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System SourceMeter Instrument Specifications**SPECIFICATION CONDITIONS**

This document contains specifications and supplemental information for the Model 2601B-PULSE System SourceMeter® 10 μ s Pulser/SMU instrument. Specifications are the standards against which the Model 2601B-PULSE instrument is tested. Upon leaving the factory, the 2601B-PULSE meets these specifications. Supplemental and typical values are non-warranted, apply at 23 °C, and are provided solely as useful information.

Source and measurement accuracies are specified at the terminals of the SourceMeter instrument under these conditions:

- 18 °C to 28 °C, <70% relative humidity.
- After two-hour warmup.
- Speed normal (1 NPLC).
- A/D autozero enabled.
- Remote sense operation only or properly zeroed local operation.
- Calibration period: One year.

Pulser specification accuracies are specified at the terminals of the instrument under these conditions:

- 10 μ s aperture minimum.
- Remote sense operation only.
- Total cable and DUT inductance of ≤ 3 μ H measured at 100 kHz.

PULSER SPECIFICATIONS**PULSER SOURCE SPECIFICATIONS^{1,2}**

Current Pulse Termination	<p>The current pulse terminates within 3 μs after terminal voltages exceed a bipolar, programmable abort threshold. Separate abort thresholds can be programmed for the sense terminals and the source terminals.</p> <p>The sense terminal threshold can be set from 5% to 200% of the selected Measure Voltage range.</p> <p>The source terminal threshold can be set from 2 V to 40 V, independent of range. The source threshold ignores normal transients during pulse rise and fall time.</p> <p>Programmable threshold uncertainty is $\pm 5\%$.</p>
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¹ Full power source operation regardless of load to 28 °C ambient. Above 28 °C and/or power sink operation, refer to "Operating Boundaries" in the *Model 2601B-PULSE Reference Manual* for additional power derating information.

² Source valid for steady state output values. See settling time specification defining the steady state output requirement.



PULSER CURRENT SOURCE SPECIFICATIONS

Current Programming Accuracy	Range	Programming Resolution	Accuracy (1 Year) ±(% reading + amps)	Typical Noise (RMS) 10 kHz to 1 MHz
	1 A	100 µA	0.17% + 2.0 mA	380 µA
	5 A	100 µA	0.17% + 2.5 mA	1.4 mA
	10 A	100 µA	0.22% + 3.0 mA	3.1 mA ³
Temperature Coefficient (0 °C to 18 °C and 28 °C to 50 °C)	±(0.15 × accuracy specification) /°C			
Duty Cycle Limits^{4, 5}	<ul style="list-style-type: none"> ▪ ±10 A at ±10 V pulse 3% duty cycle ▪ ±3 A at ±10 V pulse, 10% duty cycle ▪ ±1.0 A at ±10 V pulse, 30% duty cycle ▪ ±500 mA at ±10 V pulse, 60% duty cycle⁶ ▪ ±250 mA at ±10 V continuous 			
Current Regulation	Line: ±0.01% of range Load: ±100 µA			
Overshoot	<±0.5% of step size (typical)			

ADDITIONAL PULSER SOURCE SPECIFICATIONS

Rise Time (10% to 90%)	<1.7 µs for a full-scale step of current into any load voltage (10 V maximum).																
Pulse Current and Duty Cycle⁴	<p>Maximum duty cycle is given by:</p> $\frac{0.3125 - I_{BIAS} }{ I_{PULSE} - I_{BIAS} } * 100\%$ <p>For $I_{BIAS} \leq 10$ mA:</p> <table style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Pulse current</th> <th>Maximum duty cycle</th> </tr> </thead> <tbody> <tr> <td>±10 A</td> <td>3%</td> </tr> <tr> <td>±5 A</td> <td>6%</td> </tr> <tr> <td>±3 A</td> <td>10%</td> </tr> <tr> <td>±1 A</td> <td>30%</td> </tr> <tr> <td>±500 mA</td> <td>60%</td> </tr> <tr> <td>±250 mA</td> <td>100%</td> </tr> <tr> <td>0 A</td> <td></td> </tr> </tbody> </table>	Pulse current	Maximum duty cycle	±10 A	3%	±5 A	6%	±3 A	10%	±1 A	30%	±500 mA	60%	±250 mA	100%	0 A	
Pulse current	Maximum duty cycle																
±10 A	3%																
±5 A	6%																
±3 A	10%																
±1 A	30%																
±500 mA	60%																
±250 mA	100%																
0 A																	

³ For pulses longer than 100 µs, there can be a thermal drift of up to 0.004% of source value. This drift is already included in the overall source accuracy specifications.

