

# 2304A High-Speed Precision Power Supply

## DC VOLTAGE OUTPUT (1 Year, 23°C ± 5°C)

### OUTPUT VOLTAGE:

- 0 to +20VDC (for Normal Output Response).
- 0 to +15VDC (for Enhanced Output Response).

OUTPUT ACCURACY: ±(0.05% + 10mV).

PROGRAMMING RESOLUTION: 5mV.

READBACK ACCURACY<sup>1</sup>: ±(0.05% + 10mV).

READBACK RESOLUTION: 1mV.

OUTPUT VOLTAGE SETTLING TIME: 5ms to within stated accuracy.

LOAD REGULATION: 0.01% + 2mV.

LINE REGULATION: 0.5mV.

STABILITY<sup>2</sup>: 0.01% + 0.5mV.

TRANSIENT RESPONSE TO 1000% LOAD CHANGE:

### NORMAL MODE:

- Transient Recovery Time<sup>3</sup>: <50µs to within 100mV of previous level.
- <100µs to within 20mV of previous level.

### ENHANCED MODE:

- Transient Recovery Time<sup>3,4</sup>: <40µs to within 100mV of previous level.
- <80µs to within 20mV of previous level.

- Transient Voltage Drop: <100mV, typical.<sup>3</sup>
- <200mV, typical.<sup>4</sup>

REMOTE SENSE: Automatic, 2V max. drop in each lead. Add 2mV to the voltage load regulation specification for each 1V change in the negative output lead due to load current change.

## DC CURRENT (1 Year, 23°C ± 5°C)

OUTPUT CURRENT: 5A max. (not intended to be operated in parallel).

COMPLIANCE ACCURACY: ±(0.16% + 5mA)<sup>5</sup>.

PROGRAMMED COMPLIANCE RESOLUTION: 1.25mA.

### READBACK ACCURACY<sup>1</sup>

- 5A range: ±(0.2% + 1mA).
- 5mA range: ±(0.2% + 1µA).

### READBACK RESOLUTION

- 5A range: 100µA.
- 5mA range: 0.1µA.

### CURRENT SINK CAPACITY:

- 3A max. (for Normal Output Response).
- 1A<sup>6</sup> (for Enhanced Output Response).

LOAD REGULATION: 0.01% + 1mA.

LINE REGULATION: 0.5mA.

STABILITY<sup>4</sup>: 0.01% + 50µA.

## DIGITAL VOLTMETER INPUT(1 Year, 23°C ± 5°C)

INPUT VOLTAGE RANGE: 0 to +20VDC.

INPUT IMPEDANCE: 10<sup>10</sup>Ω typical.

MAXIMUM VOLTAGE (either input terminal) WITH RESPECT TO OUTPUT LOW: -3V, +22V.

READING ACCURACY<sup>1</sup>: ±(0.05% + 10mV).

READING RESOLUTION: 1mV.

## DC GENERAL

MEASUREMENT TIME CHOICES: 0.01 to 10 PLC<sup>7</sup>, in 0.01PLC steps.

AVERAGE READINGS: 1 to 10.

READING TIME<sup>1,8,9</sup>: 31ms, typical.

## PULSE CURRENT MEASUREMENT OPERATION

TRIGGER LEVEL: 5mA to 5A, in 5mA steps.

TRIGGER DELAY: 0 to 100ms, in 10µs steps.

INTERNAL TRIGGER DELAY: 25µs.

HIGH/LOW/AVERAGE MODE:

Measurement Aperture Settings: 33.3µs to 833ms, in 33.3µs steps.

Average Readings: 1 to 100.

BURST MODE:

Measurement Aperture: 33.3µs.

Conversion Rate: 3600/second, typical.

Number of Samples: 1 to 5000.

Transfer Samples Across IEEE Bus in Binary Mode: 4800 bytes/second, typical.

LONG INTEGRATION MODE : 11

Measurement time: 850ms (840ms) to 60 seconds in 16.7ms (20ms) steps.

## GENERAL

ISOLATION (LOW-EARTH): 22VDC max.

PROGRAMMING: IEEE-488.2 (SCPI).

USER-DEFINABLE POWER-UP STATES: 5.

REAR PANEL CONNECTOR: 8-position quick disconnect terminal block for output (4), sense (2), and DVM (2).

RELAY CONTROL JACK: 2-channel, sink 150mA max., 15V max. Accepts 0.173 in. Bantam-type plug (CS-1003-1).

TEMPERATURE COEFFICIENT (outside 23°C ± 5°C): Derate accuracy specification by (0.1 × specification)/°C.

### OPERATING TEMPERATURE:

- 0° to 50°C (50W<sup>10</sup> normal response, 25W<sup>10</sup> enhanced response).
- 0° to 35°C (100W<sup>10</sup> normal response, 75W<sup>10</sup> enhanced response).

STORAGE TEMPERATURE: -20° to 70°C.

HUMIDITY: <80% @ 35°C non-condensing.

POWER CONSUMPTION: 200VA max.

REMOTE DISPLAY/KEYPAD OPTION: Disables standard front panel.

DIMENSIONS: 89mm high × 213mm wide × 360mm deep (3½ in × 8½ in × 14¾ in).

SHIPPING WEIGHT: 5.4kg (12 lbs).

INPUT POWER: 100V-240V AC, 50 or 60Hz (auto detected at power-up).

WARRANTY: One year parts and labor on materials and workmanship.

EMC: Conforms with European Union Directive 89/336/EEC EN 55011, EN 50082-1, EN 61000-3-2 and 61000-3-3, FCC part 15 class B.

SAFETY: Conforms with European Union Directive 73/23/EEC EN 61010-1, UL 3111-1.

ACCESSORIES SUPPLIED: User manual, calibration manual, output connector mating terminal (part no. CS-846).

ACCESSORIES AVAILABLE: Model 2304-DISP Remote Display/Keypad (4.6 in × 2.7 in × 1.5 in). Includes 2.7m (9 ft) cable and rack mount kit.

<sup>1</sup> PLC = 1.00.

<sup>2</sup> Following 15 minute warm-up, the change in output over 8 hours under ambient temperature, constant load, and line operating conditions.

<sup>3</sup> Remote sense, at output terminals, 1000% load change; typical.

<sup>4</sup> Remote sense, with 4.5m (15 ft) of 16 gauge wire and 1Ω resistance in each lead to simulate typical test environment, up to 1.5A load change.

<sup>5</sup> Minimum current in constant current mode is 6mA.

<sup>6</sup> 15W typical. 0°-35°C derate 1W/°C up to 50°C.

<sup>7</sup> PLC = Power Line Cycle. 1PLC = 16.7ms for 60Hz operation, 20ms for 50Hz operation.

<sup>8</sup> Display off.

<sup>9</sup> Speed includes measurement and binary data transfer out of GPIB.

<sup>10</sup>Max. continuous.

<sup>11</sup>60Hz (50Hz).

Specifications are subject to change without notice.