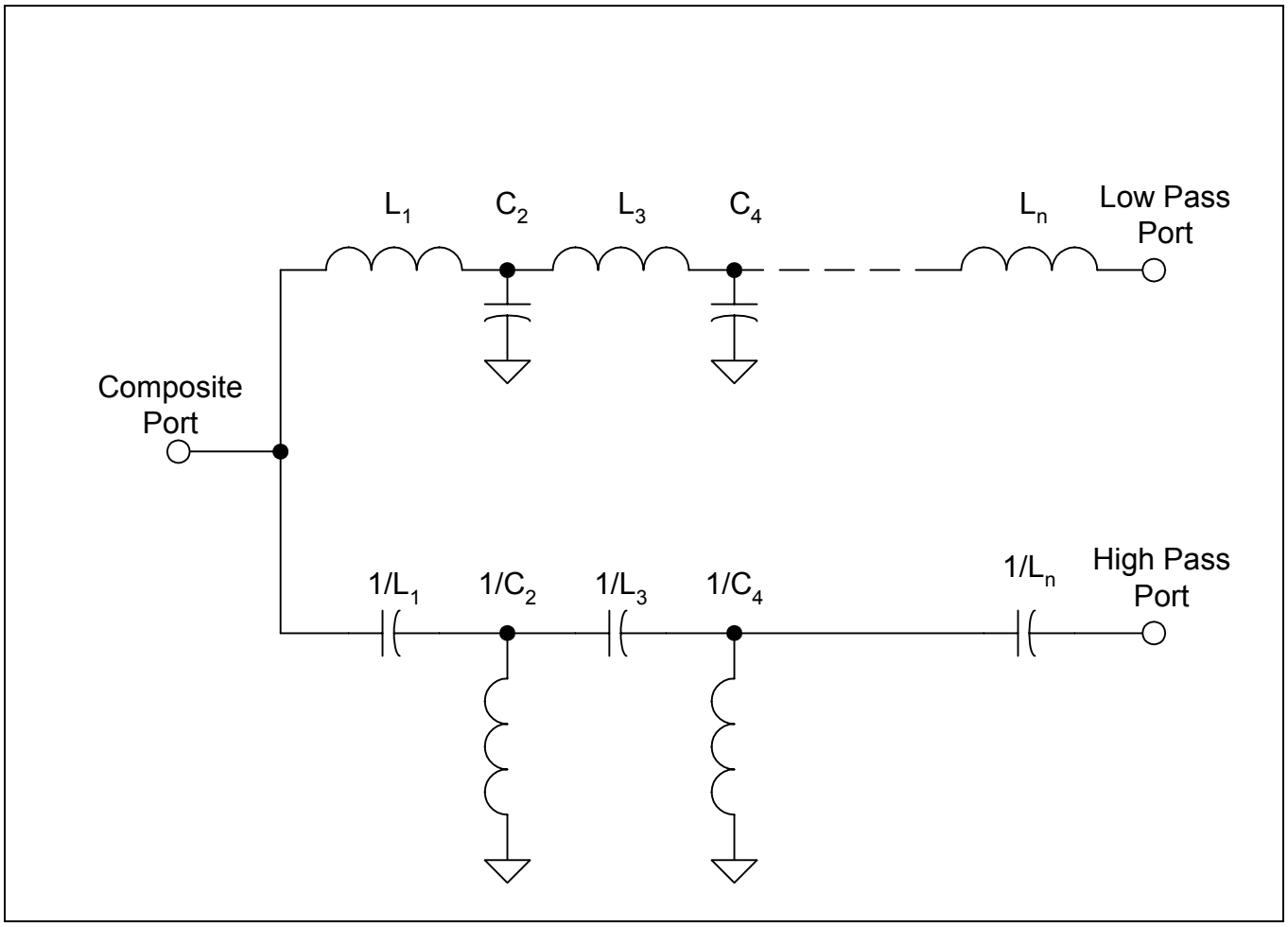

Figure 1. Prototype design for ω=1, R_0=1.

