

Keithley Instruments
28775 Aurora Road
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1-800-935-5595
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Introduction

A. SPECIFICATION CONDITIONS

1. 23 °C \pm 5 °C, 1 year
2. Relative humidity between 5 percent and 60 percent after 2-hour warm-up.
3. All specifications are based on 1 year calibration cycle for individual instruments.
4. Measurement specifications at 1 power line cycle (PLC) unless otherwise noted.
5. All measurements in 4-wire (Kelvin) configuration.
6. C-V specification on high-voltage system use C-V paths only.
7. The typical values represent the mean plus one standard deviation, are not warranted, apply to 23 °C \pm 5 °C, < 60 percent relative humidity, and are provided solely as useful information.

B. General I-V Source Specifications

1. Maximum output power per source-measure unit (SMU): 20 W (four-quadrant source or sink operation).
2. Compliance: Compliance resolution and accuracy are determined by the corresponding range used.
3. 1000 V range requires use of the high-voltage paths only.

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S530 Low-Current Parametric Test System

Current Source Specifications

Current range	Maximum voltage	SOURCE								
		Resolution	Accuracy							
1 A	20 V	20 μ A	0.05 %	+	1.8 mA	+	1.29 pA per V			
100 mA	200 V	2 μ A	0.03 %	+	30.0 μ A	+	1.29 pA per V			
10 mA	200 V	200 nA	0.03 %	+	6.0 μ A	+	1.29 pA per V			
1 mA	200 V	20 nA	0.03 %	+	300.0 nA	+	1.29 pA per V			
100 μ A	200 V	2 nA	0.03 %	+	60.0 nA	+	1.29 pA per V			
10 μ A	200 V	200 pA	0.03 %	+	5.0 nA	+	1.29 pA per V			
1 μ A	200 V	20 pA	0.03 %	+	800.6 pA	+	1.29 pA per V			
100 nA	200 V	2 pA	0.06 %	+	100.6 pA	+	1.29 pA per V			
10 nA	200 V	200 fA	0.15 %	+	5.6 pA	+	1.29 pA per V			
1 nA	200 V	20 fA	0.15 %	+	2.6 pA	+	1.29 pA per V			

Current Measure Specifications

Current range	Maximum voltage	MEASURE								
		Resolution	Accuracy							
1 A	20 V	1 μ A	0.03 %	+	1.5 mA	+	1.3 pA per V			
100 mA	200 V	100 nA	0.02 %	+	20.0 μ A	+	1.3 pA per V			
10 mA	200 V	10 nA	0.02 %	+	2.5 μ A	+	1.3 pA per V			
1 mA	200 V	1 nA	0.02 %	+	200.0 nA	+	1.3 pA per V			
100 μ A	200 V	100 pA	0.02 %	+	25.0 nA	+	1.3 pA per V			
10 μ A	200 V	10 pA	0.03 %	+	1.5 nA	+	1.3 pA per V			
1 μ A	200 V	1 pA	0.03 %	+	500.6 pA	+	1.3 pA per V			
100 nA	200 V	100 fA	0.06 %	+	100.6 pA	+	1.3 pA per V			
10 nA	200 V	10 fA	0.15 %	+	3.6 pA	+	1.3 pA per V			
1 nA	200 V	1 fA	0.15 %	+	880.0 fA	+	1.3 pA per V			
100 pA	200 V	0.1 fA	0.15 %	+	760.0 fA	+	1.3 pA per V			

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S530 Low-Current Parametric Test System (continued)
Voltage Source Specifications

Voltage range	Maximum current	SOURCE							
		Resolution	Accuracy						
200 V	100 mA	5 mV	0.02 %	+	50.13 mV	+	0 V per A		
20 V	1 A	500 μ V	0.02 %	+	5.13 mV	+	0 V per A		
2 V	1 A	50 μ V	0.02 %	+	730 μ V	+	0 V per A		
200 mV	1 A	5 μ V	0.02 %	+	505 μ V	+	0 V per A		

Voltage Measure Specifications

Voltage range	Maximum current	MEASURE							
		Resolution	Accuracy						
200 V	100 mA	1 mV	0.015 %	+	50.13 mV	+	0 V per A		
20 V	1 A	100 μ V	0.015 %	+	5.13 mV	+	0 V per A		
2 V	1 A	10 μ V	0.02 %	+	480 μ V	+	0 V per A		
200 mV	1 A	1 μ V	0.015 %	+	355 μ V	+	0 V per A		

C-V Measurement Specifications (typical⁷)

