

Keithley Instruments, Inc.

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**System SourceMeter®**  
Instrument Specifications

**SPECIFICATION CONDITIONS**

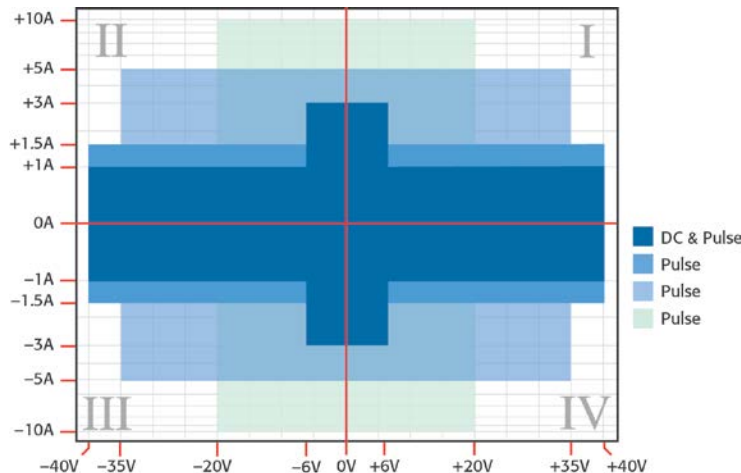
This document contains specifications and supplemental information for the Models 2601B, 2602B and 2604B System SourceMeter® instrument. Specifications are the standards against which the Models 2601B, 2602B and 2604B are tested. Upon leaving the factory, the Models 2601B, 2602B and 2604B meet these specifications. Supplemental and typical values are nonwarranted, apply at 23 °C, and are provided solely as useful information.

Source and measurement accuracies are specified at the Models 2601B, 2602B and 2604B terminals under these conditions:

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

**DC POWER SPECIFICATIONS**

	<b>Voltage</b>	<b>Current</b>
<b>Maximum output power and source/sink limits<sup>1</sup></b>	40.4 W maximum <ul style="list-style-type: none"> <li>▪ ± (40.4 V at 1.0 A, -1.0 A)</li> <li>▪ ± (6.06 V at 3.0 A, -3.0 A)</li> <li>▪ Four-quadrant source or sink operation</li> </ul>	40.4 W maximum <ul style="list-style-type: none"> <li>▪ ± (1.01 A at 40 V, -40 V)</li> <li>▪ ± (3.03 A at 6 V, -6 V)</li> <li>▪ Four-quadrant source or sink operation</li> </ul>



Refer to the “Pulse Characteristics” section for pulsing details, such as duty cycle and pulse width.

<sup>1</sup> Full power source operation regardless of load to 30 °C ambient temperature. Above 30 °C or power sink operation, refer to “Operating Boundaries” in the Series 2600B Reference Manual for additional power derating information.

## VOLTAGE ACCURACY SPECIFICATIONS<sup>2,3</sup>

Range	Source			Measure	
	Programming resolution	Accuracy ± (% reading + volts)	Typical Noise (Peak to Peak) 0.1 Hz to 10 Hz	Display resolution	Accuracy <sup>4</sup> ± (% reading + volts)
100 mV	5 µV	0.02 % + 250 µV	20 µV	100 nV	0.015 % + 150 µV
1 V	50 µV	0.02 % + 400 µV	50 µV	1 µV	0.015 % + 200 µV
6 V	50 µV	0.02 % + 1.8 mV	100 µV	1 µV	0.015 % + 1 mV
40 V	500 µV	0.02 % + 12 mV	500 µV	10 µV	0.015 % + 8 mV

