

2601 2602

System SourceMeter® Multi-Channel I-V Test Solutions

SPECIFICATION CONDITIONS

This document contains specifications and supplemental information for the Models 2601 and 2602. Specifications are the standards against which the Models 2601 and 2602 are tested. Upon leaving the factory the 2601 and 2602 meet these specifications. Supplemental and typical values are non-warranted, apply at 23°C, and are provided solely as useful information.

The source and measurement accuracies are specified at the SourceMeter CHANNEL A (2601 and 2602) or SourceMeter CHANNEL B (2602) terminals under the following conditions:

1. 23°C ± 5°C, <70% relative humidity.
2. After 2 hour warm-up.
3. Speed normal (1 NPLC).
4. A/D auto-zero enabled.
5. Remote sense operation or properly zeroed local operation.
6. Calibration period = 1 year.

SOURCE SPECIFICATIONS

VOLTAGE PROGRAMMING ACCURACY¹

RANGE	PROGRAMMING RESOLUTION	ACCURACY (1 Year) 23°C ±5°C ±(% rdg. + volts)	TYPICAL NOISE (peak-peak) 0.1Hz–10Hz
100.000 mV	5 µV	0.02% + 250 µV	20 µV
1.00000 V	50 µV	0.02% + 400 µV	50 µV
6.00000 V	50 µV	0.02% + 1.8 mV	100 µV
40.0000 V	500 µV	0.02% + 12 mV	500 µV

TEMPERATURE COEFFICIENT (0°–18°C & 28°–50°C): ±(0.15 × accuracy specification)/°C.

MAXIMUM OUTPUT POWER AND SOURCE/SINK LIMITS²: 40.4W per channel maximum. ±40.4V @ ±1.0A, ±6.06V @ ±3.0A, four quadrant source or sink operation.

VOLTAGE REGULATION: Line: 0.01% of range. Load: ±(0.01% of range + 100µV).

NOISE 10Hz–20MHz (peak-peak): 25mV typical into a resistive load.

CURRENT LIMIT/COMPLIANCE³: Bipolar current limit (compliance) set with single value. Minimum value is 10nA. Accuracy same as current source.

OVERSHOOT: <±(0.1% + 10mV) typical (step size = 10% to 90% of range, resistive load, maximum current limit/compliance).

GUARD OFFSET VOLTAGE: <10mV typical (Iout ≤ 100mA).

CURRENT PROGRAMMING ACCURACY

RANGE	PROGRAMMING RESOLUTION	ACCURACY (1 Year) 23°C ±5°C ±(% rdg. + amps)	TYPICAL NOISE (peak-peak) 0.1Hz–10Hz
100.000 nA	1 pA	0.06% + 100 pA	5 pA
1.00000 µA	10 pA	0.03% + 600 pA	25 pA
10.0000 µA	100 pA	0.03% + 2 nA	50 pA
100.000 µA	1 nA	0.03% + 30 nA	3 nA
1.00000 mA	10 nA	0.03% + 200 nA	5 nA
10.0000 mA	100 nA	0.03% + 3 µA	200 nA
100.000 mA	1 µA	0.03% + 20 µA	500 nA
1.00000 A ²	10 µA	0.05% + 900 µA	60 µA
3.00000 A ²	10 µA	0.06% + 1.5 mA	150 µA

TEMPERATURE COEFFICIENT (0°–18°C & 28°–50°C): ±(0.15 × accuracy specification)/°C.

MAXIMUM OUTPUT POWER AND SOURCE/SINK LIMITS²: 40.4W per channel maximum. ±1.01A @ ±40.0V, ±3.03A @ ±6.0V, four quadrant source or sink operation.

CURRENT REGULATION: Line: 0.01% of range. Load: ±(0.01% of range + 100pA).

VOLTAGE LIMIT/COMPLIANCE⁴: Bipolar voltage limit (compliance) set with a single value. Minimum value is 10mV. Accuracy same as voltage source.

OVERSHOOT: <0.1% typical (step size = 10% to 90% of range, resistive load; see CURRENT SOURCE OUTPUT SETTLING TIME for additional test conditions).

ADDITIONAL SOURCE SPECIFICATIONS

TRANSIENT RESPONSE TIME: <70µs for the output to recover to 0.1% for a 10% to 90% step change in load.

