

# POWER ANALYZERS

Fully characterize your power-electronics design from input to output with Tektronix power analyzers. Designed for precision measurement of power-electronics circuits and devices, these analyzers give you what you need to measure conversion efficiency and perform compliance testing on single-phase or 3-phase devices.



	PA1000 SINGLE-PHASE	PA3000	PA4000 MULTI-PHASE*
Channels	1	4	4
Basic Accuracy (V & I)	± 0.04%	± 0.04%	± 0.01%
Measurement Bandwidth	DC, 0.1Hz - 1MHz	DC, 0.1Hz - 1MHz	DC, 0.1Hz - 1MHz
Max Voltage and Current (internal shunt)	600Vrms / 20A RMS	600Vrms / 30A RMS	600Vrms / 30A RMS

\* Limited Availability thru Tektronix Encore

## CHOOSING YOUR POWER ANALYZER

Power analyzers are used for testing a wide range of power-electronics devices, from cell-phone chargers to 1000kW grid-connected inverters. To help you choose the best analyzer for your application, consider the criteria below.

### 1 Number of Inputs

Power analyzers are available in both fixed configurations (typically single-channel) and modular configurations. If your application is limited to single-phase devices, a single-channel analyzer may meet your needs. But if you need to measure conversion efficiency on these devices, a two-channel analyzer is required.

Testing of 3-phase devices of course requires a multi-phase analyzer. In many cases, two channels will be all you need for a two-wattmeter measurement on 3-wire inputs or outputs. A four-channel analyzer can measure both input and output simultaneously, to determine conversion efficiency.

### 2 Measurement Bandwidth

How much bandwidth is enough? The measurement bandwidth you need is usually determined by the switching speed of the device-under-test, or the highest-order harmonic that you are testing requires. Switching speeds of tens or hundreds of kHz are common in today's designs. But new semiconductor technologies promise to increase speeds up to 2x or more in the near future. Choose an analyzer that is capable of measuring your highest frequencies of interest, with some headroom for future-proofing.

### 3 Compliance Testing for Regulatory Standards

If your application requires you to know that your device is compliant with regulatory standards such as IEC61000 for harmonics, or ENERGY STAR™ for energy efficiency, you need an analyzer capable of meeting the test requirements specified by the standard. Even better, look for an analyzer supported by software applications that can automate instrument setup and reporting of test results in the exact format required for your application.

### 4 Current Shunts: Internal or External?

Will you be measuring milliamperes or hundreds of amperes? Power analyzers vary in the features they offer for direct current inputs or connection to external current transducers. Ideally, the analyzer should have internal current shunts that allow you to connect your device directly, for best accuracy. If you will be testing a range of devices at different power levels, you may value both high- and low-range shunts. Finally, if your application requires external current transducers (usually required for current >30 Amps), make sure there are transducers available that are well-matched to the analyzer and offer the accuracy you need.

### 5 Remote Communication

Will you have a need to control the analyzer remotely or transfer measurement data to your PC? If so, you will want to look for an instrument that features the communication ports you need. Depending on the analyzer model, some ports may be standard features or extra-cost options; be careful to choose the right instrument configuration that meets your requirements.



## PA1000 Power Analyzer

The Tektronix PA1000 is a single-phase, single-channel power analysis solution that is optimized for fast, efficient, and accurate power consumption testing to international standards. Its compact size, DMM-like user-interface, graphical display, and powerful software enable users to quickly visualize, analyze, and document the power consumption efficiency of next-generation devices, including standby power measurements and harmonic analysis.



DATA SHEET



VIRTUAL TOUR



360° VIEW

### PRODUCT HIGHLIGHTS

- Harmonic analysis to IEC/EN 61000-3-2 / 4-7 (pre-compliance testing to the 50th order)
- Standby power analysis to IEC 62301 / EN 50564 (full compliance testing as low as 5mW)
- 1 MHz bandwidth
- $\pm 0.04\%$  basic accuracy
- USB, LAN, and GPIB interfaces (standard)



Easily and accurately measure harmonic performance, standby power, and more with the PA1000, optional breakout box, and free PWRVIEW software.

MODEL	DESCRIPTION	BASIC ACCURACY (V & I)	BANDWIDTH	VOLTAGE INPUT RANGE	CURRENT RANGE (INTERNAL SHUNTS)
PA1000	PA1000 Single-Phase Power Analyzer	0.04% (45-850 Hz)	1MHz	Up to 600V <sub>rms</sub>	20 $\mu$ A to 20A <sub>RMS</sub>

### RECOMMENDED ACCESSORIES

CL200	Current Clamp, 0.5A - 200A, for Tektronix Power Analyzers
CL1200	Current Clamp, 0.1A - 1000A, for Tektronix Power Analyzers
BB1000-XX	Breakout Box simplifies connections to AC power cords. NA, EU and UK versions.
PA-LEADSET	Replacement Lead Set for Tektronix Power Analyzers (One Channel Lead Set)

### RECOMMENDED SERVICE

C3	Calibration Service 3 Years
C5	Calibration Service 5 Years
D1	Calibration Data Report
D3	Calibration Data Report 3 Years (with Opt. C3)
D5	Calibration Data Report 5 Years (with Opt. C5)

### AVAILABLE FOR FREE DOWNLOAD

- PWRVIEW - Complete Power Analysis PC Suite for compliance testing, visualizing signals, analyzing data and documenting results.
- Application notes, whitepapers and videos at: [tek.com/application/power-measurement](http://tek.com/application/power-measurement)

### SHIPS WITH PRODUCT

- Lead Set
- User Manual
- AC Power Cord
- Certificate of Traceable Calibration
- 3-year Product Warranty

## LEARN MORE

about making measurements of power, harmonics and efficiency using the PA1000 Power Supply.