## CURRENT ACCURACY SPECIFICATIONS<sup>2</sup>

Range	Source			Measure	
	Programming resolution	Accuracy ± (% reading + amperes)	Typical Noise (Peak to Peak) 0.1 Hz to 10 Hz	Display resolution	Accuracy <sup>4</sup> ± (% reading + amperes)
100 nA	2 pA	0.06 % + 100 pA	5 pA	100 fA	0.05 % + 100 pA
1 µA	20 pA	0.03 % + 800 pA	25 pA	1 pA	0.025 % + 500 pA
10 µA	200 pA	0.03 % + 5 nA	60 pA	10 pA	0.025 % + 1.5 nA
100 µA	2 nA	0.03 % + 60 nA	3 nA	100 pA	0.02 % + 25 nA
1 mA	20 nA	0.03 % + 300 nA	6 nA	1 nA	0.02 % + 200 nA
10 mA	200 nA	0.03 % + 6 µA	200 nA	10 nA	0.02 % + 2.5 µA
100 mA	2 µA	0.03 % + 30 µA	600 nA	100 nA	0.02 % + 20 µA
1 A	20 µA	0.05 % + 1.8 mA	70 µA	1 µA	0.03 % + 1.5 mA
3 A	20 µA	0.06 % + 4 mA	150 µA	1 µA	0.05 % + 3.5 mA
10 A <sup>5</sup>	200 µA	0.5 % + 40 mA	N/A	10 µA	0.4 % + 25 mA

<sup>2</sup> For temperatures 0 °C to 18 °C and 28 °C to 50 °C, accuracy is degraded by ± (0.15 × accuracy specification)/°C. High Capacitance Mode accuracy is applicable at 23 °C ± 5 °C.

<sup>3</sup> Add 50 µV to source accuracy specifications per volt of HI lead drop.

<sup>4</sup> Derate accuracy specification for NPLC setting < 1 by increasing the error term. Add appropriate typical percent of reading term for resistive loads using the table below.

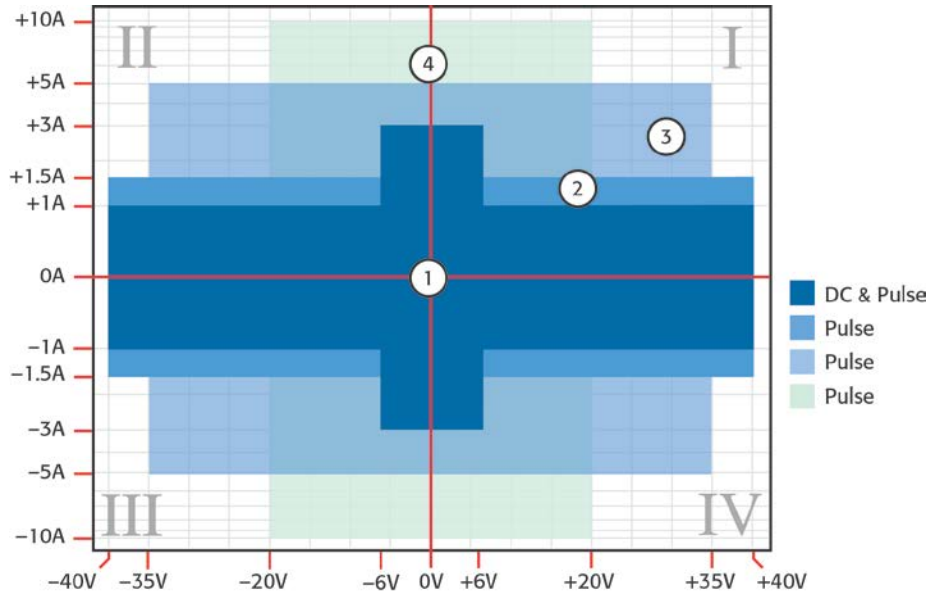
NPLC setting	100 mV range	1 V and 40 V ranges	100 nA range	1 µA to 100 mA ranges	1 A to 3 A ranges
0.1	0.01 %	0.01 %	0.01 %	0.01 %	0.01 %
0.01	0.08 %	0.07 %	0.1 %	0.05 %	0.05 %
0.001	0.8 %	0.6 %	1 %	0.5 %	1.1 %

<sup>5</sup> 10 A range is accessible in pulse mode only. Accuracy specifications for 10 A range are typical.

## SUPPLEMENTAL CHARACTERISTICS

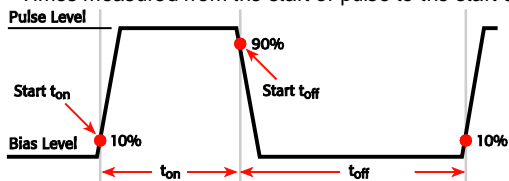
The following specifications are supplemental characteristics that provide additional information about instrument functions and performance. These characteristics are nonwarranted specifications; they describe the typical performance of the Models 2601B, 2602B and 2604B.

