

# 6220 Programmable Current Source

## SOURCE SPECIFICATIONS

Range (+5% over range)	Accuracy (1 Year) 23°C±5°C ±(%rdg. + amps)	Programming Resolution	Temperature Coefficient/°C 0°-18°C& 28°-50°C	Typical Noise (peak-peak) /RMS <sup>3,4,5</sup> 0.1Hz-10Hz	Settling Time <sup>1,2</sup> (1% of final value)
2nA	0.4% + 2pA	100fA	0.02% + 200fA	400/80fA	100µs
20nA	0.3% + 10pA	1pA	0.02% + 200fA	4/0.8pA	100µs
200nA	0.3% + 100pA	10pA	0.02% + 2pA	20/4pA	100µs
2µA	0.1% + 1nA	100pA	0.01% + 20pA	200/40pA	100µs
20µA	0.05% + 10nA	1nA	0.005% + 200pA	2/0.4nA	100µs
200µA	0.05% + 100nA	10nA	0.005% + 2nA	20/4nA	100µs
2mA	0.05% + 1µA	100nA	0.005% + 20nA	200/40nA	100µs
20mA	0.05% + 10µA	1µA	0.005% + 200nA	2/0.4µA	100µs
100mA	0.1% + 50µA	10µA	0.01% + 2µA	10/2µA	100µs

## ADDITIONAL SOURCE SPECIFICATIONS

**OUTPUT RESISTANCE:**  $>10^{14}\Omega$ . (2nA/20nA range)

**OUTPUT CAPACITANCE:**  $<10\text{pF}$ ,  $<100\text{pF}$  Filter ON. (2nA/20nA range)

**LOAD IMPEDANCE:** Stable into 100µH typical.

**CURRENT REGULATION: Line:**  $<0.01\%$  of range.

**Load:**  $<0.01\%$  of range.

**VOLTAGE LIMIT (Compliance):** Bipolar voltage limit set with single value. 0.1V to 105V in 0.01V programmable steps. Accuracy for 0.1V to 20V: 0.1% + 20mV, accuracy for 20V to 105V: 0.1% + 100mV

**MAX. OUTPUT POWER:** 11W, four quadrant source or sink operation.

### GUARD OUTPUT:

**Maximum Load Capacitance:** 10nF.

**Maximum Load Current:** 1mA for rated accuracy.

**Accuracy:**  $\pm 1\text{mV}$  for output currents  $<2\text{mA}$ . (excluding output lead voltage drop).

**PROGRAM MEMORY:** (offers point-by-point control and triggering, e.g. Sweeps)

**Number of Locations:** 64K.

**EXTERNAL TRIGGER:** TTL-compatible EXTERNAL TRIGGER INPUT and OUTPUT.

**Max Trigger Rate:** 1000/s.

## 6220 – 2182 MEASUREMENT FUNCTIONS

**DUT RESISTANCE:** Up to 1GΩ (1 nSiemen).

**DELTA MODE RESISTANCE MEASUREMENTS and DIFFERENTIAL CONDUCTANCE:** Controls Keithley Model 2182A Nanovoltmeter at up to 24Hz reversal rate (2182 at up to 12Hz).

### Source Notes

- 1 Settling times are specified into a resistive load, with a maximum resistance equal to  $2\text{V} / I_{\text{fullscale}}$  of range. See manual for other load conditions.
- 2 Settling times to 0.1% of final value are typically  $<2\text{x}$  of 1% settling times.
- 3 Noise current into  $<100\Omega$ .
- 4 RMS Noise 10Hz-20MHz (2nA – 20mA Range) Less than 1mVrms, 5mVp-p (into 50Ω load).
- 5 Typical values are non-warranted, apply at 23°C, represent the 50<sup>th</sup> percentile, and are provided solely as useful information.

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## GENERAL SPECIFICATIONS

**COMMON MODE VOLTAGE:** 250V rms, DC to 60Hz.

**COMMON MODE ISOLATION:**  $>10^9\Omega$ ,  $<2nF$ .

**SOURCE OUTPUT MODES:** Fixed DC level, Memory List.

### REMOTE INTERFACE:

IEEE-488 and RS-232C.

SCPI (Standard Commands for Programmable Instruments)

DDC (command language compatible with Keithley Model 220)

**PASSWORD PROTECTION:** 11 characters.

### DIGITAL INTERFACE:

**Handler Interface:** Start of test, end of test, 3 category bits, +5V@300mA supply.

**Digital I/O:** 1 trigger input, 4 TTL/Relay Drive outputs (33V@500mA, diode clamped).

### OUTPUT CONNECTIONS:

- Teflon insulated 3-lug triax connector for output.
- Banana Safety Jack for GUARD, OUTPUT LO
- Screw Terminal for CHASSIS
- DB-9 connector for EXTERNAL TRIGGER INPUT, OUTPUT, and DIGITAL I/O
- Two position Screw Terminal for INTERLOCK

**INTERLOCK:** Maximum  $10\Omega$  external circuit impedance.

**POWER SUPPLY:** 100V to 240V rms, 50-60Hz.

**POWER CONSUMPTION:** 120VA.

**WARRANTY:** 1 Year.

### ENVIRONMENT:

**For Indoor Use Only:** Maximum 2000m above Sea Level.

**Operating:**  $0^{\circ}$ - $50^{\circ}C$ , 70%R.H. up to  $35^{\circ}C$ . Derate 3% R.H./ $^{\circ}C$ ,  $35^{\circ}$ - $50^{\circ}C$ .

**Storage:**  $-25^{\circ}C$  to  $65^{\circ}C$ , guaranteed by design.

**EMC:** Conforms to European Union Directive 89/336/EEC, EN 61326-1.

**SAFETY:** Conforms to European Union Directive 73/23/EEC, EN61010-1.

**VIBRATION:** MIL-PRF-28800F Class 3, Random.

**WARMUP:** 1 hour to rated accuracies.

**Passive Cooling:** No fan.

### DIMENSIONS:

**Rack Mounting:** 89mm high x 213mm wide x 370mm deep (3.5 in. x 8.375 in. x 14.563 in.).

**Bench configuration (with handle and feet):** 104mm high x 238mm wide x 370mm deep (4.125 in. x 9.375 in. x 14.563 in.).

**SHIPPING WEIGHT:** 4.75kg (10 lbs).

**ACCESSORIES SUPPLIED:** Model 237-ALG-2 Triaxial Test Lead (6.6ft), Trigger Link cable, RS-232 (Null Modem) cable, Interlock terminal block, User's Manual, CD Manual, LabVIEW Drivers.