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Signal Injector Bundle Enables Bode Plot And PSRR Measurements Using Scopes

Picotest's new signal injector bundle supports Bode plot measurement and PSRR testing for oscilloscopes with frequency response analyzer (FRA) features. The Picotest FRA Bundle, consisting of the J2100A injection transformer and the J2120A line injector, provides essential support for stability and PSRR/PSMR measurement on oscilloscopes. It works with the Keysight InfiniiVision X-Series with the power measurements option, Tektronix 5 or 6 series oscilloscopes using the 5-PWR or 6-PWR software, Siglent SDS1000X-E-FG series scopes with the appropriate firmware and SAG/SDG AWG support, and Rohde & Schwarz R&S RTM, RTA, and RTB oscilloscopes using the R&SRTx-K36 FRA option (see Fig. 1).

The software options alone do not enable these measurements. Vendors don't necessarily mention this in their literature, but injectors are required to make the measurements. According to Picotest, the FRA bundle is unique because there is not another commercially available solution that supports all of these scope manufacturers and their FRA features (Fig. 2).

"Traditionally Bode plots and PSRR measurements have been made on Vector Network (VNA) or Frequency Response Analyzers (FRA). But recently scope manufactures have begun to add FRA features to oscilloscopes, expanding their measurement capabilities. While the software add-ons enable new FRA features, without our injectors end-users can't actually make the measurements" says Steve Sandler, Picotest CEO. "The FRA bundle provides the signal injectors needed to connect the scope to the DUT."

To perform these control loop measurements, the stimulus signals from the oscilloscope or AWG to the power supply under test must be injected and this requires Picotest injectors. The FRA Bundle includes the J2100A injection transformer. This injector enables Bode Plots; without an injection transformer it is not possible to break the control loop of the power supply and, therefore, cannot make the measurement even though the software may be installed.

The J2100A works from 10 Hz to 5 MHz, high enough for most power supplies—a 23-octave range, with low distortion and support for 5-Ω terminations that have minimum loop impact. The FRA bundle also includes the J2120A line injector. The J2120A enables PSRR measurements; it allows combination of the ripple signal with the power rail voltage for injection into the DUT with a 10-Hz to 10-MHz usable bandwidth, low loss design and 5-A/50-Vdc capability.

Breaking the loop is an essential aspect of the Bode Plot based stability measurement. The J2100A accomplishes this in order to inject the stimulus signal from the oscilloscope. The J2101A is an available option for applications in the 10-Hz to 45-MHz range. For applications requiring lower or higher bandwidths, the optional J2110A solid state injector works from dc to well over 100 MHz.

While the "Bode plot" injection transformer is a very wideband adapter, it is not useful for measuring ripple rejection (PSRR/PSMR) of a power supply or even an op amp. This is because the attributes that make the injection transformer perform so well also result in a transformer that is intolerant of dc current. Even very small dc currents (5 mA or less) can greatly reduce the signal capacity or even totally saturate the transformer.

For this reason, the Picotest line injector (J2120A) is another essential test adapter. The J2120A line injector allows the input dc supply voltage to be modulated by the oscilloscope's source signal output, as in the case of a Bode plot measurement. Available now and CE certified, the Picotest FRA Bundle is priced at $1,050 in single quantities. For more information and to make a purchase see the FRA Bundle page. Also see the Picotest Tektronix page and the Picotest Rohde & Schwarz page.