## PULSE CHARACTERISTICS



Pulse region specifications	Pulse region specifications			
	Region quadrant diagram	Region maximums	Maximum pulse width <sup>6</sup>	Maximum duty cycle <sup>7</sup>
	1	1 A at 40 V	DC, no limit	100 %
	1	3 A at 6 V	DC, no limit	100 %
	2	1.5 A at 40 V	100 ms	25 %
	3	5 A at 35 V	4 ms	4 %
	4	10 A at 20 V	1.8 ms	1 %

<sup>6</sup> Times measured from the start of pulse to the start off-time; see figure below.



<sup>7</sup> Thermally limited in sink mode (quadrants 2 and 4) and ambient temperatures above 30° C. See power equations in the Series 2600B Reference Manual for more information.

<b>Minimum programmable pulse width<sup>6</sup></b>	100 $\mu$ s			
	<ul style="list-style-type: none"> <li>Note: Minimum pulse width for settled source at a given I/V output and load can be longer than 100 ms.</li> </ul>			
	<b>Source value</b>	<b>Load</b>	<b>Source settling time (% of range)</b>	<b>Minimum pulse width</b>
	6 V	2 $\Omega$	0.2 %	150 $\mu$ s
	20 V	2 $\Omega$	1 %	200 $\mu$ s
	35 V	7 $\Omega$	0.5 %	500 $\mu$ s
	40 V	27 $\Omega$	0.1 %	400 $\mu$ s
	1.5 A	27 $\Omega$	0.1 %	1.5 ms
	3 A	2 $\Omega$	0.2 %	150 $\mu$ s
5 A	7 $\Omega$	0.5 %	500 $\mu$ s	
10 A	2 $\Omega$	0.5 %	200 $\mu$ s	
<b>Pulse width programming resolution</b>	1 $\mu$ s			
<b>Pulse width programming accuracy</b>	$\pm$ 5 $\mu$ s			
<b>Pulse width jitter</b>	2 $\mu$ s			

**ADDITIONAL SOURCE CHARACTERISTICS**

<b>Noise 10 Hz to 20 MHz</b>	<p>&lt; 20 mV peak-peak, &lt; 3 mV RMS</p> <ul style="list-style-type: none"> <li>6 V range</li> </ul>
<b>Transient response time</b>	< 70 $\mu$ s for the output to recover to within 0.1 % for a 10 % to 90 % step change in load.
<b>Overshoot</b>	<p>Voltage:</p> <ul style="list-style-type: none"> <li>&lt; <math>\pm</math>0.1 % + 10 mV</li> <li>Step size = 10 % to 90 % of range, resistive load, maximum current limit/compliance</li> </ul> <p>Current:</p> <ul style="list-style-type: none"> <li>&lt; <math>\pm</math>0.1 %</li> <li>Step size = 10 % to 90 % of range, resistive load</li> <li>See <a href="#">Current source output settling time</a> for additional test conditions</li> </ul>
<b>Range change overshoot</b>	<p>Voltage:</p> <ul style="list-style-type: none"> <li>&lt; 300 mV + 0.1 % of larger range</li> <li>Overshoot into a 100 k<math>\Omega</math> load, 20 MHz bandwidth</li> </ul> <p>Current:<sup>8</sup></p> <ul style="list-style-type: none"> <li>&lt; 300 mV/R<sub>load</sub> + 5 % of larger range</li> </ul>
<b>Guard offset voltage</b>	<p>&lt; 4 mV</p> <ul style="list-style-type: none"> <li>Current &lt; 10 mA</li> </ul>
<b>Remote sense operating range<sup>9</sup></b>	<p>Maximum voltage between HI and SENSE HI = 3 V</p> <p>Maximum voltage between LO and SENSE LO = 3 V</p>

<sup>8</sup> With source settling set to SETTLE\_SMOOTH\_100NA<sup>9</sup> Add 50  $\mu$ V to source accuracy specifications per volt of HI lead drop.

