

Surface Mount Considerations

The Lark line of surface mount filters has been designed to give the best trade-offs between electrical performance and physical integrity. Unfortunately these considerations do not always complement each other.

After questioning many of our customers, we realized there are several commonly used materials. Each has its own unique dielectric constants and come in a variety of thicknesses. These factors dictate the width of a 50 ohm line. Table 1 below, lists the various "common" thicknesses used along with the related 50 ohm line widths. When the line widths become much smaller than the pad size of the filter, an impedance mismatch is created. In this example the worst case is the use of the Teflon filled ceramic at its smallest thickness. When a surface mount device such as Lark's "CC" package is mounted on this, it can cause up to four tenths of a picofarad stray capacitance.

The magnitude of the problem is related to the frequency of the device. Since Lark filters get most of their selectivity through the reflective qualities of the device, it is important to achieve a good impedance match within the passband.

Impedance mismatches outside the passband are not an issue. Figures 1 and 2 below demonstrate the effect four tenths of a picofarad stray capacitance has on Lark filters with passbands ranging from 800 to 2500 MHz.

The "A" figures show the device as it would perform according to the original design. The "B" figures show the device with degradations based on manufacturing considerations. The "C" figures show the effect of the capacitive mismatch on the device represented in the "B" figures. These figures show the effects of the mis-match to be much less dramatic at frequencies less than 1700 MHz.

This stray capacitance may or may not be a problem in the sys-

MATERIAL	THICKNESS	LINE WIDTH*	MATERIAL	THICKNESS	LINE WIDTH*
Teflon	0.031	0.090	RO4003C	.008	.017
	0.020	0.058		.012	.026
Fiberglass	0.031	0.055		.016	.035
	0.020	0.035		.020	.044
Ceramic Filled	0.025	0.025		.032	.071
Teflon	0.010	0.010		.060	.134
TMM10i	0.030	0.027	RO4350	.032	.071

*Dimensions given are approximate.

FIGURE 1 – 5SD881.5-X25-5CC

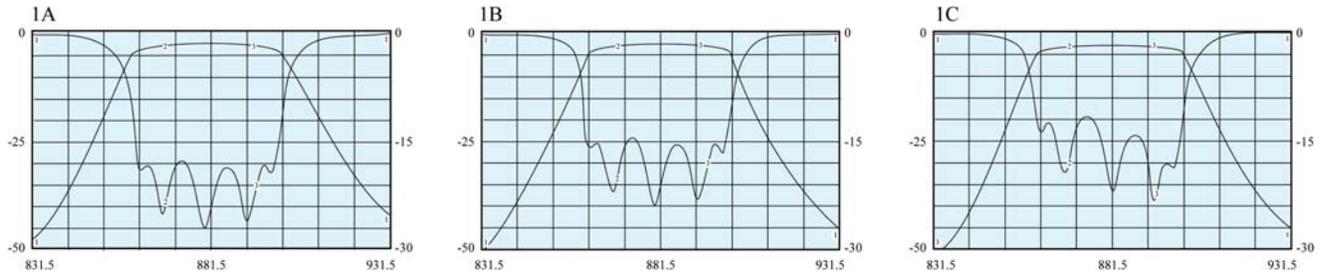
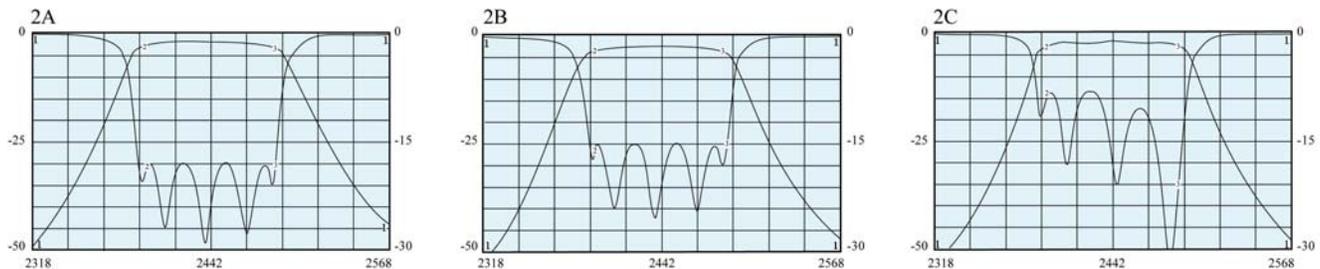


FIGURE 2 – 5SD2442.5-X90-5CC



A= Perfect tuned Design

B= Typical Production

C=Typical Production with a Capacitive I/O