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Find the *Interface Technology SM15* at our website: *Click HERE*

SM15 Source-Measure Module

Voltage/Current



- Source and Measure Up to 15 Volts
- 30 fA and 50 µV Measurement Sensitivity
- Four Operating Modes: DC, Step, Pulse, Sweep
- Store 8,190 (reading) / 256 (setting) Memory
- 0.05% Basic Accuracy
- 1000 Source / Measurements Per Second
- Fast VXIbus Operation
- 4-Wire Kelvin Connections With Driven Guard
- Four Quadrant Source Operation

SOURCE-MEASURE MODULES

Description

A fully programmable instrument, capable of sourcing and measuring voltage or current simultaneously, the SM15 is actually four instruments in one. The instrument can: source voltage/measure voltage/source current/measure current. The SM15 will source voltages from 50 µV to 15 V, and current from 30 fA to 100 mA. Selectable integration and the filtering of multiple measurements enhances sensitivity for demanding applications. Both source voltages and source currents settle to specified accuracy in as little as 500 µs (typical). Programmable delay and fast, integrating measurement capability can provide coordinated source-measure times of 1 ms.

Applications

The SM15 addresses a wide variety of applications, including the characterization of semiconductor devices, and measurement of leakage currents or resistivity. The SM15 is a powerful and versatile tool for research and industrial test applications. The large dynamic range of source and measure capabilities permits accurate measurement of insulation resistance, leakage current, and dissipation factors. The high sensitivity of this module makes it ideal for characterizing the electrical properties of many materials. Simple plug&play setup, coupled with simplified programming are big advantages for tests that need to be up and running quickly.

Voltage or Current Measurements

Measurements can be taken and recorded in an internal memory along with corresponding values of the source voltage or current. Up to 8190 values of each variable, correlated in counts, may be accessed by the soft-front panel. A user can set (and store values into memory) up to 256 steps between any two selected voltages or currents. All measurements and source values, along with the elapsed time, can be obtained over the VXI bus. All source values and corresponding measurement values are stored in sequence and share a common index.

Data Display

Memory content may be accessed via the VXI bus or displayed in several formats using the soft-front panel controls. Source and measure values may be displayed simultaneously, or with the index value. The choice between display modes is conveniently made using the soft-front panel controls. The delay time between source and measurement may be independently set from 0 to 65535 ms from the soft-front panel or the VXI interface.

Selectable Sweeps

The SM15 can be easily programmed to perform source-measurements as a function of a stepped voltage or current. Voltage and current may be swept linearly, logarithmically, or pulsed. Creating custom sweeps of voltage or current is facilitated by the use of SCPI commands or VXI bus shared memory.

Fully Guarded Measurements

The SM15 outputs and inputs are fully guarded and it is configured to allow four-terminal measurements. Two-terminal measurements are also available for more standard test procedures.

Triggers

The SM15 uses input and output triggers to synchronize its operation with other test modules, such as arbitrary waveform generators, digitizers and the SR5000 and SR2500 digital test instruments from Interface Technology.

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SOURCE-MEASURE MODULES

*SM15 SPECIFICATIONS**

Specification Conditions

The measurement and output accuracy are specified at the panel connector terminals when referenced to the Zero Check terminal under the following conditions:

1. 23ºC ± 5°C (double between 5°C to 18°C, and 28ºC to 40°C if not noted otherwise)
2. After 40 minutes warm-up
3. Ambient temperature change less than 1.5°C after auto calibration execution
4. Integration time: slow
5. Filter: ON
6. Kelvin connection
7. Calibration period: 1 year

General

Function: Can be used as DC source or meter, step source, pulse source, sweep source, or full source/measure unit.
Guard Output Impedance: <12k ohms
Maximum Common Mode Voltage: 15V