<b>Voltage output headroom</b>	<b>40 V range</b> <ul style="list-style-type: none"> <li>▪ Maximum output voltage = 42 V – (total voltage drop across source leads). Maximum 1 Ω source lead.</li> </ul> <b>6 V range</b> <ul style="list-style-type: none"> <li>▪ Maximum output voltage = 8 V – (total voltage drop across source leads). Maximum 1 Ω source lead.</li> </ul>	
<b>Over-temperature protection</b>	Internally sensed temperature overload puts the instrument in standby mode	
<b>Limit/compliance</b>	Bipolar limit (compliance) set with a single value <b>Voltage:</b> <sup>10</sup> <ul style="list-style-type: none"> <li>▪ Minimum value is 10 mV; accuracy is the same as voltage source</li> </ul> <b>Current:</b> <sup>11</sup> <ul style="list-style-type: none"> <li>▪ Minimum value is 10 nA; accuracy is the same as current source</li> </ul>	
<b>Voltage source output settling time</b>	Time required to reach within 0.1 % of final value after source level command is processed on a fixed range.	
	<b>Voltage range</b>	<b>Settling time</b>
	100 mV	< 50 μs
	1 V	< 50 μs
	10 V 40 V <sup>12</sup>	< 110 μs < 150 μs
<b>Current source output settling time</b>	Time required to reach within 0.1 % of final value after source level command is processed on a fixed range <ul style="list-style-type: none"> <li>▪ Values below for <math>I_{out} \times R_{load} = 1 V</math></li> </ul>	
	<b>Current range</b>	<b>Settling time</b>
	3 A	< 80 μs (Current < 2.5 A, $R_{load} > 2 \Omega$ )
	1 A to 10 mA	< 80 μs ( $R_{load} > 6 \Omega$ )
	1 mA	< 100 μs
	100 μA	< 150 μs
	10 μA	< 500 μs
	1 μA 100 nA	< 2 ms < 20 ms

<sup>10</sup> For sink operation (quadrants II and IV) without sink mode enabled, add 10 % of compliance range and ±0.02 % of limit settling to the corresponding voltage source accuracy specifications. For 100 mV range add an additional 60 mV of uncertainty. Specifications apply with sink mode enabled.

<sup>11</sup> For sink operation (quadrants II and IV) without sink mode enabled, add 0.06 % of limit range to the corresponding current limit accuracy specifications. Specifications apply with sink mode enabled.

<sup>12</sup> Add 150 μs when measuring on the 1 A range.

**ADDITIONAL MEASUREMENT CHARACTERISTICS**

<b>Contact check specifications</b> <sup>13,14</sup>	<b>Speed</b>	<b>Maximum measurement time to memory for 60 Hz (50 Hz)</b>	<b>Accuracy (1 year) 23° C ± 5° C ± ( % reading + ohms)</b>
	Fast	1.1 ms (1.2 ms)	5 % + 10 Ω
	Medium	4.1 ms (5 ms)	5 % + 1 Ω
	Slow	36 ms (42 ms)	5 % + 0.3 Ω
<b>Current measure settling time</b> <sup>15</sup>	Time required to reach within 0.1 % of final value after source level command is processed on a fixed range Values below for Vout = 1 V		
	<b>Current range</b>	<b>Settling time</b>	
	1 mA	< 100 μs	
<b>Input impedance</b>	> 10 GΩ		

**ADDITIONAL CHARACTERISTICS**

<b>Maximum load impedance</b>	<b>Normal mode</b> 10 nF	<b>High-capacitance mode</b> 50 μF
<b>Common mode voltage</b>	250 V DC	
<b>Common mode isolation</b>	> 1 GΩ < 4500 pF	
<b>Sense high input impedance</b>	> 10 GΩ	
<b>Maximum sense lead resistance</b>	1 kΩ for rated accuracy	
<b>Overrange</b>	101 % of source range 102 % of measure range	

<sup>13</sup> Includes measurement of SENSE HI to HI and SENSE LO to LO contact resistances.<sup>14</sup> Contact check is not available with the Model 2604B.<sup>15</sup> Compliance equal to 100 mA

