

# AC SOURCE/ANALYZERS

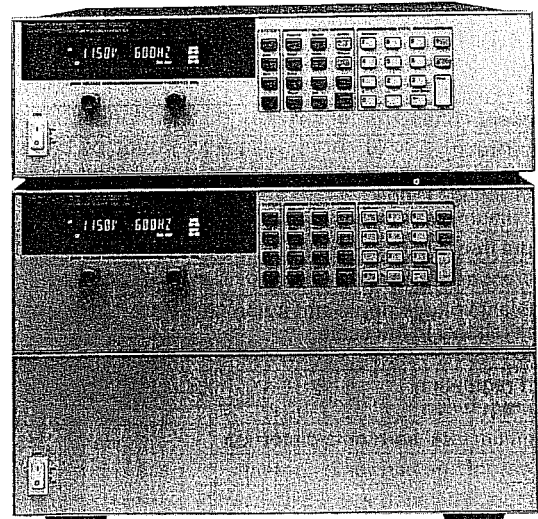
## HP 6800 Series AC Power Source/Analyzers

HP 6812A - 6814A, 6834A, 6841A-6843A (Normal mode)

- ac and dc output capability
- Compact size
- Power line disturbance simulation
- Arbitrary waveform generation
- High accuracy readback
- Built-in harmonic analysis capability
- Autoranging output (HP 6812A, 6813A, 6841A and 6842A)
- Standard Commands for Programmable Instruments (SCPI)
- Built-in HP-IB and RS-232 interface
- EC'92 compliant
- Compliance testing to IEC 555-2 Quasi-stationary current harmonics limits (6812A-6814A, 6834A)
- Full IEC 555 compliance testing with the 6840 series Harmonic/Flicker Test Systems (see pages 176 and 177)



HP 6812A, 6813A, 6841A, 6842A



HP 6814A, 6834A, 6843A

### HP 6800 Series AC Power Source/Analyzers

**HP 6812A** 0 to 300 V<sub>rms</sub>, 750 VA Single phase model  
Panel height: 5.25 inch

**HP 6813A** 0 to 300 V<sub>rms</sub>, 1750 VA Single phase model  
Panel height: 5.25 inch

**HP 6814A** 0 to 300 V<sub>rms</sub>, 3000 VA Single phase model  
Panel height: 10.5 inch

**HP 6834A** 0 to 300 V<sub>rms</sub>, 4500 VA<sub>total</sub> Three phase model  
Panel height: 10.5 inch

Hewlett-Packard ac power source/analyzers are designed for applications which require precise control, accurate measurement, and analysis of single and three phase ac power. The feature set and performance levels of this product family provide the flexibility necessary to power and test a wide variety of devices. These products are ideal for applications such as power supply testing, UPS testing, avionics ATE, the testing of power factor corrected equipment and devices, and compliance testing to regulatory standards.

The HP 6800 series utilizes a low noise switching topology, which delivers high performance and reduced size. These products can output dc (HP 6812A and HP 6813A models), ac, complex, and user-defined waveforms for exceptional application flexibility over the bus or via an easy-to-use front panel.

#### Key Features

- Sine, square, and up to 12 user-defined waveforms
- Programmable voltage, current limit, frequency, phase, and distortion (clipped sinewave)
- Programmable dc output (HP 6812A and 6813A only)
- Programmable output impedance (HP 6812A and 6813A only)
- Voltage and frequency slew control
- Power line disturbance simulation (sag, surge, dropout, clipping, and event programming)
- Independent phase control (HP 6834A)
- Measurement of rms voltage, rms current, peak current, neutral current (HP 6834A), frequency, phase, real power, reactive power, apparent power, total 3Φ power (HP 6834A), and power factor
- Harmonic analysis of voltage and current with magnitude and phase results up to the 50th harmonic
- THD measurement of voltage and current
- Over-current, over-voltage, over-power, over-temperature, and RI/DFI protection
- Built-in output isolation relays
- Sixteen non-volatile store and recall states
- User-definable power-on state
- Self-test at power-up
- HP ITG and VEE support
- Electronic calibration via the bus or front panel