⁴ Thermally limited in sink mode (quadrants 2 and 4) and ambient temperatures above 28 °C. Above 28 °C or during power sink operation, refer to “Operating Boundaries” in the *Model 2601B-PULSE Reference Manual* for additional power derating information.

⁵ Duty cycles listed can only be achieved if bias current is ≤10 mA.

⁶ Due to pulse width programming, minimum t_{off} of 16 µs.

Additional Zero-Crossing Delay	$1 \mu\text{s} + \frac{200(\text{ns} \times \text{A})}{\text{Pulse current (in amperes)}}$	
Current Source Output Settling Time (typical)	Time required to reach specified accuracy after the start of the pulse.	
	Current Range	Settling Time
	1 A	<9 μs ($V_{\text{LOAD}} \leq 10 \text{ V}$)
	5 A	<9 μs ($V_{\text{LOAD}} \leq 10 \text{ V}$)
10 A	<9 μs ($V_{\text{LOAD}} \leq 10 \text{ V}$)	
OUTPUT OFF Normal State	Electrical short (<1 Ω) between HI and LO. Maximum dc current from external sources during OUTPUT OFF state must be limited to <1 A.	
Remote Voltage Sense	Maximum voltage between HI and SENSE HI = $\pm 30 \text{ V}$. Maximum voltage between LO and SENSE LO = $\pm 30 \text{ V}$.	
Overtemperature Protection	Internally sensed overtemperature condition puts the instrument in standby mode.	
Safety Interlock	Hardware interlock (available, optional).	

Bias Current Source Specifications

Current Programming Accuracy	Range	Programming Resolution	Accuracy (1 Year) \pm(% reading + amps)	Typical Noise (RMS) 0.1 Hz to 100 kHz
	250 mA	10 μA	0.17% + 1 mA	200 μA
Temperature Coefficient (0 $^{\circ}\text{C}$ to 18 $^{\circ}\text{C}$ and 28 $^{\circ}\text{C}$ to 50 $^{\circ}\text{C}$)	$\pm(0.15 \times \text{accuracy specification}) / ^{\circ}\text{C}$			

Pulse Width Specifications

Pulse Width Programming Resolution	1 μs
Pulse Width Programming Maximum	500 μs
Pulse Width Programming Minimum	10 μs
Pulse Width Programming Accuracy	$\pm 200 \text{ ns}$
Pulse Width Jitter	110 ns (typical)
Pulse Period Jitter	2 μs (typical)
Pulse Width Programming, Minimum t_{off}	16 μs

PULSER MEASURE SPECIFICATIONS

Voltage Measurement Specifications

Voltage Measurement Accuracy	Range	Display Resolution	Accuracy (1 Year) 23 °C ±5 °C ±(% reading + volts)⁷
	5 V	1 µV	0.05% + 2.5 mV
	10 V	10 µV	0.05% + 4 mV
Voltage Measurement Settling Time	Time required to reach specified accuracy after a source level command is processed on a fixed range.		
	Voltage Range		Settling time (typical)
	5 V and 10 V		<9 µs
Temperature Coefficient (0 °C to 18 °C and 28 °C to 50°C)	±(0.15 × accuracy specification)/°C		

Current Measurement Specifications

Current Measurement Accuracy	Range	Display Resolution	Accuracy (1 Year) 23 °C ±5 °C ±(% reading + amps)⁷
	1 A	1 µA	0.12% + 0.5 mA
	5 A	1 µA	0.12% + 1 mA
	10 A	10 µA	0.12% + 1 mA
Current Measurement Settling Time	Time required to reach specified accuracy after source level command is processed on a fixed range.		
	Current Range		Settling Time (typical)
	1 A to 10 A		<9 µs
Temperature Coefficient (0 °C to 18 °C and 28 °C to 50 °C)	±(0.15 × accuracy specification)/°C		

Additional Pulser Characteristics

Maximum Inductance	3 µH (cable plus device under test (DUT)), measured at 100 kHz
Common Mode Isolation	>1 GΩ <4500 pF
Ovrange	100% of bias range 101% of source range 102% of measure range
Maximum Source/Sense Lead Resistance	0.5 Ω/100 Ω per lead
Sense HI/LO Input Impedance	2 MΩ (typical)
SMU-to-Pulser Transition Time	<7 ms

⁷ Accuracies valid for 10 µs aperture, measurement beginning at the end of the settling time. Refer to A/D Aperture Characteristics for other apertures.