**HIGH CAPACITANCE MODE<sup>16,17,18</sup>**

<b>Accuracy specifications</b>	Accuracy specifications are applicable in both Normal and High Capacitance Modes.	
<b>Voltage source output settling time</b>	Time required to reach within 0.1 % of final value after source level command is processed on a fixed range. Current limit = 1 A	
	<b>Voltage range</b>	<b>Settling time with <math>C_{load} = 4.7 \mu F</math></b>
	100 mV	< 200 $\mu s$
	1 V	< 200 $\mu s$
	6 V	< 200 $\mu s$
	40 V	< 7 ms
<b>Current measure settling time</b>	Time required to reach within 0.1 % of final value after source level command is processed on a fixed range Values below for $V_{out} = 1 V$ unless noted	
	<b>Current range</b>	<b>Settling time</b>
	3 A and 1A	< 120 $\mu s$ ( $R_{load} > 2 \Omega$ )
	100 mA and 10 mA	< 100 $\mu s$
	1 mA	< 3 ms
	100 $\mu A$	< 3 ms
	10 $\mu A$	< 230 ms
	1 $\mu A$	< 230 ms
<b>Capacitor leakage performance</b> <b>Using HIGH-C scripts<sup>19</sup></b>	200 ms @ 50 nA <ul style="list-style-type: none"> <li>▪ Load = 5 <math>\mu F</math> in parallel with 10 M<math>\Omega</math></li> <li>▪ Test: 5 V step and measure</li> </ul>	
<b>Mode change delay</b>	Current ranges of 100 $\mu A$ and above: <ul style="list-style-type: none"> <li>▪ 11 ms delay for both in and out of High Capacitance Mode</li> </ul> Current ranges below 100 $\mu A$ : <ul style="list-style-type: none"> <li>▪ 250 ms delay into High Capacitance Mode</li> <li>▪ 11 ms delay out of High Capacitance Mode</li> </ul>	
<b>Voltmeter input impedance</b>	10 G $\Omega$ in parallel with 3300 pF	
<b>Noise</b> <b>10 Hz to 20 MHz</b>	< 30 mV peak-peak <ul style="list-style-type: none"> <li>▪ 6 V range</li> </ul>	
<b>Range change overshoot</b>	Voltage: <ul style="list-style-type: none"> <li>▪ &lt; 400 mV + 0.1 % of larger range</li> <li>▪ Overshoot into a 100 k<math>\Omega</math> load, 20 MHz bandwidth</li> </ul>	

<sup>16</sup> High Capacitance Mode specifications are for DC measurements only.<sup>17</sup> 100 nA range is not available in High Capacitance Mode.<sup>18</sup> High Capacitance Mode utilizes locked ranges. Auto range is disabled.<sup>19</sup> Part of KI Factory scripts. See the Series 2600B Reference Manual for details.

## MEASUREMENT SPEED CHARACTERISTICS<sup>20,21</sup>

### Maximum sweep operation rates (operations per second) for 60 Hz (50 Hz):

A/D converter speed	Trigger origin	Measure to memory  (using user scripts)	Measure to GPIB  (using user scripts)	Source measure to memory  (using user scripts)	Source measure to GPIB  (using user scripts)	Source measure to memory  (using sweep API)	Source measure to GPIB  (using sweep API)
0.001 NPLC	Internal	20000 (20000)	9800 (9800)	7000 (7000)	6200 (6200)	12000 (12000)	5900 (5900)
0.001 NPLC	Digital I/O	8100 (8100)	7100 (7100)	5500 (5500)	5100 (5100)	11200 (11200)	5700 (5700)
0.01 NPLC	Internal	4900 (4000)	3900 (3400)	3400 (3000)	3200 (2900)	4200 (3700)	4000 (3500)
0.01 NPLC	Digital I/O	3500 (3100)	3400 (3000)	3000 (2700)	2900 (2600)	4150 (3650)	3800 (3400)
0.1 NPLC	Internal	580 (480)	560 (470)	550 (465)	550 (460)	560 (470)	545 (460)
0.1 NPLC	Digital I/O	550 (460)	550 (460)	540 (450)	540 (450)	560 (470)	545 (460)
1.0 NPLC	Internal	59 (49)	59 (49)	59 (49)	59 (49)	59 (49)	59 (49)
1.0 NPLC	Digital I/O	59 (49)	59 (49)	59 (49)	59 (49)	59 (49)	59 (49)

### Maximum single measurement rates (operations per second) for 60 Hz (50 Hz):

A/D converter speed	Trigger origin	Measure to GPIB	Source measure to GPIB	Source measure pass/fail to GPIB
0.001 NPLC	Internal	1900 (1800)	1400 (1400)	1400 (1400)
0.01 NPLC	Internal	1450 (1400)	1200 (1200)	1100 (1100)
0.1 NPLC	Internal	450 (390)	425 (370)	425 (375)
1.0 NPLC	Internal	58 (48)	57 (48)	57 (48)

<sup>20</sup> Tests performed with a Model 2602B using the following equipment: Computer hardware (Intel® Pentium® 4 2.4 GHz, 2 GB RAM, National Instruments™ PCI-GPIB); driver (NI-488.2 Version 2.2 PCI-GPIB); software (Microsoft® Windows® XP, Microsoft® Visual Studio® 2010, VISA™ version 4.1).