Capacitance	Frequency		
	10 kHz	100 kHz	1 MHz
10 pF	0.50 %	0.50 %	1.00 %
100 pF	0.50 %	0.50 %	1.00 %
1 nF	0.50 %	0.50 %	4.00 %
10 nF	0.50 %	0.50 %	5.00 %
100 nF	1.00 %	1.00 %	5.00 %

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S530 High-Voltage Parametric Test System

Current Source Specifications - General Purpose Paths

Current range		Maximum voltage	SOURCE								
			Resolution	Accuracy							
1	A	20 V	20 μ A	0.05	%	+	1.8	mA	+	4.54	pA per V
100	mA	200 V	2 μ A	0.03	%	+	30.0	μ A	+	4.54	pA per V
10	mA	200 V	200 nA	0.03	%	+	6.0	μ A	+	4.54	pA per V
1	mA	200 V	20 nA	0.03	%	+	300.1	nA	+	4.54	pA per V
100	μ A	200 V	2 nA	0.03	%	+	60.1	nA	+	4.54	pA per V
10	μ A	200 V	200 pA	0.03	%	+	5.1	nA	+	4.54	pA per V
1	μ A	200 V	20 pA	0.04	%	+	880.1	pA	+	4.54	pA per V
100	nA	200 V	2 pA	0.06	%	+	180.1	pA	+	4.54	pA per V
10	nA	200 V	200 fA	0.15	%	+	85.1	pA	+	4.54	pA per V
1	nA	200 V	20 fA	0.15	%	+	82.1	pA	+	4.54	pA per V

Current Source Specifications - High Performance / High Voltage Paths

Current range		Maximum voltage	SOURCE								
			Resolution	Accuracy							
1	A	20 V	20 μ A	0.05	%	+	1.8	mA	+	0.94	pA per V
100	mA	200 V	2 μ A	0.03	%	+	30.0	μ A	+	0.94	pA per V
20	mA	1100 V	500 nA	0.05	%	+	4.0	μ A	+	0.94	pA per V
10	mA	200 V	200 nA	0.03	%	+	6.0	μ A	+	0.94	pA per V
1	mA	1100 V	50 nA	0.03	%	+	300.0	nA	+	0.94	pA per V
100	μ A	1100 V	5 nA	0.03	%	+	60.0	nA	+	0.94	pA per V
10	μ A	1100 V	500 pA	0.03	%	+	5.0	nA	+	0.94	pA per V
1	μ A	1100 V	50 pA	0.04	%	+	804.1	pA	+	0.94	pA per V
100	nA	200 V	2 pA	0.06	%	+	104.1	pA	+	0.94	pA per V
10	nA	200 V	200 fA	0.15	%	+	9.1	pA	+	0.94	pA per V
1	nA	200 V	20 fA	0.15	%	+	6.1	pA	+	0.94	pA per V

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S530 High-Voltage Parametric Test System (continued)

Current Measure Specifications - General Purpose Paths

Current range	Maximum voltage	MEASURE						
		Resolution	Accuracy					
1 A	20 V	1 μ A	0.03 %	+	1.5 mA	+	4.54 pA per V	
100 mA	200 V	100 nA	0.02 %	+	20.0 μ A	+	4.54 pA per V	
10 mA	200 V	10 nA	0.02 %	+	2.5 μ A	+	4.54 pA per V	
1 mA	200 V	1 nA	0.03 %	+	200.1 nA	+	4.54 pA per V	
100 μ A	200 V	100 pA	0.03 %	+	25.1 nA	+	4.54 pA per V	
10 μ A	200 V	10 pA	0.03 %	+	1.6 nA	+	4.54 pA per V	
1 μ A	200 V	1 pA	0.03 %	+	580.1 pA	+	4.54 pA per V	
100 nA	200 V	100 fA	0.06 %	+	180.1 pA	+	4.54 pA per V	
10 nA	200 V	10 fA	0.15 %	+	83.1 pA	+	4.54 pA per V	
1 nA	200 V	1 fA	0.15 %	+	80.4 pA	+	4.54 pA per V	
100 pA	200 V	0.1 fA	0.15 %	+	80.3 pA	+	4.54 pA per V	