A/D Aperture Characteristics

A/D Converter Speed	1 μ s	10 μ s	100 μ s
Effective Number of Conversions	1	10	100
Effective Number of Bits (ENOB)	Current: 12 Voltage: 14	Current: 14 Voltage: 16	Current: 15 Voltage: 18
Additional Measure Current Noise Uncertainty	± 1.5 mA	0 A	0 A
Additional Measure Voltage Noise Uncertainty	$\pm 0.03\%$ of measure voltage range	0%	0%

SMU SPECIFICATIONS

VOLTAGE ACCURACY SPECIFICATIONS^{8,9}

Range	Source			Measure	
	Programming Resolution	Accuracy \pm (% reading + volts)	Typical Noise (peak-to-peak) 0.1 Hz to 10 Hz	Display Resolution	Accuracy ¹⁰ \pm (% reading + volts)
100 mV	5 μ V	0.02% + 250 μ V	20 μ V	100 nV	0.015% + 150 μ V
1 V	50 μ V	0.02% + 400 μ V	50 μ V	1 μ V	0.015% + 200 μ V
6 V	50 μ V	0.02% + 1.8 mV	100 μ V	1 μ V	0.015% + 1 mV
40 V	500 μ V	0.02% + 12 mV	500 μ V	10 μ V	0.015% + 8 mV

CURRENT ACCURACY SPECIFICATIONS⁸

Range	Source			Measure	
	Programming Resolution	Accuracy \pm (% reading + amps)	Typical Noise (peak-to-peak) 0.1 Hz to 10 Hz	Display Resolution	Accuracy ¹⁰ \pm (% reading + amps)
100 nA	2 pA	0.1% + 100 pA	5 pA	100 fA	0.08% + 100 pA
1 μ A	20 pA	0.03% + 800 pA	25 pA	1 pA	0.025% + 500 pA
10 μ A	200 pA	0.03% + 5 nA	60 pA	10 pA	0.025% + 1.5 nA
100 μ A	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 μ A	200 nA	10 nA	0.02% + 2.5 μ A

⁸ For temperatures 0 °C to 18 °C and 28 °C to 50 °C, accuracy is degraded by $\pm(0.15 \times \text{accuracy specification})/^{\circ}\text{C}$ for normal mode only. High-capacitance mode accuracy is applicable at 18 °C to 28 °C.

⁹ Add 50 μ V to source accuracy specifications per volt of HI lead drop.

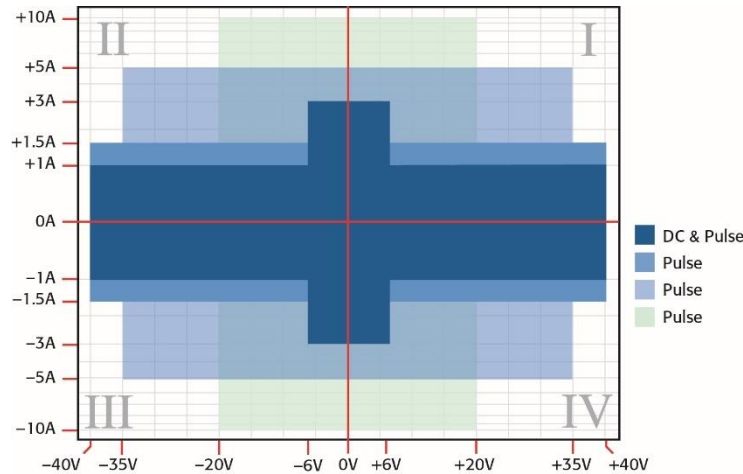
¹⁰ Derate accuracy specification for NPLC setting < 1 by increasing the error term. Add appropriate typical percent of reading term for resistive loads using the table below.

NPLC Setting	100 mV Range	1 V to 40 V Ranges	100 nA Range	1 μ A 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%

Range	Source			Measure	
	Programming Resolution	Accuracy \pm (% reading + amps)	Typical Noise (peak-to-peak) 0.1 Hz to 10 Hz	Display Resolution	Accuracy ¹⁰ \pm (% reading + amps)
100 mA	2 μ A	0.03% + 30 μ A	600 nA	100 nA	0.02% + 20 μ A
1 A	20 μ A	0.05% + 1.8 mA	70 μ A	1 μ A	0.03% + 1.5 mA
3 A	20 μ A	0.06% + 4 mA	150 μ A	1 μ A	0.05% + 3.5 mA
10 A ¹¹	200 μ A	0.5% + 40 mA	N/A	10 μ A	0.4% + 25 mA

DC POWER SPECIFICATIONS

	Voltage	Current
Maximum Output Power and Source/Sink Limits¹²	40.4 W maximum <ul style="list-style-type: none"> \pm(40.4 V at \pm1.0 A) \pm(6.06 V at \pm3.0 A) Four-quadrant source or sink operation 	40.4 W maximum <ul style="list-style-type: none"> \pm(1.01 A at \pm40 V) \pm(3.03 A at \pm6 V) Four-quadrant source or sink operation



Refer to [Pulse Characteristics](#) for pulsing details, such as duty cycle and pulse width.

