Tightly coupled source and measure for active component testing

SEMICONDUCTOR

2400-LV, 2400-C, 2401, 2420, 2420-C, 2440, 2440-C

SourceMeter® SMU Instruments for Optoelectronic I-V Testing

- **Designed for production testing of VCSELs, transmitter, high power pump lasers, and other high current electronic components**
- **Key building block for programmable LIV test system for laser diode modules**
- **Very low noise current source (50µA) for laser diode drive**
- **Up to 5A laser diode drive current**
- **Trigger Link, Source Memory, and buffer memory support automatic test sequencing**
- **Reduced GPIB bus traffic improves test throughput**
- **Expandable and flexible for future requirements**
- **Built-in comparator for fast pass/fail testing**
- **Digital I/O handler interface**
- **1000 readings/second at 4½ digits**
- **Optional contact check function**

The SourceMeter family was developed specifically for test applications that demand tightly coupled precision voltage and current sourcing and concurrent measurement, including source read back. This family of instruments can be easily programmed to drive laser diodes throughout the characterization process. Any of them can also be programmed to act as a synchronization controller to ensure simultaneous measurements during the test sequence. Selecting a fixed current range eliminates the potential for range offsets that appear as kinks during the LIV sweep testing. The Models 2400-LV and 2401 offer a drive current of up to 1A, ideal for testing VCSEL devices.

The Model 2420 offers a tighter accuracy specification that allows for precise control of transmitter laser devices. In addition to higher accuracy, the Model 2420 offers a drive current of up to 3A for devices that need drive currents greater than 1A, such as pump lasers used in EDFA amplifiers.

The Model 2440 5A SourceMeter SMU Instrument further broadens the capabilities offered by the popular SourceMeter line. The dynamic range and functionality of the Model 2440 makes it ideal for applications such as testing high power pump lasers for use in optical amplifiers, laser bar tests, and testing other higher power components. Manufacturers of Raman pump laser modules and optical amplifiers will find it invaluable for a wide range of design and production test applications.

A Keithley SourceMeter SMU instrument provides a complete, economical, high throughput solution for component production testing, all in one compact, half-rack box. It combines source, measure, and control capabilities in a form factor that's unique to the industry. The SourceMeter is also suitable for making a wide range of low power DC measurements, including resistance at a specified current or voltage, breakdown voltage, leakage current, and insulation resistance.

Single Box Solution

By linking source and measurement circuitry in a single unit, a SourceMeter SMU instrument offers a variety of advantages over systems configured with separate source and measurement instruments. For example, it minimizes the time required for test station development, setup, and maintenance, while lowering the overall cost of system ownership. It simplifies the test process itself by eliminating many of the complex synchronization and connection issues associated with using multiple instruments. Its compact, half-rack size conserves "real estate" in the test rack or bench.

ACCESSORIES AVAILABLE

LASER DIODE MOUNTS

8542	Dual In-Line Telecom Laser Diode Mount Bundle
8544	Butterfly Telecom Laser Diode Mount Bundle
8544-TEC	Butterfly Telecom Laser Diode Mount Bundle with TEC, thermistor, and AD592CN temperature sensor

COMMUNICATION INTERFACE

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

SWITCHING HARDWARE

7001	Two-Slot Switch System
7002	Ten-Slot Switch System
7053	High-Current Switch Card

TEST LEADS AND PROBES

5806	Kelvin Clip Lead Set

CABLES/ADAPTERS

2499-DIGIO	Digital I/O Expansion Assembly
7007-1	Shielded GPIB Cable, 1m (3.3 ft)
7007-2	Shielded GPIB Cable, 2m (6.6 ft)
7009-5	RS-232 Cable
8501-1	Trigger Link Cable, 1m (3.3 ft)
8501-2	Trigger Link Cable, 2m (6.6 ft)
8502	Trigger Link Adapter Box

RACK MOUNT KITS

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

1.888.KEITHLEY (U.S. only)
www.keithley.com

2400-LV, 2400-C, 2401, 2420, 2420-C, 2440, 2440-C

SourceMeter® SMU Instruments for Optoelectronic I-V Testing

Ordering Information

2400-LV Low Voltage SourceMeter
Measurements up to 20V and 1A, 20W Power Output

2400-C General-Purpose SourceMeter
Contact Check, Measurements up to 200V and 1A, 20W Power Output

