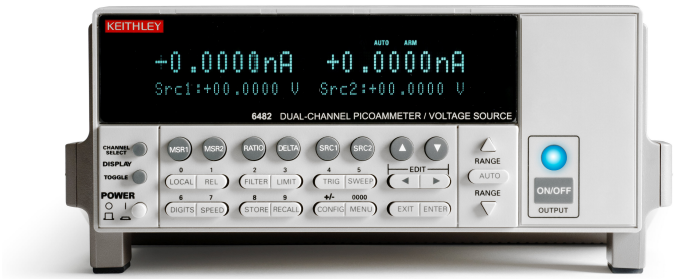
6482

Dual-Channel Picoammeter/Voltage Source Datasheet



The 6482 Dual-Channel Picoammeter/Voltage Source provides two independent picoammeter/voltage source channels for a wide range of low-level measurement applications that require dual-channel measurements. Building off the proven measurement capabilities of the Keithley 6485 5½-digit Picoammeter, the 6482 adds higher measurement resolution, a second measurement channel, and dual, independent 30 V voltage bias sources.

With its dual channel measurement capabilities, the 6482 is a great measurement tool for analyzing multi-channel devices, monitoring currents in multiple locations on materials, and recording data from multiple sensors at once. The dual channels facilitate simpler control and data aggregation. The greater channel density increases the number of instruments (and channels) that can fit in confined spaces.

Features that Expand Test and Measurement Flexibility

- **Scaled voltage analog output.** The 6482 can transmit measurement results to devices such as DMMs, data acquisition boards, oscilloscopes, or strip chart recorders.
- **220 V overload protection.** With this high overload protection and a robust design, the 6482 can withstand abusive overflows.
- **One-touch front panel design.** Functions can be configured easily with the push of a button without complicated function menus.
- **Built-in Trigger Link interface.** The Trigger Link interface simplifies synchronizing the 6482 with other instruments and voltage sources and combines six independent selectable trigger lines on a single connector for simple, direct control over all instruments in a system.
- **RS-232 and IEEE-488 (GPIB) interfaces.** These interfaces make it easy to integrate the 6482 into automated test and measurement systems.
- **Display on/off switch.** For research on light-sensitive components, such as measuring the dark currents of photodiodes, the front-panel display can be switched off to avoid introducing light that could significantly reduce the accuracy of the results.
- **REL and LOG functions.** The 6482 can make relative readings with respect to a baseline value or display the logarithm of the absolute value of the measured current.
- **Rear panel triax inputs.** Triax inputs ensure premium noise protection. Triax-to-BNC adapters, which are included, allow inexpensive, easy-to-use BNC cables to be employed in situations where noise is less of a concern.

Programmable Limits and Filters

As with most Keithley instruments, you can program the current and voltage limits of the 6482 to ensure device protection during critical points, such as start of test. These instruments also provide average and median filters, which can be applied to the data stored in the buffer memory.

Ratio and Delta Measurements

The 6482 can provide ratio or delta measurements between the two completely isolated channels. These functions can be accessed through the front panel or the GPIB interface. For test setups with multiple detectors, this capability enables targeted control capabilities.

Key Features

- Dual-channel, 6½-digit measurement capability
- Dual ±30 V bias sources
- Measure currents up to 20 mA
- Measure currents with 1 fA resolution
- 0 V to 10 V analog output for high resolution measurement feedback
- Supports assembly process, final testing, parts binning, and specification
- 3000-point buffer memory on each channel allows data transfer after test completion
- Trigger Link for binning and sweep test operations
- IEEE-488 (GPIB) and RS-232 interfaces

Applications

- Manufacturing component test
- Dual diode testing
- Semiconductor component testing
- Multi-pin component testing
- Ion beam monitoring
- Electron microscopy

Specifications

Specification conditions

This document contains specifications and supplemental information for the 6482 Dual-Channel Picoammeter/Voltage Source instrument. Specifications are the standards against which the 6482 is tested. Upon leaving the factory, the 6482 meets these specifications. Supplemental and typical values are nonwarranted, apply at 23°C, and are provided solely as useful information. The 6482 provides two independent picoammeter/voltage source channels for a wide range of measurement applications. The 6482 includes an analog output jack on the rear panel for each channel.