ADDITIONAL SOURCE CHARACTERISTICS

Noise 10 Hz to 20 MHz	<20 mV peak-to-peak, <3 mV _{RMS} <ul style="list-style-type: none"> 6 V range
Transient Response Time	<70 μ s for the output to recover to within 0.1% for a 10% to 90% step change in load.
Overshoot	Voltage: <ul style="list-style-type: none"> <\pm0.1% + 10 mV Step size = 10% to 90% of range, resistive load, maximum current limit/compliance Current: <ul style="list-style-type: none"> <\pm0.1% Step size = 10% to 90% of range, resistive load See Current source output settling time for additional test conditions

¹¹ 10 A range is accessible in SMU extended range mode only. Accuracy specifications for 10 A range are typical.

¹² Full power source operation regardless of load to 28 °C ambient temperature. Above 28 °C or power sink operation, refer to "Operating boundaries" in the *Model 2601B-PULSE Reference Manual* for additional power derating information.

Range Change Overshoot	Voltage: <ul style="list-style-type: none"> < 300 mV + 0.1% of larger range, except for the 6 V to 40 V step, where it is < 500 mV + 0.1% of larger range Overshoot into a 100 kΩ load, 20 MHz bandwidth Current: ¹³ <300 mV/R _{LOAD} + 5% of larger range	
Guard Offset Voltage	<4 mV <ul style="list-style-type: none"> Current <10 mA 	
Remote Sense Operating Range¹⁴	Maximum voltage between HI and SENSE HI = 3 V Maximum voltage between LO and SENSE LO = 3 V	
Voltage Output Headroom	40 V range <ul style="list-style-type: none"> Maximum output voltage = 42 V – (total voltage drop across source leads) Maximum 1 Ω per source lead 6 V range <ul style="list-style-type: none"> Maximum output voltage = 8 V – (total voltage drop across source leads) Maximum 1 Ω per source lead 	
Overtemperature Protection	Internally sensed overtemperature condition puts the instrument in standby mode	
Limit/Compliance	Bipolar limit (compliance) set with a single value Voltage: ¹⁵ Minimum value is 10 mV; accuracy is the same as voltage source Current: ¹⁶ Minimum value is 10 nA; accuracy is the same as current source	
Voltage Source Output Settling Time	Time required to reach within 0.1% of final value after source level command is processed on a fixed range	
	Voltage Range	Settling Time
	100 mV	<50 μs
	1 V	<50 μs
	6 V	<110 μs
	40 V ¹⁷	<150 μs
Current Source Output Settling Time	Time required to reach within 0.1% of final value after source level command is processed on a fixed range Values below for I _{OUT} × R _{LOAD} = 1 V unless noted	
	Current Range	Settling Time
	100 nA	<20 ms
	1 μA	<2 ms
	10 μA	<500 μs
	100 μA	<150 μs
	1 mA	<100 μs
	10 mA to 1 A	<80 μs (R _{LOAD} >6 Ω)
	3 A	<80 μs (current <2.5 A, R _{LOAD} >2 Ω)

¹³ With source settling set to SETTLE_SMOOTH_100NA.

¹⁴ Add 50 μV to source accuracy specifications per volt of HI lead drop.

¹⁵ 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 the 100 mV range, add an additional 60 mV of uncertainty. Specifications apply with sink mode enabled.

¹⁶ 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.

¹⁷ Add 150 μs when measuring on the 1 A range.

ADDITIONAL MEASUREMENT CHARACTERISTICS

Contact Check Specifications¹⁸	Speed	Maximum Measurement Time to Memory for 60 Hz (50 Hz)	Accuracy (1 year) ±(% reading + ohms)
	Fast	1 ms (1 ms)	5% + 10 Ω
	Medium	4 ms (5 ms)	5% + 1 Ω
	Slow	35 ms (42 ms)	5% + 0.3 Ω
Current Measure Settling Time¹⁹	Time required to reach within 0.1% of final value after source level command is processed on a fixed range Values below for $V_{OUT} = 1\text{ V}$		
	Current Range	Settling Time	
	1 mA	<100 μs	
Input Impedance	>10 GΩ		

ADDITIONAL CHARACTERISTICS

Maximum Load Capacitance	Normal Mode 10 nF	High-Capacitance Mode 50 μF
Common Mode Isolation	>1 GΩ <4500 pF	
Sense HI Input Impedance	>10 GΩ	
Maximum Sense Lead Resistance	1 kΩ for rated accuracy	
Overrange	101% of source range 102% of measure range	

¹⁸ Includes measurement of SENSE HI to HI and SENSE LO to LO contact resistances.

