

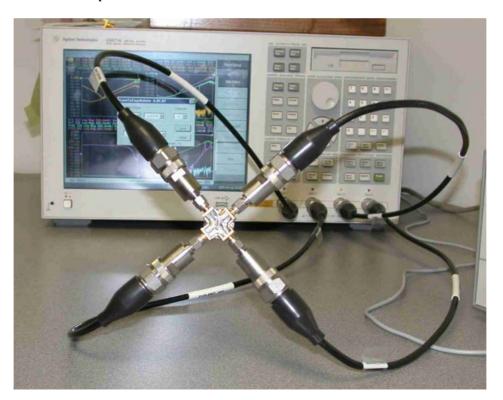
X2Y® S-parameter Extraction

Test Results #TR 6001, v2.0

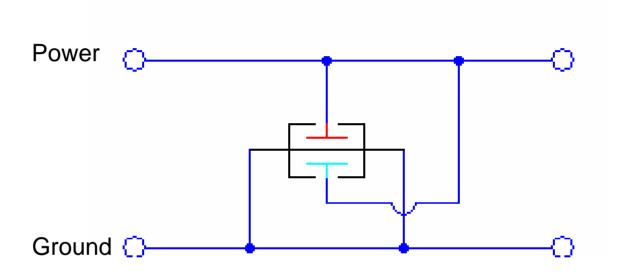
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- Network Analyzer Agilent E5071A
- Cables Agilent N6314A (n-type to n-type)
- Adapters n-type to 3.5 mm
- Cal Kit 85033E (3.5mm Calibration kit, 30 kHz to 9 GHz)







Circuit 2



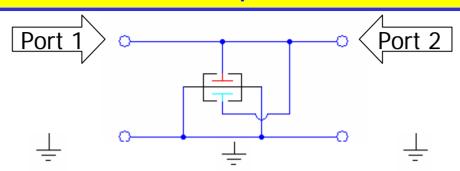


PCB Characterization

- Coplanar PCBs are designed to have 50 ohm characteristic impedance across broadest the frequency band.
- Via PCBs are designed to represent power/ground planes on a typical PCB.
- De-embedding test results are currently not de-embedded from PCB characteristics.
 - Good correlation between test PCBs used allow a fair A-to-B comparison between samples.
 - Coplanar PCBs have 50 ohm impedance to minimize the need to deembed.
 - ✓ The inductance of the DUT can be extracted from the coplanar and Via PCB testing using the method shown in: <u>Application Note #3004</u> "Accurate Capacitor Inductance Extraction from s21 Measurements".



S-parameter Extraction – Circuit 2



- One port is excited and then the response of each of the 2 ports is measured.
- The process is repeated at each port.
- (4) s-parameters are needed to characterize the X2Y[®] component for Circuit 2.

Number of Measurements	Port Excited	Port Read
1 (S11)	1	1
2 (S12)	1	2
3 (S21)	2	1
4 (S22)	2	2

- Note: The amount of measurements need to be taken can be simplified for the X2Y[®] component because of the symmetry of the set-up and component.
 - ✓ S11 = S22
 - ✓ S12 = S21

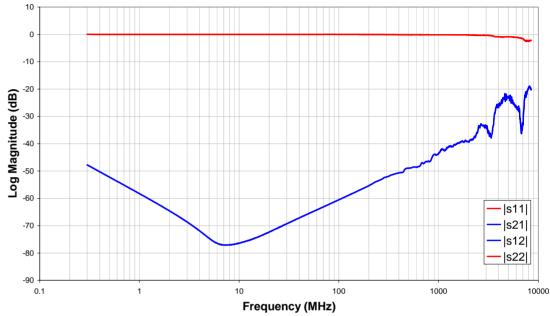


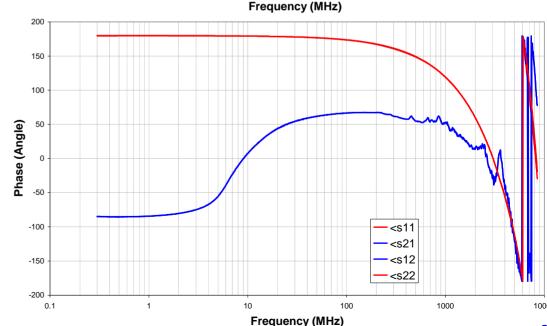
S-parameter Extraction – Circuit 2 [COPLANAR PCB]



Measurements

- √ 300 kHz Sweep Start
- √ 8.5 GHz Sweep Stop
- ✓ 1601 data points
- ✓ Logarithmic Measurement
- √ 100 Hz Bandwidth





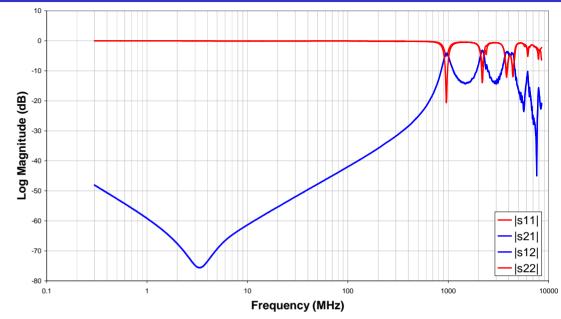


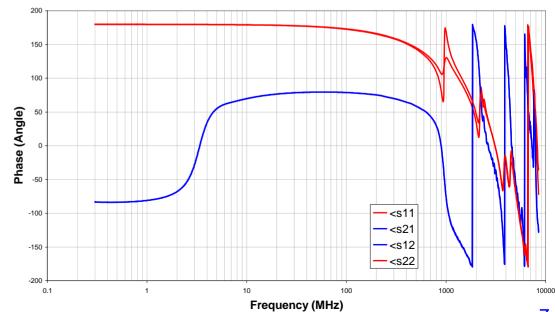
S-parameter Extraction – Circuit 2 [VIA PCB]