<sup>21</sup> Exclude current measurement ranges less than 1 mA.



<b>Maximum measurement range change rate</b>	> 7000 per second for > 10 $\mu$ A. When changing to or from a range $\geq$ 1 A, maximum rate is > 2200/second.
<b>Maximum source range change rate</b>	> 400 per second > 10 $\mu$ A. When changing to or from a range $\geq$ 1 A, maximum rate is > 190/second.
<b>Maximum source function change rate</b>	> 1000 per second
<b>Command processing time</b>	< 1 ms <ul style="list-style-type: none"> <li>▪ Maximum time required for the output to begin to change after receiving the <code>smua.source.levelv</code> or <code>smua.source.leveli</code> command.</li> </ul>

## TRIGGERING AND SYNCHRONIZATION CHARACTERISTICS

### Triggering

<b>Trigger in to trigger out</b>	0.5 $\mu$ s
<b>Trigger in to source change<sup>22</sup></b>	10 $\mu$ s
<b>Trigger timer accuracy</b>	$\pm$ 2 $\mu$ s
<b>Source change<sup>22</sup> after LXI trigger</b>	280 $\mu$ s

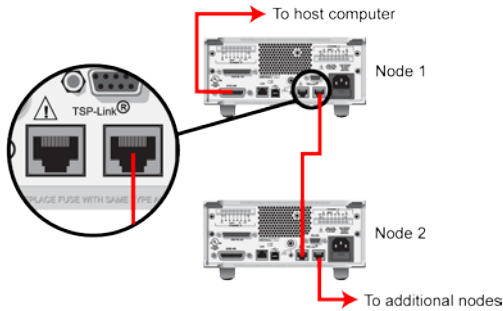
### Synchronization

<b>Multi-node synchronized source change<sup>22</sup></b>	< 0.5 $\mu$ s
<b>Single-node synchronized source change<sup>22</sup></b>	< 0.5 $\mu$ s

<sup>22</sup> Fixed source range with no polarity change.

**SUPPLEMENTAL INFORMATION**

<b>Front-panel interface</b>	Two-line vacuum fluorescent display (VFD) with keypad and navigation wheel
<b>Display</b>	<ul style="list-style-type: none"> <li>▪ Show error messages and user-defined messages</li> <li>▪ Display source and limit settings</li> <li>▪ Show current and voltage measurements</li> <li>▪ View measurements stored in dedicated reading buffers</li> </ul>
<b>Keypad operations</b>	<ul style="list-style-type: none"> <li>▪ Change host interface settings</li> <li>▪ Save and restore instrument setups</li> <li>▪ Load and run factory and user-defined test scripts that prompt for input and send results to the display</li> <li>▪ Store measurements into dedicated reading buffers</li> </ul>
<b>Programming</b>	<p>Embedded Test Script Processor (TSP®) scripting engine is accessible from any host interface:</p> <ul style="list-style-type: none"> <li>▪ Responds to individual instrument control commands</li> <li>▪ Responds to high-speed test scripts comprised of remote commands and test script language (TSL) statements (for example, branching, looping, and math)</li> <li>▪ Able to execute high-speed test scripts stored in memory without host intervention</li> </ul>
<b>Minimum user memory available</b>	16 MB (approximately 250,000 lines of TSP code)
<b>Test Script Builder</b>	<p>Integrated development environment for building, running, and managing TSP scripts; includes an instrument console for interactive communication with any TSP-enabled instrument</p> <p>Requires:</p> <ul style="list-style-type: none"> <li>▪ VISA (NI-VISA included on the Product Information CD-ROM)</li> <li>▪ Microsoft® .NET Framework (included on the Product Information CD-ROM)</li> <li>▪ Keithley I/O Layer (included on the Product Information CD-ROM)</li> <li>▪ Intel® Pentium III 800 MHz or faster personal computer</li> <li>▪ Microsoft® Windows® 2000, XP, Vista®, or 7</li> </ul>
<b>TSP® Express (embedded)</b>	<p>Tool that allows you to quickly and easily perform common I-V tests without programming or installing software</p> <p>To run TSP Express, you need:</p> <ul style="list-style-type: none"> <li>▪ Java™ Platform, Standard Edition 6 or 7</li> <li>▪ Microsoft® Internet Explorer®, Mozilla® Firefox®, or another Java-compatible web browser</li> </ul>
<b>Software interface</b>	TSP™ Express (embedded), direct GPIB/VISA, read/write with Microsoft® Visual Basic®, Visual C/C++®, Visual C#®, LabVIEW™, CEC TestPoint™ Data Acquisition Software Package, NI LabWindows™/CVI, and so on.