¹⁹ Compliance equal to 100 mA.

HIGH-CAPACITANCE MODE^{20, 21, 22}

Accuracy Specifications	Accuracy specifications are applicable in both normal and high-capacitance modes.	
Voltage Source Output Settling Time	Time required to reach within 0.1% of final value after source level command is processed on a fixed range. Current limit = 1 A	
	Voltage source range	Settling time with C_{LOAD} = 4.7 μF
	100 mV	<200 μs
	1 V	<200 μs
	6 V	<200 μs
	40 V	<7 ms
Current Measure Settling Time	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	
	Current range	Settling time
	1 μA	<230 ms
	10 μA	<230 ms
	100 μA	<3 ms
	1 mA	<3 ms
	10 mA and 100 mA	<100 μs
	1 A and 3 A	<120 μs (R _{LOAD} >2 Ω)
Capacitor Leakage Performance using the KHighC Factory Script ²³	200 ms at 50 nA <ul style="list-style-type: none"> Load = 5 μF in parallel with 10 MΩ Test: 5 V step and measure 	
Mode Change Delay	Current ranges of 100 μA and above: <ul style="list-style-type: none"> 11 ms delay for both in and out of high-capacitance mode Current ranges below 100 μA: <ul style="list-style-type: none"> 250 ms delay into high-capacitance mode 11 ms delay out of high-capacitance mode 	
Voltmeter Input Impedance	10 GΩ in parallel with 3300 pF	
Noise 10 Hz to 20 MHz	<30 mV peak-to-peak <ul style="list-style-type: none"> 6 V range 	
Source Range Change Overshoot	Voltage: <ul style="list-style-type: none"> <400 mV + 0.1% of larger range Overshoot into a 100 kΩ load, 20 MHz bandwidth 	

²⁰ High-capacitance mode specifications are for dc measurements only.

²¹ 100 nA range is not available in high-capacitance mode.

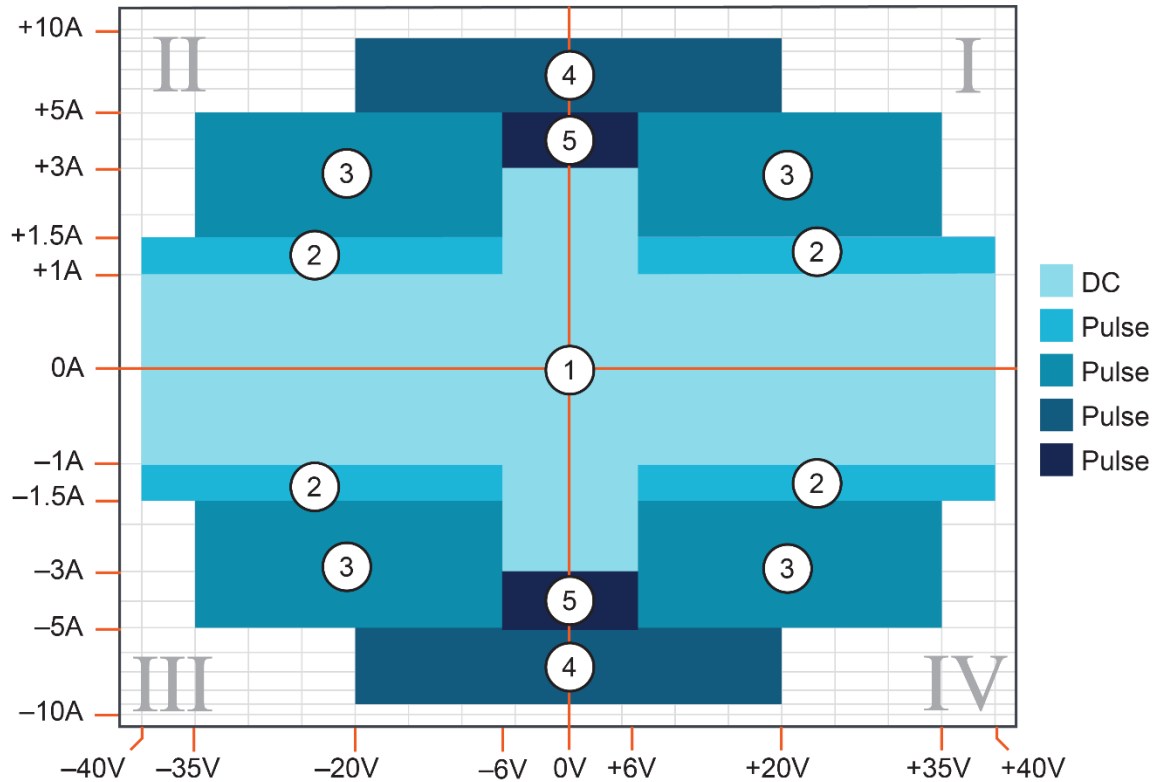
²² High-capacitance mode uses locked ranges. Autorange is disabled.

