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Broad Injector Product Line Eases Power Supply Stability Analysis

Developed to aid power supply designers in control-loop stability analysis, Picotest's line of signal injectors are being introduced as the "most flexible and sophisticated injector product line ever introduced." The product line includes the two injection transformers; the J2100A which features 1-Hz to 5-MHz bandwidth and the J2101A, which offers 10-Hz to 45-MHz bandwidth. To complement these, Picotest offers a dc- to 50-MHz solid-state signal injector (J2110A), a line injector for measuring PSRR (J2120A), a dc bias injector (J2130A), and a wideband current injector (J2111A). A set of attenuators are also available.

Picotest offers various combinations of these components in bundles to suit a range of customer requirements (see the figure.) Future enhancements will include wideband preamps and active filters for measuring noise, as well as active splitters/signal distribution amplifiers.

The injection transformers offer low distortion and a 5-Ω termination that minimizes the transformer's impact on the control loop being measured. Additionally, they provide attenuation of the injection signal, ensuring the accuracy of small-signal measurements. Both transformers are 600-V CAT II compliant for PFC testing. The line of injectors can be used with any manufacturer's test equipment and network analyzers.

In the case of the J2100A, its 1-Hz lower limit on bandwidth supports testing of PFC regulators, while the 5-MHz upper limit is high enough to enable testing of most power supplies and regulators. With the J2101A, the 10-Hz lower limit supports testing of offline power supplies, while the 45-MHz upper limit provides a bandwidth that's high enough for even state-of-the-art, multi-megahertz switching regulators.

Nevertheless, there are applications for which the bandwidths of the injection transformers—these as well as existing devices on the market—are insufficient. For example, a typical heater control loop (and some PLLs) might have a bandwidth of much less than 1 Hz, while some linear regulators and op amp amplifier circuits can have bandwidths of up to 100 MHz or even higher. For these applications, the Picotest solid-state injector (J2110A) can provide the necessary bandwidth.

And while the injection transformer is a very wideband adapter, it is not useful for measuring ripple rejection (PSRR) of a power supply or even an op amp. That's 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 useful test adapter.

Likewise, Picotest dc bias injector (J2130A) is needed when using the network analyzer to measure impedance, such as the capacitance and ESR of a capacitor, or the DCR of an inductor. In these and other tests, it is often necessary to provide a voltage bias to the device being tested. This is also true when measuring semiconductor junction capacitances and varactor capacitances. In all these cases, the impedance is a function of the dc bias on the device, so the bias injector is needed.

For more information, visit www.picotest.com.

Figure. With its 10-Hz to 45-MHz bandwidth, the J2101A injection transformer can support control loop stability analysis for designs ranging from offline power supplies to state-of-the art, multi-megahertz switching regulators. Another model, the J2100A features a bandwidth that extends down to 1 Hz. The 0- to 50-MHz solid-state signal injector is pictured above (photo on left) with the Injector Bundle Kit (photo on right).