### Performance and Features to Meet Critical Testing Needs

#### Powerful Direct Digital Synthesis (DDS) Waveform Generation

The HP 6800 series offers the ultimate in waveform generation versatility. These products can provide low distortion sine and square waveforms up to a maximum frequency of 1 kHz. For testing products under ac line distortion conditions, clipped sinewaves can be generated with 0% to 43% distortion. Up to twelve user-defined arbitrary waveforms can be defined and stored in non-volatile memory. These waveforms can be used to generate steady-state outputs or can be combined for more complex transient generation schemes. Testing for compliance to ac line harmonic immunity standards can easily be achieved. Sinewaves with harmonic content specified by this standard can be downloaded into non-volatile memory and generated as needed.

For testing that requires dc output capability or waveforms with a dc offset, the output of the HP 6812A and 6813A can be configured in ac or dc mode. Output changes can be programmed to start at any phase angle for all models.

#### Flexible Transient Generation

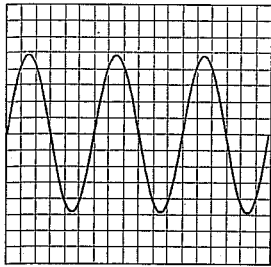
When testing requires precise synchronization between waveform generation and measurement of the device under test, the HP 6800 series transient generation capability provides a powerful tool. The Step and Pulse modes offer an easy and convenient method of executing single step and continuous output changes. The output voltage amplitude, frequency, phase, waveform shape, voltage slew rate, and frequency slew rate can be controlled in response to an input trigger generated from an internal or external event. The List transient mode further extends this capability for more complex waveform generation needs. Up to 100 sequences of output settings can be precisely executed in response to a trigger or paced by programmed dwell times without computer intervention.

#### Extensive Measurement and Analysis

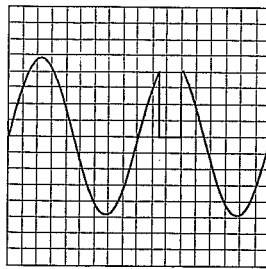
The HP 6800 series has measurement functionality equivalent to commercially available high-accuracy wattmeters. This eliminates the need for a separate system wattmeter for most applications, and lowers systems cost, increases available rack space, and simplifies cabling. All measurements are made with 16-bit resolution, suitable for even the most demanding applications.

For testing devices for compliance to regulatory standards, the HP 6800 series has built-in voltage and current waveform digitization combined with harmonic analysis capability. Amplitude, phase, and total harmonic distortion results up to the 50th harmonic are provided for output frequencies equal to or less than 250 Hz. This measurement feature, accessible via the front panel or over the bus, provides a sophisticated solution for verification of compliance in regulatory testing agencies and for precompliance testing during product development.

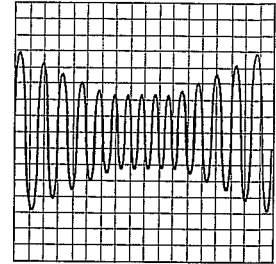
### HP 6800 Series Waveform Examples



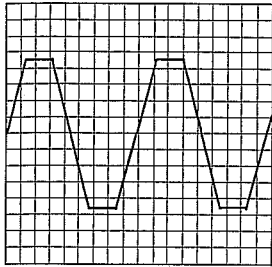
Low distortion sinewave



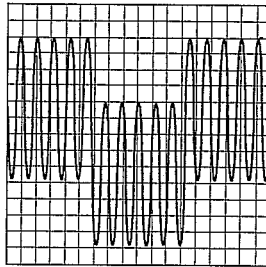
Phase referenced cycle dropout



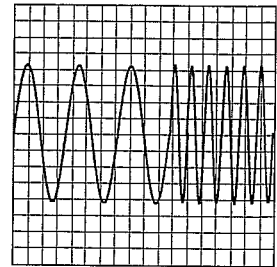
Voltage amplitude change with programmable slew rate



Programmable distortion (clipped sinewave)