²³ Part of KI Factory scripts. See the *Model 2601B-PULSE Reference Manual* for details.

SUPPLEMENTAL CHARACTERISTICS

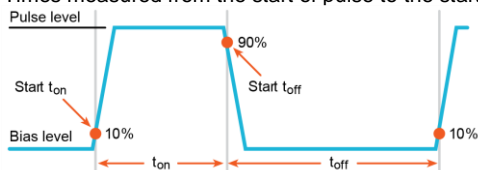
The following specifications are supplemental characteristics that provide additional information about instrument functions and performance. These characteristics are nonwarranted specifications; they describe the typical performance of the 2601B-PULSE.

PULSE CHARACTERISTICS



Pulse Region Specifications			
Quadrant Region	Region Maximums	Maximum Pulse Width ²⁴	Maximum Duty Cycle ²⁵
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%
5	5 A at 6 V	10 ms	10%

²⁴ Times measured from the start of pulse to the start off-time; see figure below.



²⁵ Thermally limited in sink mode (quadrants 2 and 4) and ambient temperatures above 28 °C. See power equations in the *Model 2601B-PULSE Reference Manual* for more information.

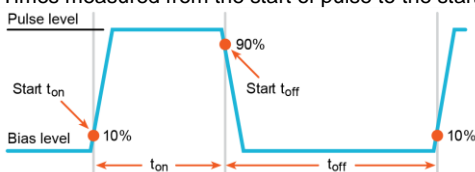
Minimum Programmable Pulse Width²⁶	100 μ s NOTE: Minimum pulse width for settled source at a given I/V output and load can be longer than 100 μ s.			
	Source Value	Load	Source Settling (% of Range)	Minimum Pulse Time to Settle
	6 V	2 Ω	0.2%	150 μ s
	20 V	2 Ω	1%	200 μ s
	35 V	7 Ω	0.5%	500 μ s
	40 V	27 Ω	0.1%	400 μ s
	1.5 A	27 Ω	0.1%	1.5 ms
	3 A	2 Ω	0.2%	150 μ s
	5 A	7 Ω	0.5%	500 μ s
	10 A	2 Ω	0.5%	200 μ s
Pulse Width Programming Resolution	1 μ s			
Pulse Width Programming Accuracy	\pm 5 μ s			
Pulse Width Jitter	2 μ s			

SMU MEASUREMENT SPEED CHARACTERISTICS²⁷

MAXIMUM SWEEP OPERATION RATES, OPERATIONS PER SECOND FOR 60 HZ (50 HZ)

A/D Converter Speed (NPLC)	Trigger Origin	Measure to Memory Using User Scripts	Measure to USB Using User Scripts	Source Measure to Memory Using User Scripts	Source Measure to USB Using User Scripts	Source Measure to Memory Using Sweep API	Source Measure to USB Using Sweep API
0.001	Internal	20000 (20000)	9800 (9600)	6700 (6700)	6600 (6600)	13400 (13400)	6450 (6450)
0.001	Digital I/O	7400 (7400)	7250 (7250)	5500 (5500)	5400 (5400)	13400 (13400)	6500 (6500)
0.01	Internal	5000 (4300)	3900 (3400)	3300 (3000)	3300 (2900)	4400 (3800)	4400 (3800)
0.01	Digital I/O	3400 (3100)	3400 (3000)	2900 (2700)	2900 (2600)	4400 (3800)	4400 (3800)
0.1	Internal	580 (480)	560 (470)	550 (465)	550 (460)	570 (480)	570 (480)

²⁶ Times measured from the start of pulse to the start off-time; see figure below.



²⁷ Exclude current measurement ranges less than 1 mA.

