

# 2303, 2303-PJ High-Speed Precision Power Supply

## DC VOLTAGE OUTPUT (2 Years, 23°C ± 5°C)

**OUTPUT VOLTAGE:** 0 to +15VDC.  
**OUTPUT ACCURACY:** ±(0.05% + 10mV).  
**PROGRAMMING RESOLUTION:** 5mV.  
**READBACK ACCURACY<sup>1</sup>:** ±(0.05% + 3mV).  
**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:**

**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>

**RIPPLE AND NOISE (20Hz to 20MHz):** 3mV rms/8mV p-p, typical.  
**REMOTE SENSE:** Automatic 1V 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 (2 Years, 23°C ± 5°C)

**OUTPUT CURRENT:** 0–9V: 5A max. >9V–15V: 3A max. (not intended to be operated in parallel).  
**SOURCE COMPLIANCE ACCURACY:** ±(0.16% + 5mA)<sup>5</sup>.  
**PROGRAMMED SOURCE COMPLIANCE RESOLUTION:** 1.25mA.  
**READBACK ACCURACY<sup>1</sup>**  
**2303:** 5A range: ±(0.2% + 400µA). 5mA range: ±(0.2% + 1µA).  
**2303-PJ:** 5A range: ±(0.2% + 400µA). 500mA range: ±(0.2% + 40µA).  
**READBACK RESOLUTION**  
**2303:** 5A range: 100µA. 5mA range: 0.1µA.  
**2303-PJ:** 5A range: 100µA. 500mA range: 10µA.  
**CURRENT SINK CAPACITY:** 0–5V: 2A max. 5V–15V: Derate 0.1A per volt above 5V.  
**LOAD REGULATION:** 0.01% + 1mA.  
**LINE REGULATION:** 0.5mA.  
**STABILITY<sup>2</sup>:** 0.01% + 50µA.

## DIGITAL VOLTMETER INPUT (2 Years, 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% + 3mV).  
**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:**  
**2303:** 5mA to 5A, in 5mA steps.  
**2303-PJ: 5A Range:** 0mA to 5A, in 5mA steps.  
**500mA Range:** 0mA to 500mA, in 0.5mA 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: Measurement Time<sup>6</sup>:** 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).  
**TEMPERATURE COEFFICIENT (outside 23°C ± 5°C):** Derate accuracy specification by (0.1 × specification)/°C.  
**OPERATING TEMPERATURE:**  
0° to 35°C (Full power).  
0° to 50°C (Derate to 70%).  
**STORAGE TEMPERATURE:** –20° to 70°C.  
**HUMIDITY:** <80% @ 35°C non-condensing.  
**POWER CONSUMPTION:** 150VA max.  
**REMOTE DISPLAY/KEYPAD OPTION:** Disables standard front panel.  
**DIMENSIONS:** 89mm high × 213mm wide × 360mm deep (3½ in × 8½ in × 14⅞ in).  
**NET WEIGHT:** 3.2kg (7.1 lbs).  
**SHIPPING WEIGHT:** 5.4kg (12 lbs).  
**INPUT POWER:** 100–120VAC/220–240VAC, 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.  
**AC LINE LEAKAGE CURRENT:** 450µA @ 110VAC, typ.; 600µA @ 220VAC, typ.  
**RELAY CONTROL JACK:** 1-channel, sink 150mA max., 15V max. 5V output, 100mA max., also available on jack. Accepts 0.173 in Bantam-type plug (CS-1003-1).  
**ACCESSORIES SUPPLIED:** User manual, service 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.  
**Optional Version Model 2303B:** 2303 with blank front panel (only AC power indicator LED).

<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 source 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> 60Hz (50Hz).

<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.