Waveform with a dc offset



Frequency change with programmable slew rate

**Specifications** (Per phase for a sinewave with a resistive load at 0° to 40° C, within an output frequency range of 45 Hz to 1000 Hz, and in ac coupled mode unless otherwise noted)<sup>1</sup>

	HP 6812A/6841A <sup>2</sup>	HP 6813A/6842A <sup>2</sup>	HP 6814A	HP 6834A	HP 6843A <sup>2</sup>
Number of phases	1	1	1	3	1
Output ratings					
Power	750 VA	1750 VA	3000 VA	4500 VA	4800 VA
rms voltage range	0 to 300 V	0 to 300 V	0 to 300 V (high range) 0 to 150 V (low range)	0 to 300 V (high range) 0 to 150 V (low range)	0 to 300 V (high range) 0 to 150 V (low range)
DC voltage range	425 V	425 V	N/A	N/A	N/A
Maximum rms current	6.5 A	13 A	10 A (high range) 20 A (low range)	5 A (high range) 10 A (low range)	16 A (high range) 32 A (low range)
Maximum dc current	3.25 A	6.5 A	N/A	N/A	N/A
Maximum repetitive peak current	26 A	52 A	25 A (high range) 50 A (low range)	12.5 A (high range) 25 A (low range)	48 A (high range) 96 A (low range)
Crest factor	4	4	2.5	2.5	4
Maximum nonrepetitive peak current	40 A	80 A	25 A (high range) 50 A (low range)	12.5 A (high range) 25 A (low range)	48 A (high range) 96 A (low range)
Output frequency range	dc; 45 Hz to 1 kHz	dc; 45 Hz to 1 kHz	45 Hz to 1 kHz	45 Hz to 1 kHz	45 Hz to 1 kHz
Constant voltage ripple and noise (20 kHz to 10 MHz)	-60 dB	-60 dB	-60 dB	-60 dB	-60 dB
Line regulation	0.1%	0.1%	0.1%	0.1%	0.1%
Load regulation	0.5%	0.5%	0.5%	0.5%	0.5%
Maximum total harmonic distortion	0.25% at 50 Hz/60 Hz 1% worst case 45 Hz to 1 kHz	0.25% at 50 Hz/60 Hz 1% worst case 45 Hz to 1 kHz	1%	1%	1%
Programming accuracy (25° C ± 5° C)					
rms voltage	0.15% + 0.3V (45 to 100 Hz) 0.5% + 0.3V (>100 to 500 Hz) 1% + 0.3V (>500 to 1000 Hz)	0.15% + 0.3V (45 to 100 Hz) 0.5% + 0.3V (>100 to 500 Hz) 1% + 0.3V (>500 to 1000 Hz)	0.15% + 0.3V (45 to 100 Hz) 0.5% + 0.3V (>100 to 500 Hz) 1% + 0.3V (>500 to 1000 Hz)	0.15% + 0.3V (45 to 100 Hz) 0.5% + 0.3V (>100 to 500 Hz) 1% + 0.3V (>500 to 1000 Hz)	0.15% + 0.3V (45 to 100 Hz) 0.5% + 0.3V (>100 to 500 Hz) 1% + 0.3V (>500 to 1000 Hz)
DC voltage	0.1% + 0.5V	0.5% + 0.3V	N/A	N/A	N/A
Frequency	0.01% + 0.01 Hz	0.01% + 0.01 Hz	0.01% + 0.01 Hz	0.01% + 0.01 Hz	0.01% + 0.01 Hz
Phase	N/A	N/A	N/A	0.1° (45 to 100 Hz) 1° (>100 to 1 kHz)	0.1° (45 to 100 Hz) 1° (>100 to 1 kHz)
Measurement accuracy (25° C ± 5° C)					
rms voltage	0.03% + 100 mV	0.03% + 100 mV	0.05% + 250 mV	0.05% + 250 mV	0.05% + 250 mV
DC voltage	0.03% + 150 mV	0.03% + 150 mV	N/A	N/A	N/A
rms current	0.05% + 10 mA	0.05% + 10 mA	0.1% + 50 mA	0.1% + 50 mA	0.1% + 150 mA
Frequency	0.01% + 0.01 Hz	0.01% + 0.01 Hz	0.01% + 0.01 Hz	0.01% + 0.01 Hz	0.01% + 0.01 Hz
Power (VA)	0.1% + 1 VA	0.1% + 1 VA	0.15% + 5 VA	0.15% + 3 VA	0.15% + 9 VA
Power (watts)	0.1% + 1 W	0.1% + 1 W	0.15% + 5 W	0.15% + 3 W	0.15% + 9 W
Power factor	0.01	0.01	0.01	0.01	0.01
Isolation to ground	300 V <sub>rms</sub>				

