

KEITHLEY

6220

The Keithley 6220 is a high-precision DC current source designed for low-resistance testing, nanotechnology measurements, and semiconductor characterization. It features ultra-low noise output from 100 fA to 100 mA, high output impedance, and built-in control features to support delta-mode measurements when paired with a Keithley nanovoltmeter.

SPECIFICATIONS

General

Interfaces	GPIB (IEEE-488), RS-232, Trigger Link
Display	Vacuum Fluorescent Display (VFD)
Standard Warranty	1 year

Physical

Power Supply	100 V to 240 V AC, 50 Hz to 60 Hz, 120 VA max
Operating Temperature	0 °C to 50 °C °C
Dimensions (W×H×D)	213 mm × 89 mm × 370 mm mm
Weight	4.75 kg

System and Channel Configuration

Number of Channels	1
Guard Offset Voltage	< 1 mV
Maximum Common Mode Voltage	250 V rms (DC to 60 Hz)
Maximum Isolated Voltage to Earth	250 V rms
Output Terminals	3-slot triaxial (rear panel)
Guard Output Type	Active Guard

Current Source Specifications

Current Output Ranges	2 nA, 20 nA, 200 nA, 2 μ A, 20 μ A, 200 μ A, 2 mA, 20 mA, 100 mA
Minimum Current Output	100 fA
Maximum Current Output	105 mA
Current Programming Resolution (2 nA range)	100 fA
Current Programming Resolution (20 nA range)	1 pA
Current Programming Resolution (200 nA range)	10 pA
Current Programming Resolution (2 μ A range)	100 pA
Current Programming Resolution (20 μ A range)	1 nA
Current Programming Resolution (200 μ A range)	10 nA
Current Programming Resolution (2 mA range)	100 nA
Current Programming Resolution (20 mA range)	1 μ A
Current Programming Resolution (100 mA range)	10 μ A
Current Programming Accuracy (2 nA range)	$\pm(0.4\% + 2 \text{ pA})$
Current Programming Accuracy (20 nA range)	$\pm(0.3\% + 10 \text{ pA})$
Current Programming Accuracy (200 nA range)	$\pm(0.1\% + 100 \text{ pA})$
Current Programming Accuracy (2 μ A range)	$\pm(0.05\% + 1 \text{ nA})$
Current Programming Accuracy (20 μ A range)	$\pm(0.05\% + 10 \text{ nA})$
Current Programming Accuracy (200 μ A range)	$\pm(0.05\% + 100 \text{ nA})$
Current Programming Accuracy (2 mA range)	$\pm(0.05\% + 1 \text{ \muA})$
Current Programming Accuracy (20 mA range)	$\pm(0.05\% + 10 \text{ \muA})$
Current Programming Accuracy (100 mA range)	$\pm(0.05\% + 100 \text{ \muA})$
Voltage Compliance Range	0.1 V to 105 V (10 mV steps)
Voltage Compliance Accuracy	$\pm(0.1\% + 20 \text{ mV})$
Output Impedance (2 nA range)	$> 10^{14} \Omega$
Output Impedance (20 nA range)	$> 10^{13} \Omega$
Output Impedance (200 nA range)	$> 10^{12} \Omega$
Output Impedance (2 μ A range)	$> 10^{11} \Omega$
Output Impedance (20 μ A range)	$> 10^{11} \Omega$
Output Impedance (200 μ A range)	$> 10^{10} \Omega$
Output Impedance (2 mA range)	$> 10^9 \Omega$
Output Impedance (20 mA range)	$> 10^8 \Omega$
Output Impedance (100 mA range)	$> 10^7 \Omega$
Current Source Noise (0.1 Hz to 10 Hz, 2 nA range)	$< 80 \text{ fA p-p}$

Current Source Noise (0.1 Hz to 10 Hz, 20 nA range)	< 80 fA p-p
Current Source Noise (0.1 Hz to 10 Hz, 200 nA range)	< 800 fA p-p
Current Source Noise (0.1 Hz to 10 Hz, 2 μ A range)	< 8 pA p-p
Current Source Noise (0.1 Hz to 10 Hz, 20 μ A range)	< 80 pA p-p
Current Source Noise (0.1 Hz to 10 Hz, 200 μ A range)	< 800 pA p-p
Current Source Noise (0.1 Hz to 10 Hz, 2 mA range)	< 8 nA p-p
Current Source Noise (0.1 Hz to 10 Hz, 20 mA range)	< 80 nA p-p
Current Source Noise (0.1 Hz to 10 Hz, 100 mA range)	< 800 nA p-p
Output Settling Time	< 110 μ s to 0.1% of final value

Triggering and Memory Buffer

Data Buffer Memory Size	65,536 points
Trigger Source Options	Immediate, Timer, Manual, GPIB, Trigger Link, Digital I/O
Trigger Latency	< 2 μ s

Control and Connectivity

Digital I/O Port	1 input, 4 outputs
Safety Interlock	3-pin micro-fit connector
Command Sets / Programming Languages	SCPI (Standard Commands for Programmable Instruments), Keithley Model 220 Emulation

General and Environmental

Warm-up Time	1 hour to rated accuracy
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Physical and Environmental

Storage Temperature Range	-25 $^{\circ}$ C to 65 $^{\circ}$ C
Operating Altitude Limit	Up to 2000 m

Compliance and Standards

Safety Certifications	Conforms to European Union Directive 73/23/EEC, EN 61010-1
Electromagnetic Compatibility (EMC)	Conforms to European Union Directive 89/336/EEC, EN 61326-1

Performance

Maximum Output Power	11 W
Maximum Load Capacitance (Stable Operation)	10 nF (typical)
Temperature Coefficient	$\pm(0.1 \times \text{specification})/^{\circ}\text{C}$ for 0°C to 18°C and 28°C to 50°C
Sweep Types	Linear, Logarithmic, Custom (up to 65,536 points)

Compliance

Compliance Voltage Programming Resolution	10 mV
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Interfaces

Trigger Link Connector	8-pin mini-DIN
Digital I/O Connector Type	9-pin D-sub
GPIO Connector Type	24-pin IEEE-488
RS-232 Connector Type	9-pin D-sub

Power Supply

Maximum Power Consumption	120 VA
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TECHNOLOGY

Precision Current Source

APPLICATIONS

Nanotechnology characterization, low-resistance measurements, Hall effect measurements, differential conductance

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