2401 Low Voltage SourceMeter
Measurements up to 20V and 1A, 20W Power Output

2420 High-Current SourceMeter
Measurements up to 60V and 3A, 60W Power Output

2420-C High-Current SourceMeter
Contact Check, Measurements up to 60V and 3A, 60W Power Output

2440 5A SourceMeter
Measurements up to 40V and 5A, 50W Power Output

2440-C 5A SourceMeter
Contact Check, Measurements up to 40V and 5A, 50W Power Output

Accessories Supplied

Test Leads, User's Manual, Service Manual, and LabVIEW® Drivers

High Throughput to Meet Demanding Production Test Schedules

A SourceMeter SMU instrument's highly integrated architecture offers significant throughput advantages. Many features of this family enable them to "take control" of the test process, eliminating additional system bus traffic and maximizing total throughput. Built-in features that make this possible include:

- Source Memory List test sequencer with conditional branching
- Handler/prober interface
- Trigger Link compatibility with switching hardware and other instruments from Keithley
- High speed comparator, pass/fail limits, mathematical scaling
- Deep memory buffer

The SourceMeter SMU instruments also offer standard RS-232 and GPIB interfaces for integration with a PC. Adding one of Keithley's versatile switch systems enables fast, synchronized multi-point testing.

Testing Optoelectronic Components

Use a SourceMeter SMU instrument to measure a component's electrical performance characteristics and to drive laser diodes and other components.

Types of Optoelectronic Components

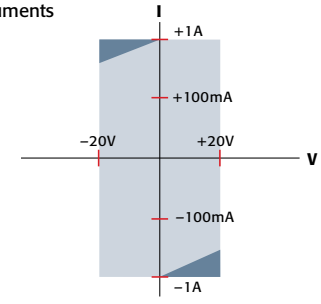
- Laser diodes
- Laser diode modules
- Photodetectots
- Light-emitting diodes (LEDs)
- Photovoltaic cells

Typical Tests

- LIV test (laser diodes and LEDs)
- Kink test (laser diode)
- I-V characterization

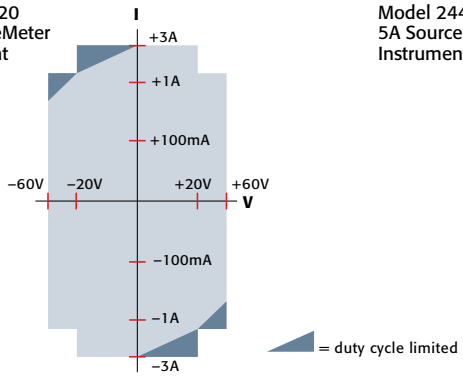
Model	2400-LV/2400-C/2401	2420/2420-C	2440/2440-C
Description	General Purpose	3 A	5 A
Power Output	20 W	60 W	50 W
Voltage Range	±1 μV to ±20 V	±1 μV to ±63 V	±1 μV to ±42 V
Current Range	±50 pA to ±1.05 A	±500 pA to ±3.15 A	±500 pA to ±5.25 A
Ohms Range	<0.2 Ω to >200 Ω	<0.2 Ω to >200 MΩ	<2.0 Ω to >200 MΩ
Applications	Optoelectronic components. VCSELs.	Transmitter modules. EDFA pumps.	5A pump laser diodes. Raman amplifiers.

Models 2400-LV/2401 SourceMeter Instruments



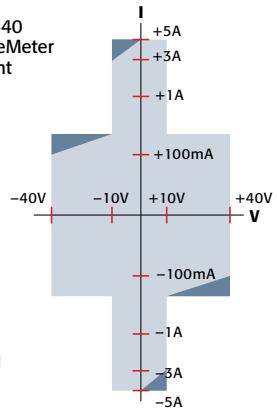
The Models 2400-LV and 2401 are ideal for testing a wide variety of devices, including diodes, resistors, resistor networks, active circuit protection devices, and portable battery-powered devices and components.

Model 2420 3A SourceMeter Instrument



Choose the Model 2420 for testing higher power resistors, thermistors, I_{DDQ}, solar cells, batteries, and high-current or medium power diodes, including switching and Schottky diodes.

Model 2440 5A SourceMeter Instrument



The Model 2440's wide dynamic range is well-suited for applications such as testing high-power pump lasers for use in optical amplifiers and laser bar tests, as well as testing other higher power components.