A/D Converter Speed (NPLC)	Trigger Origin	Measure to Memory Using User Scripts	Measure to USB Using User Scripts	Source Measure to Memory Using User Scripts	Source Measure to USB Using User Scripts	Source Measure to Memory Using Sweep API	Source Measure to USB Using Sweep API
0.1	Digital I/O	550 (460)	550 (460)	520 (450)	540 (450)	570 (480)	570 (480)
1	Internal	59 (49)	59 (49)	59 (49)	59 (49)	59 (49)	59 (49)
1	Digital I/O	59 (48)	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 (NPLC)	Trigger Origin	Measure to USB	Source Measure to USB	Source Measure Pass/Fail to USB
0.001	Internal	2100 (2100)	1600 (1600)	1600 (1600)
0.01	Internal	1800 (1650)	1400 (1200)	1300 (1150)
0.1	Internal	480 (410)	450 (390)	400 (380)
1.0	Internal	58 (48)	57 (48)	57 (48)

Maximum Measurement Range Change Rate	>7000 per second for >10 μ A. When changing to or from a range \geq 1 A, maximum rate is > 2200 per second.
Maximum Source Range Change Rate	>400 per second >10 μ A. When changing to or from a range \geq 1 A, maximum rate is >190 per second.
Maximum Source Function Change Rate	>1000 per second.
Command Processing Time	<1 ms. <ul style="list-style-type: none"> Maximum time required for the output to begin to change after receiving the <code>smua.source.levelv</code> or <code>smua.source.leveli</code> attribute.

TRIGGERING AND SYNCHRONIZATION CHARACTERISTICS

TRIGGERING

Trigger In to Trigger Out	0.5 μ s
Trigger In to Source Change²⁸	10 μ s
Trigger Timer Accuracy	\pm 2 μ s
Source Change²⁸ after LXI Trigger	280 μ s

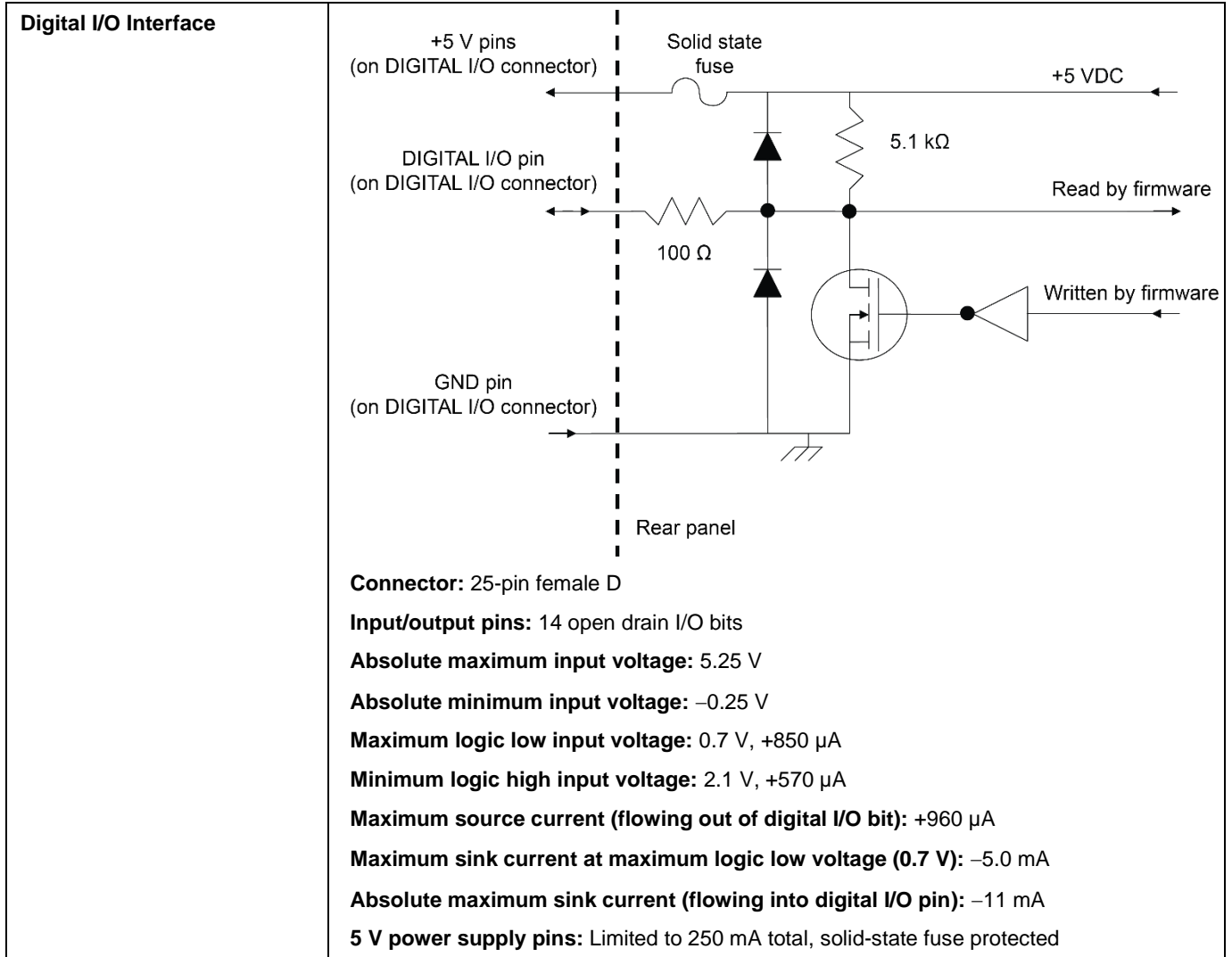
Synchronization

Multi-node Synchronized Source Change²⁸	<0.5 μ s
Single-Node Synchronized Source Change²⁸	<0.5 μ s

²⁸ Fixed source range with no polarity change.