BB1000-UN Universal Breakout Box



## PA3000 Power Analyzer

The Tektronix PA3000 is a 1 to 4 channel power analyzer optimized for testing today's single and multi-phase, high efficiency power conversion products and designs. Use it to quickly visualize, analyze, and document power efficiency, energy consumption, and electrical performance to the latest regional and international standards including Level VI, EnergyStar, CEC, IEC 62301, and CQC-3146.

### PRODUCT HIGHLIGHTS

- 1 to 4 channels supports single-and three phase applications; Up to 600 V<sub>RMS</sub> (2000Vpk) and 30 A<sub>RMS</sub> direct input
- 10 mW standby power measurement
- 1 MHz bandwidth and harmonic analysis to 100th order
- ±0.04% basic voltage and current accuracy
- USB and LAN interfaces standard (GPIB option)
- Free PWRVIEW software



The PA3000's full color display provides intuitive readout of measured values. View measurements in full color graphical, tabular, or vector format.



Application specific test modes simplify test setup and analysis for Standby Power, Energy Integration, Ballasts, and Motor Drives.

MODEL	DESCRIPTION	BASIC ACCURACY (V & I)	BANDWIDTH	VOLTAGE INPUT	CURRENT INPUT
PA3000 1CH	PA3000 Power Analyzer with 1 input module	± 0.04%	1MHz	Up to 600 V <sub>RMS</sub> (2000Vpk)	80µA to 30A
PA3000 2CH	PA3000 Power Analyzer with 2 input modules	± 0.04%	1MHz	Up to 600 V <sub>RMS</sub> (2000Vpk)	80µA to 30A
PA3000 3CH	PA3000 Power Analyzer with 3 input modules	± 0.04%	1MHz	Up to 600 V <sub>RMS</sub> (2000Vpk)	80µA to 30A

### RECOMMENDED ACCESSORIES

CT-60-S	Fixed-Core Current Transducer, High Accuracy, up to 60A
CT-200-S	Fixed-Core Current Transducer, High Accuracy, up to 200A
CT-1000-S	Fixed-Core Current Transducer, High Accuracy, up to 1000A (requires external power supply)
CT-100-M	Fixed-Core Current Transducer, Hall Effect, up to 100A
CT-200-M	Fixed-Core Current Transducer, Hall Effect, up to 200A
CT-1000-M	Fixed-Core Current Transducer, Hall Effect, up to 1000A
CL200	Current Clamp, 0.5A - 200A, for Tektronix Power Analyzers
CL1200	Current Clamp, 0.1A - 1000A, for Tektronix Power Analyzers

### RECOMMENDED ACCESSORIES

BB1000-XX	Breakout Box simplifies connections to AC power cords. NA, EU and UK versions.
PA-LEADSET	Replacement stackable banana test leads, safety shrouded with insulated alligator clips, 1000V CAT II, 30A. (Set of four for one channel)
PA-EXT-LEADSET	Replacement stackable 2mm Test Leads for External Current Sensor Input

### RECOMMENDED SERVICE

PA3000 C3	Calibration Service 3 Years
PA3000 C5	Calibration Service 5 Years
PA3000 D1	Calibration Data Report
PA3000 D3	Calibration Data Report 3 Years (with Option C3)
PA3000 D5	Calibration Data Report 5 Years (with Option C5)
PA3000 G3	3 Year Gold Care Plan
PA3000 G5	5 Year Gold Care Plan
PA3000 R5	Standard Warranty Extended to 5 Years

### SHIPS WITH PRODUCT

- PWRVIEW - Complete Power Analysis PC Suite for compliance testing, visualizing signals, analyzing data and documenting results.
- Stackable Test Lead Set (1 set per input channel)
- Built-in +/- 15V power supply for external current transducers
- Calibration Certificate
- User Manual and AC Power Cord
- 3-year Product Warranty

LEARN MORE with the "Fundamentals of AC Power Measurements" Application Note.



# ALLICE

Allied Consulting Engineers

make ALLICE your partner

ALLICE MESSTECHNIK GMBH

ALLICE SysTEC GMBH

KELSTERBACHER STRASSE 15-19 60528 FRANKFURT AM MAIN

TEL.: +49(0)69-67724-583 FAX: +49(0)69-67724-582

INFO@ALLICE.DE

[www.allice.de](http://www.allice.de)

© 2017 ALLICE MESSTECHNIK GMBH & ALLICE SysTEC GMBH- ALLE RECHTE VORBEHALTEN.

© 2017 ALLICE MESSTECHNIK GMBH & ALLICE SysTEC GMBH- ALL RIGHTS RESERVED

VERWENDETE WARENZEICHEN UND SCHUTZRECHTE SIND EIGENTUM DER JEWEILIGEN HERSTELLER.

LOGOS AND COMPANY NAMES LISTED ARE TRADEMARKS OR TRADE NAMES OF THEIR RESPECTIVE OWNERS.