VOLTAGE SOURCE OUTPUT SETTLING TIME: Time required to reach 0.1% of final value, when changing from 10% to 90% of range, after source level command is processed on a fixed range.

100mV, 1V Ranges: <50µs typical.

6V Range: <100µs typical.

40V Range: <150µs typical.⁵

CURRENT SOURCE OUTPUT SETTLING TIME: Time required to reach 0.1% of final value, when changing from 10% to 90% of range, after source level command is processed on a fixed range. Values below for Iout · Rload = 2V unless noted.

3A–10mA Ranges: <80µs typical (current less than 2.5A, Rload >1.5Ω).

1mA Range: <100µs typical.

100µA Range: <150µs typical.

10µA Range: <500µs typical.

1µA Range: <2.5ms typical.

100nA Range: <25ms typical.

DC FLOATING VOLTAGE: Output can be floated up to ±250VDC from chassis ground.

REMOTE SENSE OPERATING RANGE¹:

Maximum voltage between HI and SENSE HI = 3V.

Maximum voltage between LO and SENSE LO = 3V.

VOLTAGE OUTPUT HEADROOM:

40V Range: Max. output voltage = 42V – total voltage drop across source leads (maximum 1Ω per source lead).

6V Range: Max. output voltage = 8V – total voltage drop across source leads.

OVER TEMPERATURE PROTECTION: Internally sensed temperature overload puts unit in standby mode.

VOLTAGE SOURCE RANGE CHANGE OVERSHOOT: Overshoot into a 100kΩ load, 20MHz BW, 300mV typical.

CURRENT SOURCE RANGE CHANGE OVERSHOOT: <5% + 300mV/Rload of larger range typical. (See CURRENT SOURCE OUTPUT SETTLING TIME for additional test conditions.)

NOTES

1. Add 50µV to source accuracy specifications per volt of HI lead drop.
2. Full power source operation regardless of load to 30°C ambient. Above 30°C and/or power sink operation, refer to Section 8 – Operating Boundaries in the Series 2600 Reference Manual for additional power derating information.
3. For sink mode operation (quadrants II and IV), add 12% of limit range and ±0.02% of limit setting to corresponding current limit accuracy specifications. For 1A range add an additional 40mA of uncertainty.
4. For sink mode operation (quadrants II and IV), add 10% of compliance range and ±0.02% of limit setting to corresponding voltage source specification. For 100mV range add an additional 60mV of uncertainty.
5. Add 150µs when measuring on the 1A range.

METER SPECIFICATIONS

VOLTAGE MEASUREMENT ACCURACY ¹

RANGE	DISPLAY RESOLUTION ³	INPUT RESISTANCE	ACCURACY (1 Year) 23°C ±5°C ±(% rdg. + volts)
100.000 mV	1 µV	>10 GΩ	0.015% + 150 µV
1.00000 V	10 µV	>10 GΩ	0.015% + 200 µV
6.00000 V	10 µV	>10 GΩ	0.015% + 1 mV
40.0000 V	100 µV	>10 GΩ	0.015% + 8 mV

TEMPERATURE COEFFICIENT (0°–18°C & 28°–50°C): ±(0.15 × accuracy specification)/°C.

CURRENT MEASUREMENT ACCURACY

RANGE	DISPLAY RESOLUTION ³	VOLTAGE BURDEN ²	ACCURACY (1 Year) 23°C ±5°C ±(% rdg. + amps)
100.000 nA	1 pA	<1 mV	0.05 % + 100 pA
1.00000 µA	10 pA	<1 mV	0.025% + 300 pA
10.0000 µA	100 pA	<1 mV	0.025% + 1.5 nA
100.000 µA	1 nA	<1 mV	0.02 % + 25 nA
1.00000 mA	10 nA	<1 mV	0.02 % + 200 nA
10.0000 mA	100 nA	<1 mV	0.02 % + 2.5 µA
100.000 mA	1 µA	<1 mV	0.02 % + 20 µA
1.00000 A	10 µA	<1 mV	0.03 % + 1.5 mA
3.00000 A	10 µA	<1 mV	0.05 % + 3.5 mA

TEMPERATURE COEFFICIENT (0°–18°C & 28°–50°C): ±(0.15 × accuracy specification)/°C.

