



**Product Note: B6137223**

## **Notes on Capacitor and Inductor Testing in Series-thru, Shunt-thru and Shunt-to-ground Configurations**

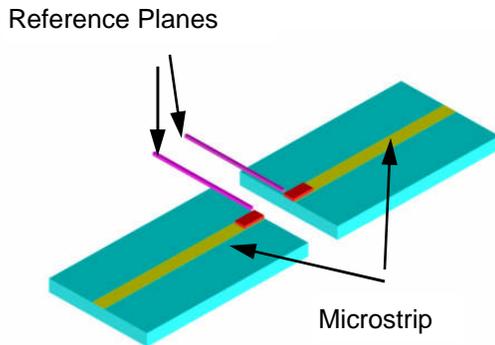
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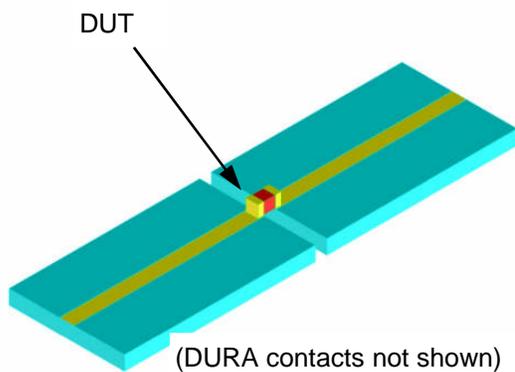
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## Series-thru Capacitor and Inductor Testing



For Series-thru testing, the DUT is placed between two microstrip launches.

When the system is calibrated, the reference planes are established at the ends of the microstrip launches. Small DURA contacts are soldered to the end of the microstrip in order to have long contact life.

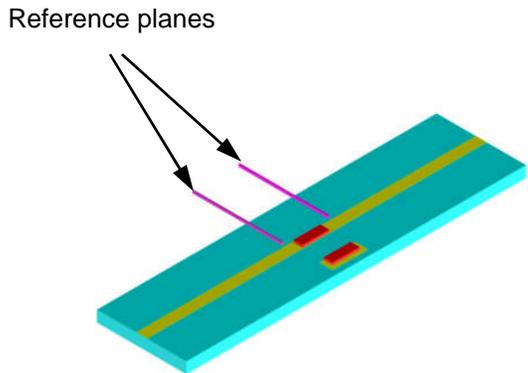


When the DUT is placed onto the microstrip, there is a finite length where the DUT contacts the microstrip. Since the reference plane is at the edge of the microstrip, the DUT contacts are actually behind the reference planes.

There is an area of “confusion” because it is physically impossible to have the DUT contact the microstrip at the reference planes. It might be necessary to shift the reference planes by adding an electrical delay to port one and port two on the automatic network analyzer.

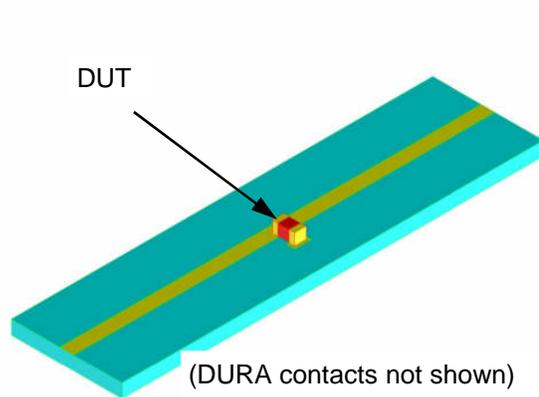
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## Shunt-thru Capacitor and Inductor Testing



For Shunt-thru testing, the DUT is placed between the Microstrip Line and ground.

When the system is calibrated, the reference planes are established at the points indicated and the space between the reference planes is 100 mils. Small DURA contacts are soldered to the microstrip and the ground contact areas in order to have long contact life.

