Agilent
On-Wafer Impedance Measurements Using the ENA and Impedance Parameter Display Software

Overview
The ENA Series RF network analyzer with Cascade Microtech’s RF probing system offers on-wafer impedance measurement for characterizing integrated RF passive components such as spiral inductors and capacitors on RFICs and LTCC devices. Using the ENA’s new impedance parameter display software and the ENA Wafer Cal software, you can easily make measurements up to 8.5 GHz.

Impedance Parameter Display Software
The impedance parameter display software calculates impedance parameters such as C, D, L, and Q from S-parameter measurement results and then displays them on the ENA’s screen. You can directly read out frequency characteristics of all impedance parameters without using an external PC. The software handles three different connection modes for S-parameter to impedance conversion: Series-Thru, Shunt-Thru, and Shunt-GND.

Figure 2 shows a measurement example. The measurement procedure is as follows:

• Make measurement setups, such as frequency range and IFBW and then perform calibration. Here you can use the ENA Wafer Cal software.
• Load and run the impedance parameter display software.
• Select the connection model, number of traces, and parameters.
• Measure the DUTs.
ENA Wafer Cal Software
Cascade Microtech provides a complete solution for performing on-wafer RF measurements. The ENA Wafer Cal is a software program created by Cascade Microtech that runs on the ENA Series. This software provides a calibration wizard that guides the user through the setup calibration kit and calibration steps, thus reducing one of the greatest sources of error for calibration.

Also, all of the most commonly desired settings can be set up at a central location within the software. This helps ensure that the measurement conditions remain consistent. This is critical when comparing data captured at different times.

On-Wafer Calibration
Cascade Microtech provides the impedance standard substrate (ISS) for on-wafer calibration. By using the ENA Wafer Cal and ISS with the Air Coplanar™ (ACP) probe, on-wafer calibration can be performed easily and accurately.

For more information, visit:
Agilent ENA Series
http://www.agilent.com/find/ena
Cascade Microtech
http://www.cascademicrotech.com

Table 1. Comparison of on-wafer RF impedance measurement solutions

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<tr>
<th>Features</th>
<th>ENA with impedance parameter display software (300 kHz to 8.5 GHz)</th>
<th>E4991A RF impedance analyzer with Option 010 (1 MHz to 3 GHz)</th>
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<tbody>
<tr>
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<td>• Up to 8.5 GHz frequency coverage</td>
<td>• Higher measurement accuracy and stability in wide impedance range</td>
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<td>• Covers both impedance measurements and network measurements with one instrument.</td>
<td>• Impedance measurement accuracy is specified.</td>
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Figure 4. ENA Wafer Cal

Figure 5. ISS and ACP probe

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