Tightly coupled source and measure for active component testing

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SourceMeter® SMU Instruments for Optoelectronic I-V Testing

Faster, Easier, and More Efficient Testing and Automation

Coupled Source and Measure Capabilities

The tightly coupled nature of a SourceMeter SMU instrument provides many advantages over separate instruments. The ability to fit a source and a meter in a single half-rack enclosure saves valuable rack space and simplifies the remote programming interface. Also, the tight control and a single GPIB address inherent in a single instrument result in faster test times for ATE applications due to reduced GPIB traffic.

Standard and Custom Sweeps

SourceMeter SMU instruments provide sweep solutions that greatly accelerate testing with automation hooks for additional throughput improvement.

Optional Contact Check

The Contact Check option available on all Series 2400 SourceMeter SMU instruments allows quick verification of a good connection to the DUT before functional testing proceeds. This feature helps prevent the loss of precious test time due to damaged, corroded, or otherwise faulty contacts in a test fixture. The innovative contact check design completes the verification and notification process in less than 350µs; comparable capabilities in other test equipment can require up to 5ms to perform the same function. Contact check failure is indicated on the instrument's front panel and over the GPIB bus. The digital I/O interface can also be used to communicate contact failure to the component handler in automated applications.

SOURCEMETER SMU INSTRUMENT SPECIFICATIONS

The following tables summarize the capabilities of the Models 2400-LV, 2420, and 2440.

2400-LV SOURCEMETER (I-V MEASUREMENTS)

Current Programming Accuracy

Range	Programming Resolution	Accuracy (1 Year) 23°C ± 5°C ± (% rdg. + amps)
1.00000 µA	50 pA	0.035% + 600 pA
10.0000 µA	500 pA	0.033% + 2 nA
100.000 µA	5 nA	0.031% + 20 nA
1.00000 mA	50 nA	0.034% + 200 nA
10.0000 mA	500 nA	0.045% + 2 µA
100.000 mA	5 µA	0.066% + 20 µA
1.00000 A	50 µA	0.27 % + 900 µA

Voltage Measurement Accuracy

Range	Default Resolution	Input Resistance	Accuracy (1 Year) 23°C ±5°C ± (% rdg. + volts)
200.000 mV	1 µV	> 10 GΩ	0.01 % + 300 µV
2.00000 V	10 µV	> 10 GΩ	0.012% + 300 µV
20.0000 V	100 µV	> 10 GΩ	0.015% + 1.5 mV

2420 SOURCEMETER (I-V MEASUREMENTS)

Current Programming Accuracy

Range	Programming Resolution	Accuracy (1 Year) 23°C ± 5°C ± (% rdg. + amps)
10.0000 µA	500 pA	0.033% + 2 nA
100.000 µA	5 nA	0.031% + 20 nA
1.00000 mA	50 nA	0.034% + 200 nA
10.0000 mA	500 nA	0.045% + 2 µA
100.000 mA	5 µA	0.066% + 20 µA
1.00000 A	50 µA	0.067% + 900 µA
3.00000 A	50 µA	0.059% + 2.7 mA

Voltage Measurement Accuracy

Range	Default Resolution	Input Resistance	Accuracy (1 Year) 23°C ±5°C ± (% rdg. + volts)
200.000 mV	1 µV	> 10 GΩ	0.012% + 300 µV
2.00000 V	10 µV	> 10 GΩ	0.012% + 300 µV
20.0000 V	100 µV	> 10 GΩ	0.015% + 1 mV
60.0000 V	1 mV	> 10 GΩ	0.015% + 3 mV

2440 SOURCEMETER (I-V MEASUREMENTS)

Current Programming Accuracy

Range	Programming Resolution	Accuracy (1 Year)[3] 23°C ± 5°C ± (% rdg. + amps)
10.0000 µA	500 pA	0.033% + 2 nA
100.000 µA	5 nA	0.031% + 20 nA
1.00000 mA	50 nA	0.034% + 200 nA
10.0000 mA	500 nA	0.045% + 2 µA
100.000 mA	5 µA	0.066% + 20 µA
1.00000 A	50 µA	0.067% + 900 µA
5.00000 A	50 µA	0.10 % + 5.4 mA

Voltage Measurement Accuracy

Range	Default Resolution	Input Resistance	Accuracy (1 Year) 23°C ±5°C ± (% rdg. + volts)
200.000 mV	1 µV	> 10 GΩ	0.012% + 300 µV
2.00000 V	10 µV	> 10 GΩ	0.012% + 300 µV
10.0000 V	100 µV	> 10 GΩ	0.015% + 750 µV
40.0000 V	1 mV	> 10 GΩ	0.015% + 3 mV