<sup>1</sup>It is possible to program the output frequency of the HP 6812A, 6813A, 6841A (Normal mode) and 6842A (Normal mode) from dc to 45 Hz (please see note 3).

<sup>2</sup>Specifications are for Normal mode operation only of the HP 6841A, 6842A, and 6843A Harmonic/Flicker Test Systems

**Notes:**

- 30-minute warm-up period
- Specifications subject to change without notice
- Product may be operated between dc and 45 Hz subject to the following conditions:
  - Measurements may be extended to 4.5 Hz at full accuracy only by selecting a digitization rate of 250 μseconds per point
  - Frequency content of the measured signal must be limited to 4 kHz or less to avoid aliasing effects

# AC SOURCE/ANALYZERS

## HP 6800 Series AC Power Source/Analyzers (cont'd)

HP 6812A - 6814A, 6841-6843A (Normal mode)

### Supplemental Characteristics (Non-warranted characteristics determined by design that are useful in applying the product)

		HP 6812A/6841A	HP 6813A/6842A	HP 6814A	HP 6834A	HP 6843A
Average programming accuracy	rms current	0.2% + 25 mA	0.2% + 50 mA	0.2% + 80 mA	0.2% + 40 mA	0.2% + 40 mA
Average programming resolution	rms voltage	80 mV	80 mV	80 mV	80 mV	80 mV
	DC voltage	110 mV	110 mV	N/A	N/A	N/A
Overvoltage programming (OVP)	voltage	2 V	2 V	2 V	2 V	2 V
	rms current	2 mA	4 mA	5 mA	2.5 mA	2.5 mA
	Peak current	10 mA	20 mA	N/A	N/A	N/A
	Output frequency	0.001 Hz	0.001 Hz	0.001 Hz	0.001 Hz	0.001 Hz
	Phase	N/A	N/A	N/A	0.001° (45 Hz to 1 kHz)	0.001° (45 Hz to 1 kHz)
Average measurement resolution	rms voltage	10 mV	10 mV	10 mV	10 mV	10 mV
	rms current	1 mA	2 mA	1.2 mA	6 mA	6 mA
	Net weight	28.2 kg (62 lb)	32.7 kg (72 lb)	79.5 kg (175 lb)	87.7 kg (193 lb)	87.7 kg (193 lb)
	Shipping weight	31.8 kg (70 lb)	36.4 kg (80 lb)	119.1 kg (262 lb)	127.3 kg (280 lb)	127.3 kg (280 lb)

**Remote Sensing:** Up to 10 Vrms can be dropped across each load lead.

**Command Processing Time:** The average time for the output rms voltage to change after receiving an HP-IB command is 10 milliseconds.

**Calibration Interval:** One year

**HP-IB Capabilities:** SH1, AH1, T6 I4, SR1, RLI PPO, DC1, DT1, E1, and CO, and a command set compatible with IEEE 488.2 and SCPI