CONTACT CHECK⁴

SPEED	MAXIMUM MEASUREMENT TIME TO MEMORY FOR 60Hz (50Hz) ⁴	ACCURACY (1 Year) 23°C ±5°C ±(%rdg. + ohms)
FAST	1 (1.2) ms	5% + 10
MEDIUM	4 (5) ms	5% + 1
SLOW	36 (42) ms	5% + 0.3

ADDITIONAL METER SPECIFICATIONS

LOAD IMPEDANCE: Stable into 10,000pF typical.

COMMON MODE VOLTAGE: 250VDC.

COMMON MODE ISOLATION: >1GΩ, <4500pF

OVERRANGE: 101% of source range, 102% of measure range.

MAXIMUM SENSE LEAD RESISTANCE: 1kΩ for rated accuracy.

SENSE INPUT IMPEDANCE: >10GΩ.

NOTES

1. Add 50µV to source accuracy specifications per volt of HI lead drop.
2. Four-wire remote sense only.
3. Applies when in single channel display mode.
4. Includes measurement of SENSE HI to HI and SENSE LO to LO contact resistances.

GENERAL

HOST INTERFACES: Computer control interfaces.

IEEE-488: IEEE-488.1 compliant. Supports IEEE-488.2 common commands and status model topology.

RS-232: Baud rates from 300 bps to 115200 bps. Programmable number of data bits, parity type, and flow control (RTS/CTS hardware or none). When not programmed as the active host interface, the SourceMeter can use the RS-232 interface to control other instrumentation.

EXPANSION INTERFACE: The TSP-Link expansion interface allows TSP enabled instruments to trigger and communicate with each other.

Cable Type: Category 5e or higher LAN crossover cable.

Length: 3 meters maximum between each TSP enabled instrument.

DIGITAL I/O INTERFACE:

Connector: 25-pin female D.

Input/Output Pins: 14 open drain I/O bits.

Absolute Maximum Input Voltage: 5.25V

Absolute Minimum Input Voltage: –0.25V

Maximum Logic Low Input Voltage: 0.7V + 850µA max.

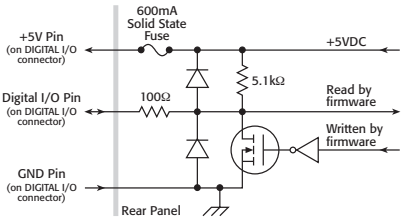
Minimum Logic High Input Voltage: 2.1V + 570µA.

Maximum Source Current (flowing out of Digital I/O bit): +960µA.

Maximum Sink Current @ Maximum Logic Low Voltage (0.7V): –5.0mA.

Absolute Maximum Sink Current (flowing into Digital I/O pin): –11mA.

5V Power Supply Pin: Limited to 600mA, solid state fuse protected.



Output Enable Pin: Active high input pulled down internally to ground with 10kΩ resistor. When the Output Enable input function has been activated, each SourceMeter channel will not turn on unless the Output Enable pin is driven to >2.1V (nominal current = 2.1V / 10kΩ = 210µA).

POWER SUPPLY: 100V to 240VAC, 50–60Hz (manual setting), 240VA max.

COOLING: Forced air. Side intake and rear exhaust. One side must be unobstructed when rack mounted.

WARRANTY: 1 year.

EMC: Conforms to European Union Directive 89/356/EEC, EN 61326-1.

SAFETY: Conforms to European Union Directive 73/23/EEC, EN 61010-1, and UL 61010-1.

DIMENSIONS: 89mm high × 213mm wide × 460mm deep (3½ in × 8½ in × 17½ in). Bench Configuration (with handle & feet): 104mm high × 238mm wide × 460mm deep (4½ in × 9½ in × 17½ in).

WEIGHT: 2601: 4.75kg (10.4 lbs). 2602: 5.50kg (12.0 lbs).

ENVIRONMENT: For indoor use only.

Altitude: Maximum 2000 meters above sea level.

Operating: 0°–50°C, 70% R.H. up to 35°C. Derate 3% R.H./°C, 35°–50°C.

Storage: –25°C to 65°C.