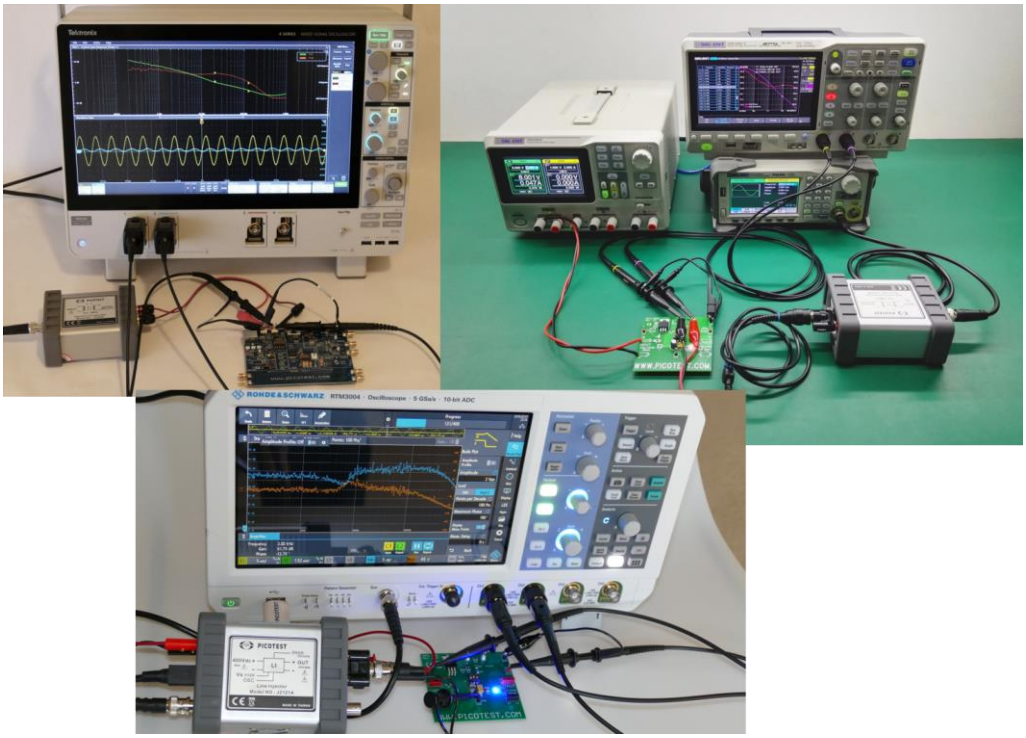

Fig. 1. The Picotest FRA Bundle, consisting of the J2100A injection transformer and the J2120A line injector, works with the newer FRA-enabled oscilloscopes to make stability and PSRR/PSMR measurements. These scopes include the Keysight InfiniiVision X-series with the power measurements option, Tektronix 5 or 6 series oscilloscopes using the 5-PWR or 6-PWR software, Siglent SDS1000X-E-FG series scopes with the appropriate firmware and SAG/SDG AWG support, and Rohde & Schwarz R&S RTM, RTA, and RTB oscilloscopes using the R&SRTx-K36 FRA option. These setups give designers an alternative to frequency-response analyzers and vector network analyzers when making Bode plot and PSRR measurements.

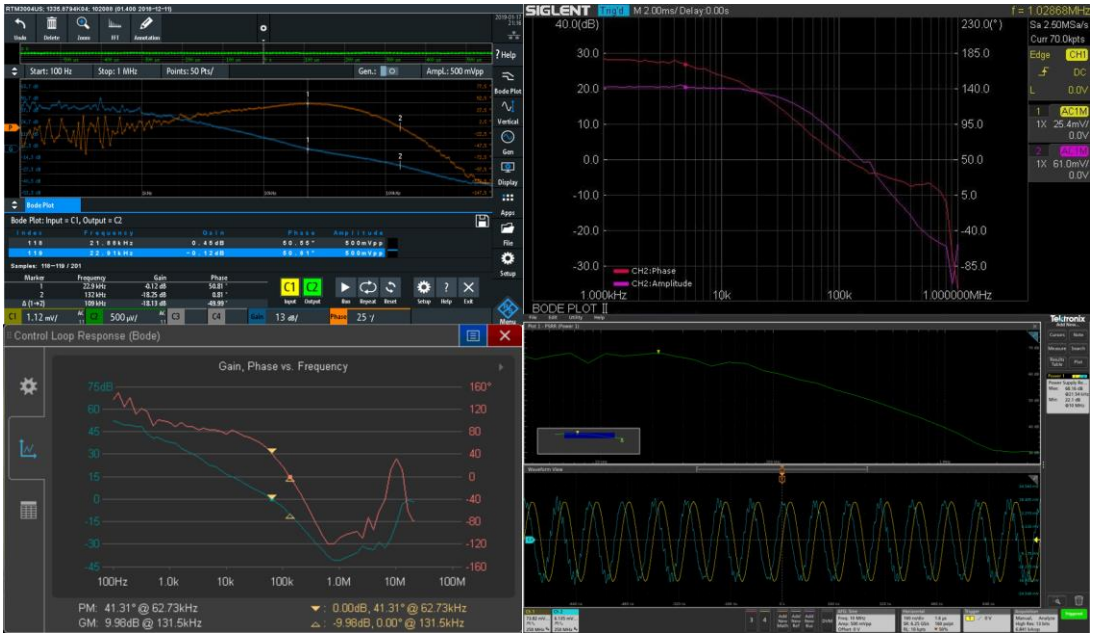

Fig. 2. The software options on the new scopes enable Bode Plot and PSRR measurements but are not sufficient on their own. To perform these control loop measurements, the stimulus signals from the oscilloscope or AWG to the power supply under test must be injected—a function performed by the Picotest injectors. While there are others offering injection transformers, according to Picotest their FRA bundle is the only commercially available solution that supports all of the listed scope manufacturers and their FRA features.