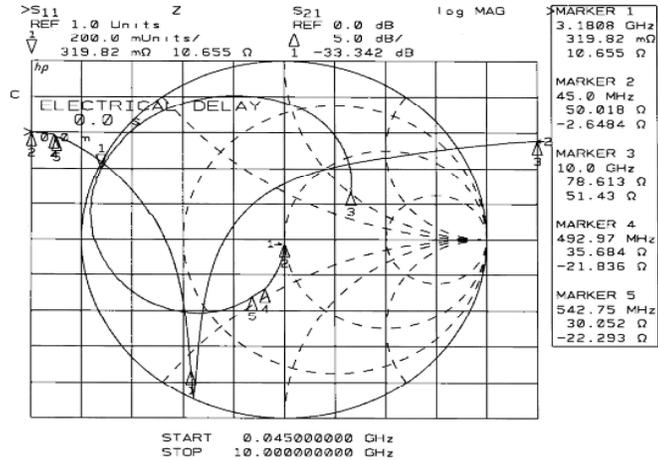


When the DUT is placed onto the microstrip, there is a finite length of microstrip line between the reference plane and where the DUT contacts the microstrip. The measured data actually represents a 100 mil long microstrip with a DUT in the middle. Since the DUT has a specific "contact width", it is difficult to define where the "perfect reference plane" should be.

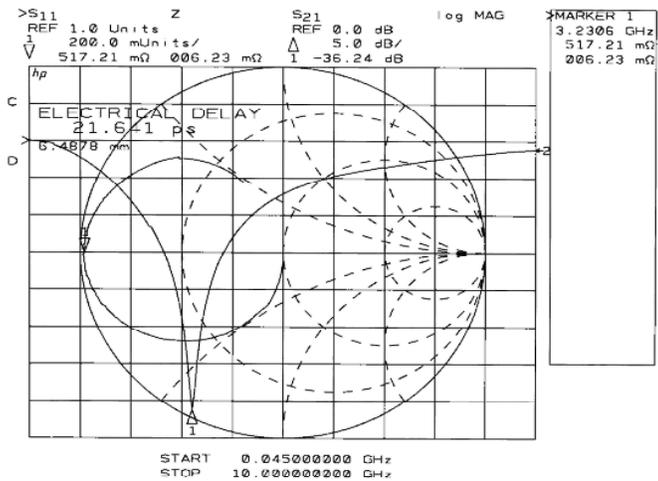
It may be necessary to shift the reference planes by adding electrical delay to port one and port two on the automatic network analyzer in order to have correct data. The attached example shows the measured data with and without electrical delay.

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## Measured Data



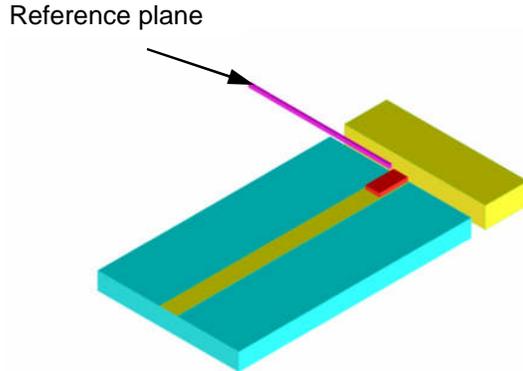
Measured without delay added  
 S21 shows resonance at 3.23 GHz (marker 1)  
 S11 at 3.23 GHz (marker 1) shows additional phase shift



Measured with delay added  
 S21 shows resonance at 3.23 GHz (marker 1)  
 S11 at 3.23 GHz (marker 1) shows a short with 21.64 ps electrical delay.

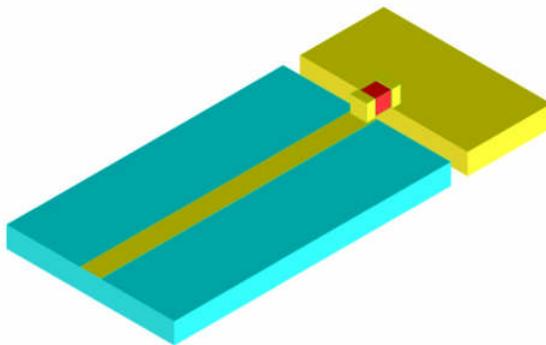
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## Shunt-to-ground Capacitor and Inductor Testing



For Shunt-to-ground testing, the DUT is placed between the microstrip launch and ground.

When the system is calibrated, the reference plane is established at the end of the microstrip launch. A small DURA contact is soldered to the end of the microstrip in order to have long contact life.



When the DUT is placed onto the microstrip, there is a finite length where the DUT contacts the microstrip. Since the reference plane is at the edge of the microstrip, the DUT contact is actually behind the reference plane.

There is an area of "confusion" because it is physically impossible to have the DUT contact the microstrip at the reference planes. It might be necessary to shift the reference planes by adding an electrical delay to port one on the automatic network analyzer.

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