**Regulatory Compliance:** Listed to UL 1244; certified to CSA 22.2 No. 231; conforms to IEC 1010

**RFI Suppression:** Complies with CISPR-11, Group 1, Class A

**Warranty Period:** Three years

### AC Input Ratings (\*Input power configuration for the standard unit)

	HP 6812A/6841A	HP 6813A/6842A	HP 6814A	HP 6834A/6843A
Voltage range (Vac)	87 to 106 Vac *104 to 127 Vac 191 to 254 Vac	174 to 220 Vac *191 to 254 Vac	*180 to 254 L-L (3Φ) 342 to 456 L-L (3Φ)	*180 to 254 L-L (3Φ) 342 to 456 L-L (3Φ)
Maximum input Current (rms)	24 A (at 100, 120 Vac) 15 A (at 200, 230 Vac)	19 A	18 A 10 A	25 A 15 A
Input power (max)	2500 VA/1400 W	3800 VA/2600 W	5800 VA/4100 W	8900 VA/5900 W
Input frequency	47 to 63 Hz	47 to 63 Hz	47 to 63 Hz	47 to 63 Hz

### Key Literature

1995/96 Power Products Catalog, p/n 5963-3906.

HP 6800 Series Product Note, p/n 5963-7044.

### Ordering Information

<b>HP 6812A AC Power Source/Analyzer</b>	\$6,900
Opt 0BN Extra Documentation	\$35
Opt 1CM Rack Mount Kit (p/n 5062-3977)	\$40
Opt ICP Rack Mount Kit with Handles (p/n 5062-3983)	\$90
Opt 100 87 to 106 Vac, 48 to 63 Hz (Japan only)	\$0
Opt 230 191 to 254 Vac, 48 to 63 Hz	\$0
Opt 831 12 AWG, 200 to 240 Vac, unterminated	\$0
Opt 833 1.5 mm <sup>2</sup> wire size, 200 to 240 Vac, unterminated	\$0
Opt 834 10 AWG, 100 to 120 Vac, unterminated	\$0
Opt 841 Line Cord with NEMA 6-20P; 20 A, 250 V Plug	\$15
Opt 845 Line Cord with IEC 309; 16A, 220V Plug	\$35
Opt 846 Line Cord with NEMA L5-30P; 30 A, 120 V Plug, (p/n 8120-6509)	\$35
Opt 847 Line Cord with CEE 7/7; 16 A, 220 V Plug	\$35
Opt 848 Line Cord with BS 546; 15 A, 240 V Plug	\$35
<b>HP 6813A AC Power Source/Analyzer</b>	\$9,500
Opt 0BN Extra Documentation	\$35
Opt 1CM Rack Mount Kit (p/n 5062-3977)	\$40
Opt ICP Rack Mount Kit with Handles (p/n 5062-3983)	\$90
Opt 200 174 to 220 Vac, 47 to 63 Hz. If Opt 200 is not ordered, the ac source will be configured to operate at 191 to 254 Vac, 47 to 63 Hz.	\$0
Opt 831 12 AWG, 200 to 240 Vac, unterminated	\$0
Opt 832 4 mm <sup>2</sup> wire size, unterminated	\$0
Opt 841 Line Cord with NEMA 6-20P; 20 A, 250 V Plug	\$15
Opt 842 Line Cord with IEC 309, 32 A, 220 V Plug	\$75
Opt 844 Line Cord with NEMA L6-30P, 30 A, 250 V Locking Plug	\$55

Support rails required when rack mounting the HP 6812A and 6813A Opt 1CM and Opt 1CP.

<b>HP 6814A AC Power Source/Analyzer</b>	\$11,500
<b>HP 6834A AC Power Source/Analyzer</b>	\$13,900
Opt 0BN Extra Documentation Set	\$35
Opt 1CM Rack Mount Kit (Two p/n 5062-3977)	\$75
Opt 400 360 to 440 Vac, 3-phase, 47 to 63 Hz operation	\$1,500

**HP E3664A cabinet rails must be ordered with Opt 1CM for rackmounting the HP 6814A and HP 6834A**

### HP 6814A and HP 6834A Accessories

HP p/n 5060-3513 Three 30-A replacement fuses for 180 to 235 Vac line	\$29
HP p/n 5060-3512 Three 16-A replacement fuses for 360 to 440 Vac line	\$29
HP p/n 5063-2310 Heavy duty rack slide kit	\$300

For HP 6841A, 6842A, and 6843A Harmonic/Flicker Test System pricing and product information, see page 176 and 177.