Source and measurement accuracies are specified at the 6482 terminals under these conditions:

- 18°C to 28°C, <70 percent relative humidity.
- After a one-hour warm-up period.
- Speed normal (1 NPLC).
- A/D autozero enabled.
- Properly zeroed operation.
- Calibration period: One year.

Measurement Specifications

Measurement specifications are tested with the speed set to Normal (1.0 NPLC) and the filter on.

DC Input Impedance is measured as DVin/ΔIin at full scale (and zero) input currents.

Range	Maximum Resolution	Accuracy (One Year) 18°C to 28°C ±(% reading + offset)	Temperature Coefficient 0° to 18°C and 28° to 50°C ±(%reading + offset)/°C	DC Input Impedance (maximum)
2.000000 nA	1 fA	1.00% + 2 pA	0.01 + 200 fA	20 kΩ
20.00000 nA	10 fA	0.40% + 2 pA	0.01 + 200 fA	20 kΩ
200.0000 nA	100 fA	0.30% + 200 pA	0.02 + 20 pA	200 Ω
2.000000 µA	1 pA	0.20% + 200 pA	0.02 + 20 pA	200 Ω
20.00000 µA	10 pA	0.10% + 20 nA	0.01 + 2 nA	2.0 Ω
200.0000 µA	100 pA	0.10% + 20 nA	0.01 + 2 nA	2.0 Ω
2.000000 mA	1 nA	0.10% + 2 µA	0.02 + 200 nA	0.2 Ω
20.00000 mA	10 nA	0.10% + 2 µA	0.02 + 200 nA	0.2 Ω

Voltage Bias Specifications

Load regulation is measured as DVin/ΔIin at full scale (20 mA) and zero load currents.

Range	Resolution	Accuracy 18°C to 28°C	Maximum Current	Load Regulation	Temperature Coefficient
±10 V	<400 µV	±(0.15% of setting + 5 mV)	20 mA	< 0.30%, 0 to 20 mA	150 ppm/°C
±30 V	<4 mV	±(0.3% of setting + 50 mV)	20 mA	< 0.30%, 0 to 20 mA	300 ppm/°C

Analog Output Specifications

Output Voltage Range (output is inverting) One Year: –10 V out for positive full scale input, +10 V out for negative full scale input.
Output Impedance: 1 kΩ typical.

Range	Accuracy (One Year) 18°C to 28°C ±(% reading + offset)	Temperature Coefficient 0° to 18°C and 28° to 50°C ±(%reading + offset)/°C	Typical Rise Time (10% to 90%)
2.000000 nA	6.0% + 90 mV	0.30% + 7 mV	6.1 ms
20.00000 nA	3.0% + 9 mV	0.11% + 700 µV	6.1 ms
200.0000 nA	6.0% + 90 mV	0.30% + 4 mV	395 µs
2.000000 µA	3.0% + 9 mV	0.11% + 400 µV	395 µs
20.00000 µA	6.0% + 90 mV	0.30% + 4 mV	135 µs
200.0000 µA	2.5% + 9 mV	0.11% + 400 µV	135 µs
2.000000 mA	6.0% + 90 mV	0.30% + 4 mV	21 µs
20.00000 mA	2.5% + 9 mV	0.11% + 400 µV	21 µs

Typical Noise Floor Measurement Specifications

	Typical Noise Floor — RMS (1 STDEV), 100 Samples			
Range	0.01 NPLC	0.1 NPLC	1.0 NPLC	10 NPLC
2.000000 nA	2.5 pA	1.5 pA	45 fA	15 fA
20.00000 nA	2.5 pA	1.5 pA	45 fA	15 fA
200.0000 nA	200 pA	120 pA	2 pA	500 fA
2.000000 µA	200 pA	120 pA	2 pA	500 fA
20.00000 µA	20 nA	12 nA	200 pA	50 pA
200.0000 µA	20 nA	12 nA	200 pA	50 pA
2.000000 mA	2 µA	1.5 µA	25 nA	5 nA
20.00000 mA	2 µA	1.5 µA	25 nA	5 nA