<p><b>Reading buffers</b></p>	<p>Nonvolatile memory uses dedicated storage areas reserved for measurement data. Reading buffers are arrays of measurement elements. Each element can store the following items:</p> <ul style="list-style-type: none"> <li>▪ Measurement</li> <li>▪ Source setting (at the time the measurement was taken)</li> <li>▪ Measurement status</li> <li>▪ Range information</li> <li>▪ Timestamp</li> </ul> <p>Reading buffers can be filled using the front-panel STORE key, and retrieved using the RECALL key or host interface.</p>
<p><b>Buffer size, with timestamp and source setting</b></p>	<p>&gt; 60,000 samples</p>
<p><b>Buffer size, without timestamp and source setting</b></p>	<p>&gt; 140,000 samples</p>
<p><b>System expansion<sup>23</sup></b></p>	<p>The TSP-Link expansion interface allows TSP-enabled instruments to trigger and communicate with each other. See the figure below.</p> <div style="text-align: center;">  </div> <p>Each Model 2601B and 2602B has two TSP-Link connectors to make it easier to connect instruments in a sequence.</p> <ul style="list-style-type: none"> <li>▪ Once source-measure instruments are interconnected through the TSP-Link expansion interface, a computer can access all of the resources of each source-measure instrument through the host interface of any System SourceMeter.</li> <li>▪ A maximum of 32 TSP-Link nodes can be interconnected. Each source-measure instrument uses one TSP-Link node</li> </ul>

**Timing**

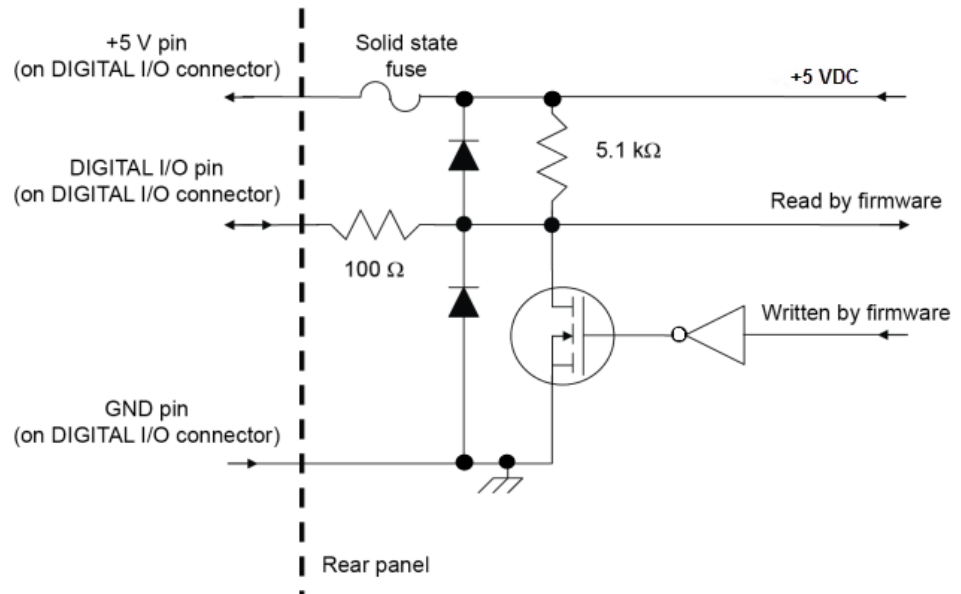
<p><b>Timer</b></p>	<p>Free-running 47-bit counter with 1 MHz clock input. Reset each time instrument power is turned on. If the instrument is not turned off, the timer is automatically reset to zero (0) every four years.</p>
<p><b>Timestamp</b></p>	<p>TIMER value is automatically saved when each measurement is triggered</p>
<p><b>Resolution</b></p>	<p>1 μs</p>
<p><b>Timestamp accuracy</b></p>	<p>±100 ppm</p>

<sup>23</sup> TSP-Link is not available with the Model 2604B.