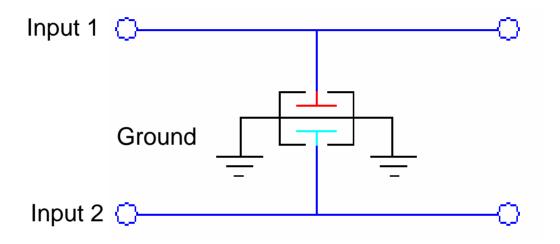
Measurements

- √ 300 kHz Sweep Start
- √ 8.5 GHz Sweep Stop
- √ 1601 data points
- ✓ Logarithmic Measurement
- √ 100 Hz Bandwidth









Circuit 1



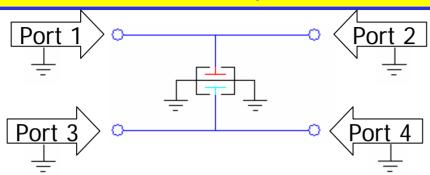
PCB Characterization

Coplanar PCB with ground planes are designed to have 50 ohm characteristic impedance across broadest frequency band.

- De-embedding test results are currently not deembedded from PCB characteristics.
 - Good correlation between test PCBs used allow a fair Ato-B comparison between samples.
 - Coplanar PCB with ground planes have 50 ohm impedance to minimize the need to de-embed.



S-parameter Extraction - Circuit 1

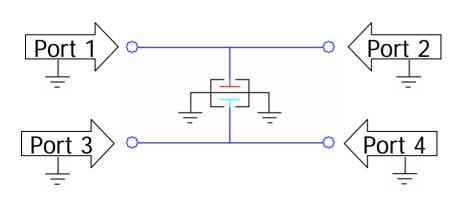


- One port is excited and then the response of each of the 4 ports is measured.
- The process is repeated at each port.
- 16 s-parameters are needed to characterize the X2Y® component for Circuit 1.
- Note: The amount of measurements need to be taken can be simplified for the X2Y® component.

Number of	Port	Port Read
Measurements	Excited	
1 (S11)	1	1
2 (S12)	1	2
3 (S13)	1	3
4 (S14)	1	4
5 (S22)	2	2
6 (S21)	2	1
7 (S23)	2	3
8 (S24)	2	4
9 (S33)	3	3
10 (S31)	3	1
11 (S32)	3	2
12 (S34)	3	4
13 (S44)	4	4
14 (S41)	4	1
15 (S42)	4	2
16 (S43)	4	3



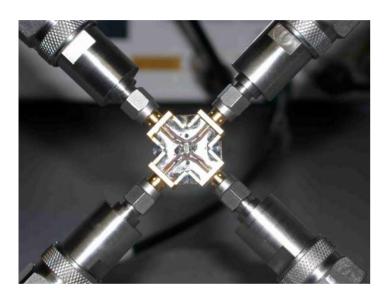
The following measurements are equivalent measurements due to the symmetry of the set-up and component:



Number of	Port Excited	Port Read
Measurements	Excited	
1 (S11)	1	1
2 (S12)	1	2
3 (S13)	1	3
4 (S14)	1	4
5 (S22)	2	2
6 (S21)	2	1
7 (S23)	2	3
8 (S24)	2	4
9 (S33)	3	3
10 (S31)	3	1
11 (S32)	3	2
12 (S34)	3	4
13 (S44)	4	4
14 (S41)	4	1
15 (S42)	4	2
16 (S43)	4	3

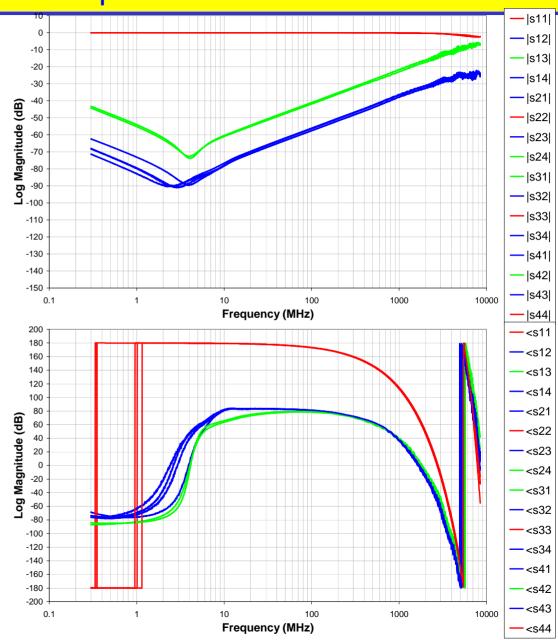


S-parameter Extraction – Circuit 1



Measurements

- √ 300 kHz Sweep Start
- √ 8.5 GHz Sweep Stop
- √ 1601 data points
- ✓ Logarithmic Measurement
- 100 Hz Bandwidth





Direct inquiries and questions about Test Reports, Application Notes, or X2Y® products, please contact:



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