Typical Speed and Noise Rejection

	Readings per Second			
Digits	GPIB (SCPI)	GPIB (488.1)	NPLC	NMRR
4½	700	900	0.01	—
5½	60	475	0.1	—
6½	58	58	1	60 dB

General

Source Capacitance	Stable to 10.0 nF (typical).
Input Bias Current	50 fA maximum @ 23°C. Specification by design.
Input Voltage Burden	4.0 mV maximum. Measured (at input triaxial connector) as DVin at full scale (20 mA) versus zero input currents.
Voltage Source Slew Rate	3.0 ms/V (typical).
Common Mode Voltage	200 VDC.
Common Mode Isolation	Typically $10^9\Omega$ in parallel with 150 nF.
Overrange	105% of measurement range.
Memory Buffer	6000 readings (two 3000 point buffers). Includes selected measured values and timestamp.
Programmability	IEEE-488.2 (GPIB), RS-232, five user-definable power-up states plus factory default and *RST.
Output Enable Connector	**Output Enable:** Active low input. **Input Line:** Start of test (SOT) trigger input.
Power Supply	100 V, 120 V, 220 V, 240 V (±10%), 50 Hz or 60 Hz, 50 VA maximum.
Warranty	1 year.
EMC	Conforms with European Union Directive 89/336/EEC, EN61326-1.
Vibration	MIL-T-28800F random class 3.
Safety	Conforms with European Union Directive 73/23/EEC, EN61010-1.
Warm-up	1 hour to rated accuracy.
Dimensions	**Rack Mount:** 89 mm high × 213 mm wide × 370 mm deep (3.5 in. × 8.4 in. × 14.6 in.). **Bench Configuration (with handle and feet):** 104 mm high × 238 mm wide × 370 mm deep (4.1 in. × 9.4 in. × 14.6 in.).
Weight	4.8 kg (10.5 lb.).
Environment	For indoor, non-residential use only. **Altitude:** Maximum 2000 m (6562 ft.) above sea level. **Operating:** 0°C to 50°C, 70% relative humidity up to 35°C. Derate 3% relative humidity/°C, 35° to 50°C. **Storage:** −25° to 65°C.

Ordering information

6482	Dual Channel Picoammeter/Voltage Source (120 V line power voltage)
6482/E	Dual Channel Picoammeter/Voltage Source (220-240 V line power voltage)
6482/J	Dual Channel Picoammeter/Voltage Source (100 V line power voltage)

Supplied Accessories

7078-TRX-BNC	Triax-to-BNC Connector (2×)

Available Accessories

Cables

237-ALG-2	Low Noise Triax Cable with Alligator Clips, 2 m (6.6 ft)
7007-1	Shielded IEEE-488 Cable, 1 m (3.3 ft)
7078-TRX-*	3-Slot Triax Cable
7754-3	BNC to Alligator Cable 0.9 (3 ft)
8501-1	Trigger Link Cable with Male Micro-DIN Connectors at each End, 1 m (3.3 ft)

Adapters

237-TRX-BAR	3-lug Triax Barrel
7078-TRX-BNC	Female BNC to 3-Slot Male Triax for connecting BNC cable into triax fixture
CS-565	BNC Barrel

Rack Mount Kits

4288-1	Single Fixed Rack Mounting Kit
4288-2	Dual Fixed Rack Mounting Kit

GPIB Interfaces

KPCI-488LPA	IEEE-488 Interface/Controller for the PCI Bus
KUSB-488B	IEEE-488 USB-to-GPIB Interface Adapter

Available Services

6482-3Y-EW	1 Year Factory Warranty extended to 3 years from date of shipment
6482-5Y-EW	1 Year Factory Warranty extended to 3 years from date of shipment
C/6482-3Y-DATA	3 (Z-540-1 compliant) calibrations within 3 years of purchase for 6482
C/6482-5Y-DATA	5 (Z-540-1 compliant) calibrations within 5 years of purchase for 6482
C/6482-3Y-ISO	3 (ISO-17025 accredited) calibrations within 3 years of purchase for 6482
C/6482-5Y-ISO	5 (ISO-17025 accredited) calibrations within 5 years of purchase for 6482

Certifications

Tektronix is registered to ISO 9001:2015 and ISO 14001:2015.

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