Chapter 1 - The PowerMeasure™ PMA1 Software

The Tools and the Work They Do

The PowerMeasure Analysis (PMA1) software package — when combined with a LeCroy digital storage oscilloscope (DSO), and current and differential measurement tools — provides a complete set of hardware and software tools for the design and analysis of power conversion circuits. PMA1 consists of three major measurement areas:

Power Device Analysis: This section covers measurements made on power switching devices used in power conversion products such as power supplies, electronic motor drives (adjustable-speed drives), or high-efficiency lighting circuits. Measurements covered include device instantaneous power, safe operating area (SOA), saturation voltage, and dynamic on-resistance. With PowerMeasure Analysis, these device measurements can be made either on a test stand or while the devices are operating in a power conversion circuit.

Modulation Analysis: This section covers the acquisition and analysis of information contained in a power conversion circuit's modulated control signal. It facilitates the analysis of modulation changes in pulse width (PWM), duty cycle, frequency, or period as the circuit responds to change in line and/or load, as well as during start-up and shut-down.

Line Power Analysis: This section covers the measurement of line voltage and current applied to an offline power conversion device. Real power, apparent power, power factor, and line harmonics are measured. Analysis of line harmonic content is covered to assist the design and evaluation engineer in designing for pre-compliance to EN61000-3-2 requirements.

Equipment Required

DSO: PowerMeasure Analysis software operates on any LeCroy LC, 9300C, or LT (*Waverunner*) Series DSO. For analysis of phenomenon requiring the acquisition of many cycles, a DSO with a minimum of 1 mpoint per channel should be used. Steady state analysis can be accomplished with shorter record length. Two acquisition channels are adequate for most measurements, but a four-channel DSO is required if analysis of multiple devices or complex triggering is desired.

Voltage Probes: Since most voltage signals associated with power conversion circuits are not ground related, differential measurement capability is required. To carry out all the measurements covered in the Power Device Analysis section, the CMRR, CMR, Overdrive Recovery, and compensation flatness performance of the LeCroy DA1855A differential amplifier and its associated DXC series passive differential probes is required. The measurement requirement in the Modulation and Line Power Analysis sections can be made with medium-performance differential probes.

Current Probes: The Power Device Analysis section requires precision wide-bandwidth current probes with DC measurement capability. The LeCroy AP015 DC to 50 MHz current probe is recommended.

Deskew Signal Source: A source of time-coincident voltage and current signals is required to allow the propagation delay differences in the voltage and current signals to be matched. The LeCroy DCS015 Deskew Calibration Source is provided for this purpose.

Note: The time delay of a DA1855/ DXC100 (A or non-A versions) connected to the DSO with a 1.2 m 50 coaxial cable is the same as the AP015 Current Probe's delay, and no deskew adjustment is required.