Table 1. Singly-terminated Butterworth prototype element values.

n	L_1	C_2	L_3	C_4	L_5	C_6	L_7	C_7	L_9	C_{10}
1	1									
2	1.41	.707								
3	1.50	1.33	.500							
4	1.53	1.58	1.08	.383						
5	1.55	1.69	1.38	.894	.309					
6	1.55	1.76	1.55	1.20	.758	.259				
7	1.56	1.80	1.66	1.40	1.06	.656	.222			
8	1.56	1.82	1.73	1.53	1.26	.937	.578	.195		
9	1.56	1.84	1.78	1.62	1.40	1.14	.841	.516	.174	
10	1.56	1.86	1.81	1.69	1.51	1.29	1.04	.763	.465	.156

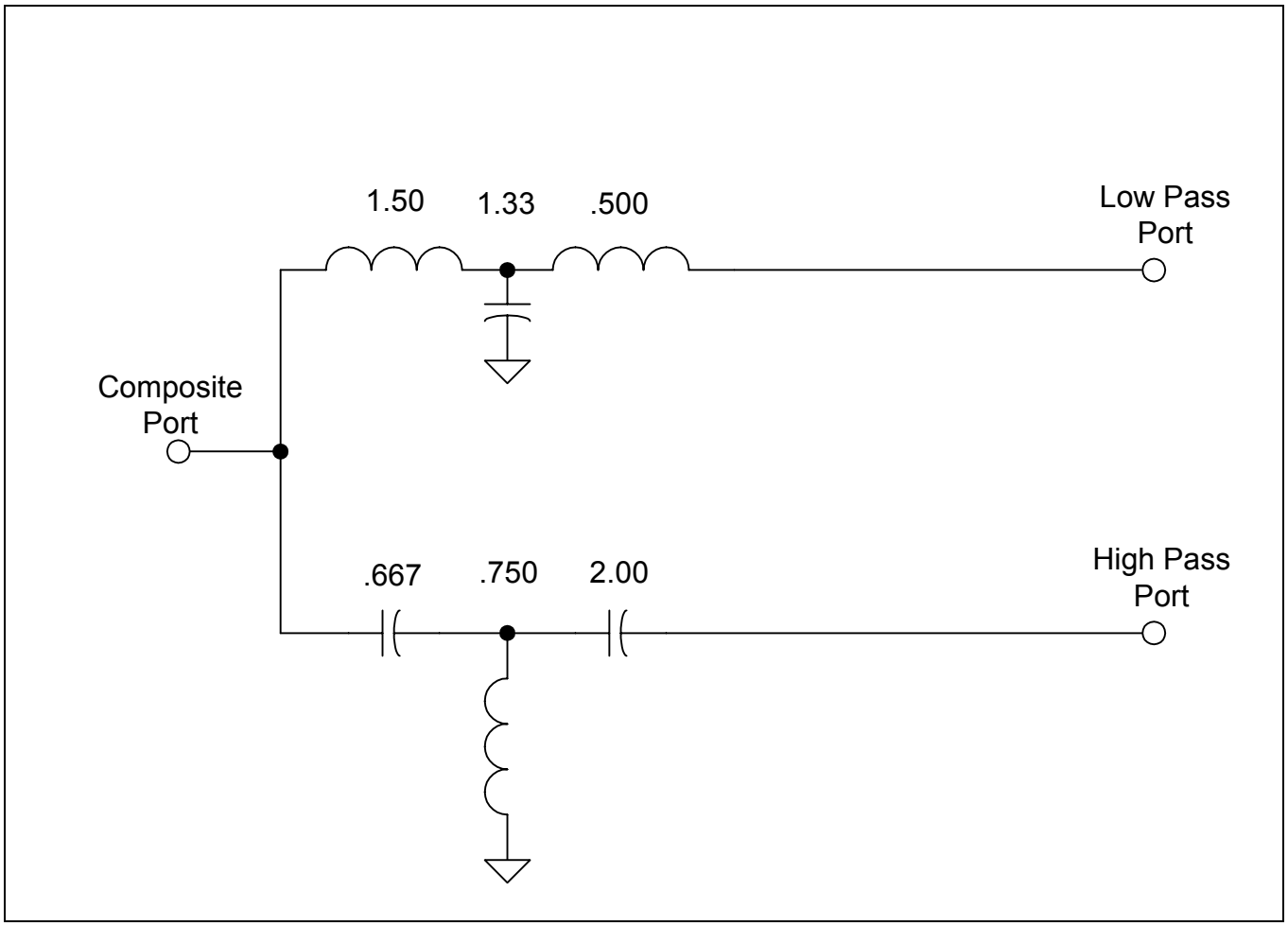

Figure 2 . Example: 3 pole prototype (R_0 = 1, ω=1).