GENERAL SPECIFICATIONS

IEEE-488	IEEE Std 488.1 compliant. Supports IEEE Std 488.2 common commands and status model topology.
RS-232	<ul style="list-style-type: none"> ▪ Baud rates from 300 bps to 115,200 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 2601B-PULSE can use the RS-232 interface to control other instruments.
Ethernet	RJ-45 connector, 10/100BaseT, Auto-MDIX.
LXI Compliance	Version 1.5 LXI Device Specification 2016 compliant.
LXI Timing	<p>Total output trigger response time: 245 μs minimum, 280 μs typical, (not specified) maximum.</p> <p>Receive LAN[0-7] event delay: Unknown.</p> <p>Generate LAN[0-7] event delay: Unknown.</p>
Expansion Interface	<ul style="list-style-type: none"> ▪ The TSP-Link[®] expansion interface allows TSP-enabled instruments to trigger and communicate with each other. ▪ Category 5e or higher LAN crossover cable type. ▪ Three meters (9.84 ft) maximum between each TSP-enabled instrument. ▪ A maximum of 32 TSP-Link nodes can be interconnected. ▪ Each source-measure instrument uses one TSP-Link node.
USB Control (Rear)	USB 2.0 device: USB-TMC488 protocol.
USB File System (Front)	USB 2.0 host: Mass storage class device.
Power Supply	100 V ac to 240 V ac, 50 Hz or 60 Hz (autosensing), 240 VA maximum.
Cooling	Forced air; side intake and rear exhaust. One side must be unobstructed when rack mounted.
Warranty	1 year.
EMC	Conforms to European Union EMC Directive.
Safety	NRTL listed to UL61010-1:2008 and CSA C22.2 No. 61010-1. Conforms to European Union Low Voltage Directive.
Environment	For indoor use only. Altitude: Maximum 2000 m (6562 ft) above sea level. Operating: 0 °C to 35 °C at up to 70% relative humidity; at 35 °C to 50 °C, derate 3% relative humidity per °C. Storage: -25 °C to 65 °C.
Dimensions	<p>2601B-PULSE only: 105 mm x 235 mm x 445 mm (4.1 in. high x 9.25 in. wide x 17.5 in. deep).</p> <p>2601B-PULSE with 2601B-P-INT attached: 105 mm x 235 mm x 503 mm (4.1 in. high x 9.25 in. wide x 19.82 in. deep).</p>
Weight	<p>2601B-PULSE only: 5.9 kg (13 lb).</p> <p>2601B-PULSE with 2601B-P-INT attached: 6.4 kg (14 lb).</p>



SUPPLEMENTAL INFORMATION

Front-Panel Interface	Two-line vacuum fluorescent display (VFD) with keypad and navigation wheel.
Display	<ul style="list-style-type: none"> ▪ Show error messages and user-defined messages. ▪ Display source and limit settings. ▪ Show current and voltage measurements. ▪ View measurements stored in dedicated reading buffers.
Keypad Operations	<ul style="list-style-type: none"> ▪ Change host interface settings. ▪ Save and restore instrument setups. ▪ Load and run factory and user-defined test scripts that prompt for input and send results to the display. ▪ Store measurements into dedicated reading buffers.
Programming	Embedded Test Script Processor (TSP®) accessible from any host interface; responds to high-speed test scripts comprised of remote commands and statements (for example, branching, looping, and math); able to execute test scripts stored in memory without host intervention.
Minimum User Memory Available	16 MB (approximately 250,000 lines of TSP code).
Reading Buffers	<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"> ▪ Measurement ▪ Source setting (at the time the measurement was made) ▪ Measurement status ▪ Range information ▪ Timestamp <p>Reading buffers can be filled using the front-panel STORE key and retrieved using the RECALL key or host interface.</p>
Buffer Size, with Timestamp and Source Setting	>60,000 samples.
Buffer size, without Timestamp and Source Setting	>140,000 samples.

TIMING

Timer	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.
Timestamp	TIMER value is automatically saved when each measurement is triggered.
Resolution	1 μ s.
Timestamp Accuracy	\pm 100 ppm.