Current Measure Specifications - High Performance / High Voltage Paths

Current range	Maximum voltage	MEASURE						
		Resolution	Accuracy					
1 A	20 V	1 μ A	0.03 %	+	1.5 mA	+	0.94 pA per V	
100 mA	200 V	100 nA	0.02 %	+	20.0 μ A	+	0.94 pA per V	
20 mA	1100 V	100 nA	0.04 %	+	1.2 μ A	+	0.94 pA per V	
10 mA	200 V	10 nA	0.02 %	+	2.5 μ A	+	0.94 pA per V	
1 mA	1100 V	10 nA	0.03 %	+	200.0 nA	+	0.94 pA per V	
100 μ A	1100 V	1 nA	0.03 %	+	25.0 nA	+	0.94 pA per V	
10 μ A	1100 V	100 pA	0.03 %	+	1.5 nA	+	0.94 pA per V	
1 μ A	1100 V	10 pA	0.03 %	+	504.1 pA	+	0.94 pA per V	
100 nA	200 V	100 fA	0.06 %	+	104.1 pA	+	0.94 pA per V	
10 nA	200 V	10 fA	0.15 %	+	7.1 pA	+	0.94 pA per V	
1 nA	200 V	1 fA	0.15 %	+	4.4 pA	+	0.94 pA per V	
100 pA	200 V	0.1 fA	0.15 %	+	4.3 pA	+	0.94 pA per V	

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S530 High-Voltage Parametric Test System (continued)

Voltage Source Specifications

Voltage range	Maximum current	SOURCE							
		Resolution	Accuracy						
1000 V	20 mA	50 mV	0.02 %	+	100.2 mV	+	0 V per A		
200 V	100 mA	5 mV	0.02 %	+	50.1 mV	+	0 V per A		
20 V	1 A	500 μ V	0.02 %	+	5.1 mV	+	0 V per A		
2 V	1 A	50 μ V	0.02 %	+	680.0 μ V	+	0 V per A		
200 mV	1 A	5 μ V	0.02 %	+	680.0 μ V	+	0 V per A		

Voltage Measure Specifications

Voltage range	Maximum current	MEASURE							
		Resolution	Accuracy						
1000 V	20 mA	10 mV	0.015 %	+	50.2 mV	+	0 V per A		
200 V	100 mA	1 mV	0.015 %	+	50.0 mV	+	0 V per A		
20 V	1 A	100 μ V	0.015 %	+	5.0 mV	+	0 V per A		
2 V	1 A	10 μ V	0.02 %	+	374.0 μ V	+	0 V per A		
200 mV	1 A	1 μ V	0.015 %	+	324.0 μ V	+	0 V per A		

C-V Measurement Specifications (typical⁷)

Capacitance	Frequency		
	10 kHz	100 kHz	1 MHz
10 pF	0.50 %	0.50 %	3.00 %
100 pF	0.50 %	0.50 %	2.00 %
1 nF	0.50 %	0.50 %	7.00 %
10 nF	0.50 %	0.50 %	5.00 %
100 nF	1.00 %	1.00 %	5.00 %

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Typical Performance Addendum

S530 Low-Current Parametric Test System

Current Source Specifications (typical⁷)

Current range	Maximum voltage	SOURCE								
		Resolution	Accuracy							
1 A	20 V	20 μ A	0.03	%	+	0.18	mA	+	0.2	pA per V
100 mA	200 V	2 μ A	0.005	%	+	2.5	μ A	+	0.2	pA per V
10 mA	200 V	200 nA	0.005	%	+	0.80	μ A	+	0.2	pA per V
1 mA	200 V	20 nA	0.005	%	+	25	nA	+	0.2	pA per V
100 μ A	200 V	2 nA	0.005	%	+	6.5	nA	+	0.2	pA per V
10 μ A	200 V	200 pA	0.005	%	+	0.30	nA	+	0.2	pA per V
1 μ A	200 V	20 pA	0.01	%	+	160	pA	+	0.2	pA per V
100 nA	200 V	2 pA	0.01	%	+	5.0	pA	+	0.2	pA per V
10 nA	200 V	200 fA	0.01	%	+	1.2	pA	+	0.2	pA per V
1 nA	200 V	20 fA	0.03	%	+	0.6	pA	+	0.2	pA per V

Current Measure Specifications (typical⁷)

