

# SEPIA - Scope Embedded Power Integrity Analysis

Solution Brochure

## Deconstructing Power Supply Measurements for the Purposes of Modeling and Optimizing Solutions

Putting traces on an oscilloscope is nice, but you're busy. You don't need more traces, you need answers. SEPIA takes the power supply output step load response data and deconstructs it to, providing an R-L-C equivalent model. In addition, SEPIA can optimize the model leading to an improved design. The model can be used with any SPICE simulator for system level simulation.

Using minimal equipment including the Tektronix Series 5/6 oscilloscope and the Picotest s2000, P2105 (s10 or s50) browser probe steppers, or J2111A/J2112A current injectors, the step load response is captured as shown below.



From this limited data SEPIA determines the loaded Q, Phase Margin, Capacitance, Excess Inductance, natural and forced resonance frequencies, and output impedance.

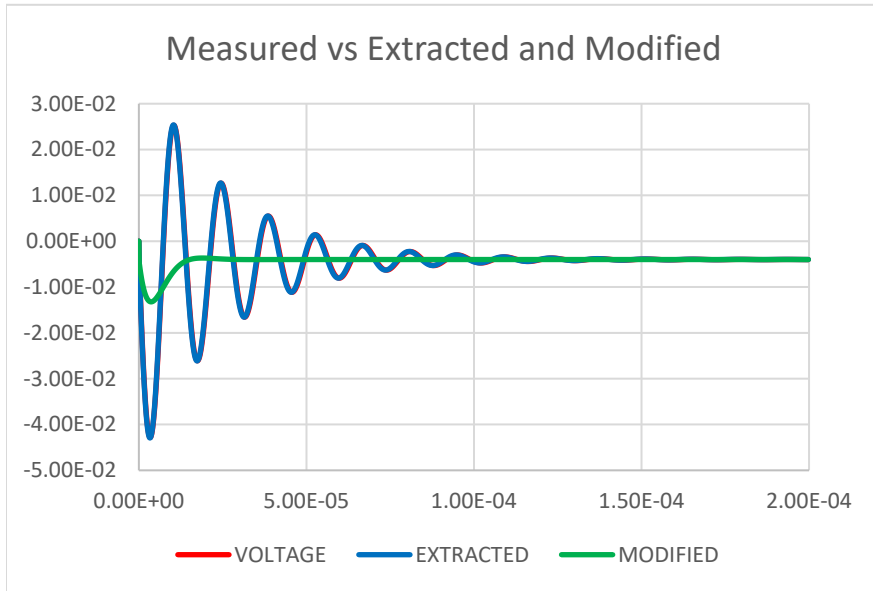
This data can be exported as a SPICE simulation model and the software can even suggest the correct capacitance and ESR to provide a stable solution at the target impedance you need. SEPIA does all this using a single acquisition and through mathematical functions it extracts all the missing parameters of the circuit.

- SEPIA Software runs on your oscilloscope
- Extract an electrical SPICE model of your Power Supply's output impedance from simple voltage measurement
- Determines natural and forced resonance frequencies and frequency domain output impedance
- Determines Q and Phase Margin for assessing stability performance
- Determines output capacitance, excess inductance and the characteristic impedance
- Suggests the appropriate capacitor solutions for optimum performance at a given target impedance, or the minimum adjustment needed to obtain a stable solution.
- Simple support for Power Integrity design, analysis, and simulation

# SEPIA Software and Hardware

The SEPIA software extracts the test result and model allowing you to simulate your power systems response. The software can then guide you in the optimization of your output load capacitance.

The measured step load response show above is deconstructed by the SEPIA software and mathematically reconstructed below (blue waveform). SEPIA's recommended solution (green) improved the phase margin from 10 degrees to 72 degrees. Electrical representations are provided.



## Extracted Impedance SPICE Netlist

	Extracted	Modified
<b>Q</b>	5.58E+00	6.85E-01
<b>Zo</b>	2.23E-02	1.51E-02
<b>ERS</b>	2.01E-03	2.00E-02
<b>RS</b>	1.99E-03	2.00E-03
<b>L</b>	4.98E-08	5.00E-08
<b>C</b>	9.98E-05	2.20E-04

<b>PM deg</b>	<b>10.23</b>	<b>72.23</b>
<b>BW</b>	7.14E+04	4.80E+04

## Power Supply Output Impedance SPICE Netlist (model)

SPICE				
*IN	OUT	GND		
*1	2	3		
L1	1	1a	4.98E-08	
R1	1a	2	2.01E-03	
C1	2	2a	9.98E-05	
R2	2a	3	1.99E-03	
.END				

## Products

**J2111A pr** Closed Loop analog controlled  
**J2112A** current injectors

**P2105A (s10)** Browser probe stepper (up to 10A/ns)

**P2105A (s50)** Browser probe stepper (up to 50A/ns)

**S2000** Custom Transient Load Stepper board (2000A /ns)

Scope software additional

To learn how this solution can address your specific needs please contact Picotest:

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