To transform prototype from ω=1, R_0 = 1 to desired values:

Multiply prototype inductor values by: R_0/ω
Multiply prototype capacitor values by: $1/R_0\omega$

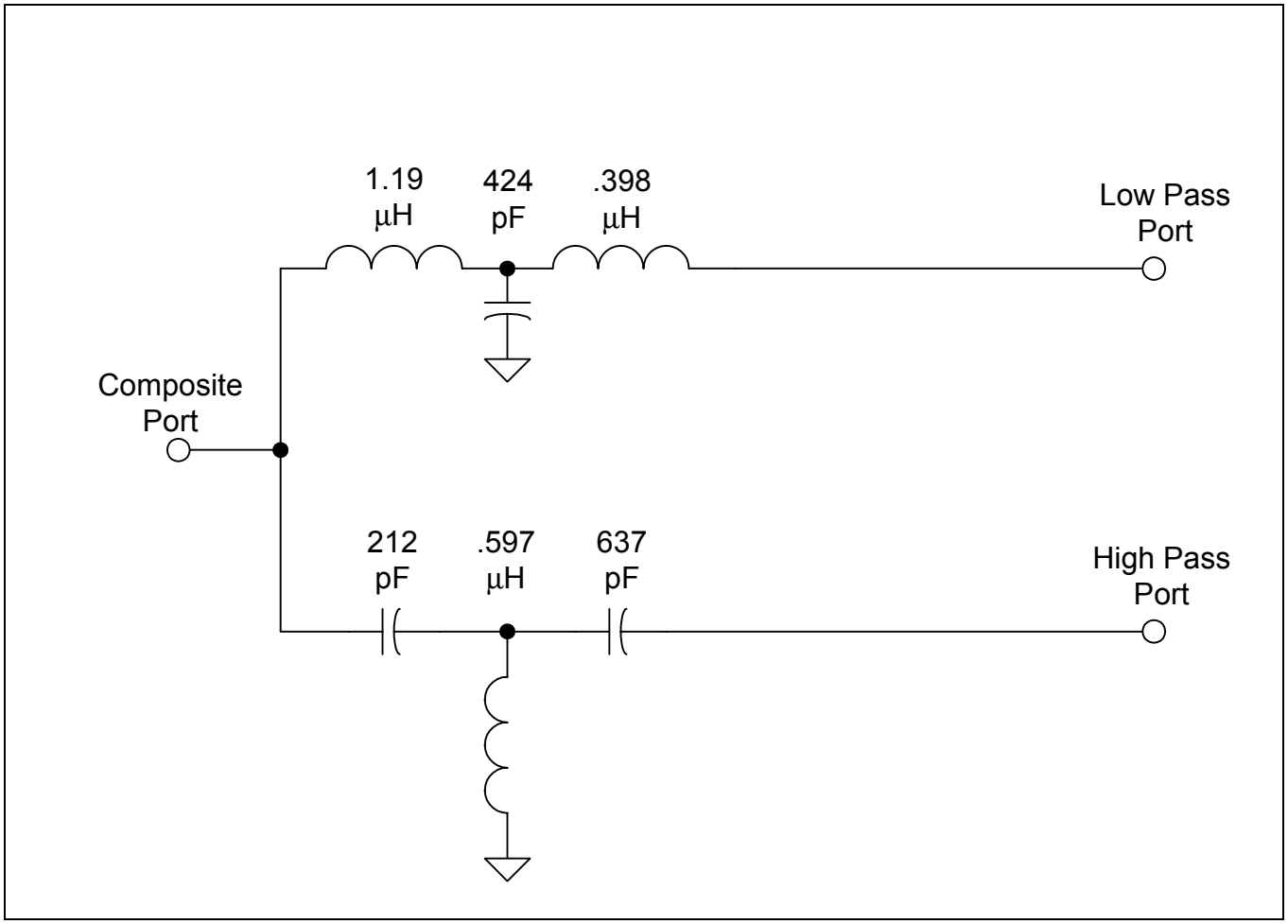

Figure 3. Example: f = 10 MHz and R_0 = 50 ohms.

Return to N6RK home page