Execution Speed

Minimum Source-Delay-Measure Cycle Time: 1ms
Response VXI SCPI Command (as a source): 15ms
Measurement Rate: 1ms per point into internal buffer
Continuous Measurement Speed (source DC value over VXIbus): 1000 readings per second (Block Mode)
Trigger Latency Time: < 6 ms

Memory

Store Reading	8,190
Store Setting	256

Voltage

SOURCE V			MEASURE V	
RANGE (Max Value)	STEP SIZE	ACCURACY (1 Year) 18º - 28º C	RESOLUTION	ACCURACY (1 Year) 18º - 28º C
±1.5 V	50 µV	±(0.05% +650 µV)	50 µV	±(0.05% + 650 µV)
±15 V	500 µV	±(0.05% +3.2 mV)	500 µV	±(0.05% + 3.20 mV)

Compliance	Bipolar limit set with single value
Maximum	±15V
Minimum	±1% of selected range
Accuracy	0.5% of selected range
Overshoot	<0.1% (10V step, 10mA range)
Settling Time	<500µs to 0.05% (10V step, 10mA range)
Input Impedance	10^{13} ohm (as a voltmeter) paralleled by < 20 pF
RMT Sense Drop	2.0 (maximum)

Noise (p-p)

RANGE	0.1-10 Hz	DC-20 MHz
15 V	< 3 ppm of range	35 mV
1.5 V	< 15 ppm of range	35 mV

Wideband Noise 0.1 to 20 MHz, 20 mV p-p typical

Current

SOURCE I			MEASURE I	
RANGE (Max Value)	STEP SIZE	ACCURACY (1 Year) 18º - 28ºC	RESOLUTION	ACCURACY (1 Year) 18º - 28ºC
±1 nA	30 fA	±(0.5% + 900 fA)	30 fA	±(0.5% + 900 fA)
±10 nA	305 fA	±(0.5% + 3 pA)	305 fA	±(0.5% + 1 pA)
±100 nA	3 pA	±(0.5% + 30 pA)	3 pA	±(0.5% + 6 pA)
±1 µA	30 pA	±(0.5% + 300 pA)	30 pA	±(0.05% + 60 pA)
±10 µA	305 pA	±(0.05% + 3 nA)	305 pA	±(0.05% + 900 pA)
±100 µA	3 nA	±(0.05% + 30 nA)	3 nA	±(0.05% + 6 nA)
±1 mA	30 nA	±(0.05% + 300 nA)	30 nA	±(0.05% + 60 nA)
±10 mA	305 nA	±(0.05% + 3 µA)	305 nA	±(0.05% + 900 nA)
±100 mA	3 µA	±(0.1% + 30 µA)	3 µA	±(0.1% + 6 µA)

Compliance	Bipolar limit set with single value
Maximum	±100mA
Minimum	±1% of selected range
Accuracy	±0.5% of selected range
Noise (p-p of range)	0.1-10 Hz <5 ppm
Overshoot	<0.1% (10mA step, RL = 1k ohm)
Settling Time	<500 µs to 0.05% (10mA step, RL = 1k ohm)
Output Resistance	10^{13} ohm paralleled by <20 pF

VXI Specifications

Interface Compatibility

Type	Message-based servant
VXI Revision	1.4
Size	C-size, single slot
Configuration	Static

Power Requirements

+5.0 volts	2.00 A	10.00 W
+12.0 volts	0.50 A	6.00 W
-12.0 volts	0.50 A	6.00 W
+24.0 volts	0.16 A	3.84 W
-24.0 volts	0.16 A	3.84 W

Total Power		29.68 W

Cooling Requirements

Per-slot Average	23 W typical, 30 W, maximum
Airflow	2.0 L / sec @ 0.19 mm water pressure for 10º C temperature rise

Environmental

Temperature	Storage = -25º C to +60º C Operating = 0º C to +50º C
Humidity	5% to 70% relative, noncondensing

Software Drivers

National Instruments	LabWindows/CVI

* Specifications subject to change without notice.

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