**GENERAL SPECIFICATIONS**

<b>IEEE-488</b>	IEEE Std 488.1 compliant. Supports IEEE Std 488.2 common commands and status model topology
<b>RS-232</b>	<ul style="list-style-type: none"> <li>▪ Baud rates from 300 bps to 115,200 bps</li> <li>▪ Programmable number of data bits, parity type, and flow control (RTS/CTS hardware or none)</li> <li>▪ When not programmed as the active host interface, the Models 2601B, 2602B and 2604B can use the RS-232 interface to control other instruments</li> </ul>
<b>Ethernet</b>	RJ-45 connector, LXI version 1.4 Core 2011, 10/100BaseT, Auto-MDIX
<b>LXI compliance</b>	LXI version 1.4 Core 2011
<b>Expansion interface<sup>24</sup></b>	<ul style="list-style-type: none"> <li>▪ The TSP-Link® expansion interface allows TSP-enabled instruments to trigger and communicate with each other</li> <li>▪ Cable type: Category 5e or higher LAN crossover cable</li> <li>▪ 9.84 ft (3 m) maximum between each TSP-enabled instrument</li> </ul>
<b>USB Control (Rear)</b>	USB 2.0 Device: USB-TMC488 protocol
<b>USB File System (Front)</b>	USB 2.0 Host: Mass storage class device
<b>Power supply</b>	100 V to 240 V AC, 50 Hz or 60 Hz (auto sensing), 240 VA maximum
<b>Cooling</b>	Forced air; side intake and rear exhaust. One side must be unobstructed when rack mounted.
<b>Warranty</b>	1 year
<b>EMC</b>	Conforms to European Union EMC Directive
<b>Safety</b>	NRTL listed to UL61010-1:2008 and CSA C22.2 No. 61010-1 Conforms to European Union Low Voltage Directive
<b>Environment</b>	For indoor use only <b>Altitude:</b> Maximum 6562 ft (2000 m) above sea level <b>Operating:</b> 0 °C to 50 °C, 70 % relative humidity up to 35 °C. Derate 3 % relative humidity/°C, 35 °C to 50 °C <b>Storage:</b> -25 °C to 65 °C
<b>Dimensions</b>	Rack mount: 3.5 in. high x 8.4 in. wide x 17.5 in. deep (89 mm x 213 mm x 460 mm) Bench configuration (with handle and feet): 4.1 in. high x 9.4 in. wide x 17.5 in. deep (104 mm x 238 mm x 460 mm)
<b>Weight</b>	<b>2601B:</b> 10.4 lb (4.75 kg) <b>2602B and 2604B:</b> 12.0 lb (5.50 kg)

<sup>24</sup> TSP-Link is not available with the Model 2604B.

**Digital I/O interface<sup>25</sup>**

**Connector:** 25-pin female D

**Input/output pins:** 14 open drain I/O bits

**Absolute maximum input voltage:** 5.25 V

**Absolute minimum input voltage:** -0.25 V

**Maximum logic low input voltage:** 0.7V, +850  $\mu$ A max

**Minimum logic high input voltage:** 2.1 V, +570  $\mu$ A

**Maximum source current (flowing out of digital I/O bit):** +960  $\mu$ A

**Maximum sink current at maximum logic low voltage (0.7):** -5.0 mA

**Absolute maximum sink current (flowing into digital I/O pin):** -11 mA

**5 V power supply pins:** Limited to 250 mA total, solid-state fuse protected

**Output Enable:** Active high input pulled down internally to ground with a 10 k $\Omega$  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 > 2.1 V (nominal current = 2.1 V / 10 k $\Omega$  = 210  $\mu$ A).

<sup>25</sup> The Digital I/O feature is not available with the Model 2604B. Only +5 V, GND and INTERLOCK pins are available with the Model 2604B