Current range	Maximum voltage	MEASURE								
		Resolution	Accuracy							
1 A	20 V	1 μ A	0.03	%	+	0.18	mA	+	0.2	pA per V
100 mA	200 V	100 nA	0.005	%	+	2.5	μ A	+	0.2	pA per V
10 mA	200 V	10 nA	0.005	%	+	0.80	μ A	+	0.2	pA per V
1 mA	200 V	1 nA	0.005	%	+	25	nA	+	0.2	pA per V
100 μ A	200 V	100 pA	0.005	%	+	6.5	nA	+	0.2	pA per V
10 μ A	200 V	10 pA	0.005	%	+	0.30	nA	+	0.2	pA per V
1 μ A	200 V	1 pA	0.01	%	+	160	pA	+	0.2	pA per V
100 nA	200 V	100 fA	0.01	%	+	5.0	pA	+	0.2	pA per V
10 nA	200 V	10 fA	0.01	%	+	1.2	pA	+	0.2	pA per V
1 nA	200 V	1 fA	0.03	%	+	600	fA	+	0.2	pA per V
100 pA	200 V	0.1 fA	0.05	%	+	400	fA	+	0.2	pA per V

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S530 Low-Current Parametric Test System (continued)
Voltage Source Specifications (typical⁷)

Voltage range	Maximum current	SOURCE							
		Resolution	Accuracy						
200 V	100 mA	5 mV	0.005 %	+	7.0 mV	+	0	V per A	
20 V	1 A	500 μ V	0.005 %	+	0.70 mV	+	0	V per A	
2 V	1 A	50 μ V	0.005 %	+	80 μ V	+	0	V per A	
200 mV	1 A	5 μ V	0.005 %	+	70 μ V	+	0	V per A	

Voltage Measure Specifications (typical⁷)

Voltage range	Maximum current	MEASURE							
		Resolution	Accuracy						
200 V	100 mA	1 mV	0.005 %	+	7.0 mV	+	0	V per A	
20 V	1 A	100 μ V	0.005 %	+	0.70 mV	+	0	V per A	
2 V	1 A	10 μ V	0.005 %	+	80 μ V	+	0	V per A	
200 mV	1 A	1 μ V	0.005 %	+	70 μ V	+	0	V per A	

C-V Measurement Specifications (typical⁷)

Capacitance	Frequency		
	10 kHz	100 kHz	1 MHz
10 pF	0.50 %	0.50 %	1.00 %
100 pF	0.50 %	0.50 %	1.00 %
1 nF	0.50 %	0.50 %	4.00 %
10 nF	0.50 %	0.50 %	5.00 %
100 nF	1.00 %	1.00 %	5.00 %

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S530 High-Voltage Parametric Test System

Current Source Specifications (typical⁷) - General Purpose Paths

Current range	Maximum voltage	SOURCE							
		Resolution	Accuracy						
1 A	20 V	20 μ A	0.03 %	+	1.2 mA	+	2 pA per V		
100 mA	200 V	2 μ A	0.005 %	+	2.5 μ A	+	2 pA per V		
10 mA	200 V	200 nA	0.005 %	+	2 μ A	+	2 pA per V		
1 mA	200 V	20 nA	0.005 %	+	25 nA	+	2 pA per V		
100 μ A	200 V	2 nA	0.005 %	+	10 nA	+	2 pA per V		
10 μ A	200 V	200 pA	0.005 %	+	0.3 nA	+	2 pA per V		
1 μ A	200 V	20 pA	0.01 %	+	100 pA	+	2 pA per V		
100 nA	200 V	2 pA	0.02 %	+	23 pA	+	2 pA per V		
10 nA	200 V	200 fA	0.03 %	+	21 pA	+	2 pA per V		
1 nA	200 V	20 fA	0.05 %	+	20 pA	+	2 pA per V		

Current Source Specifications (typical⁷) - High Performance / High Voltage Paths

Current range	Maximum voltage	SOURCE							
		Resolution	Accuracy						
1 A	20 V	20 μ A	0.03 %	+	1.2 mA	+	0.5 pA per V		
100 mA	200 V	2 μ A	0.005 %	+	2.5 μ A	+	0.5 pA per V		
20 mA	1100 V	500 nA	0.005 %	+	2 μ A	+	0.5 pA per V		
10 mA	200 V	200 nA	0.005 %	+	2 μ A	+	0.5 pA per V		
1 mA	1100 V	50 nA	0.005 %	+	25 nA	+	0.5 pA per V		
100 μ A	1100 V	5 nA	0.005 %	+	10 nA	+	0.5 pA per V		
10 μ A	1100 V	500 pA	0.005 %	+	0.3 nA	+	0.5 pA per V		
1 μ A	1100 V	50 pA	0.01 %	+	80 pA	+	0.5 pA per V		
100 nA	200 V	2 pA	0.02 %	+	3 pA	+	0.5 pA per V		
10 nA	200 V	200 fA	0.03 %	+	1 pA	+	0.5 pA per V		
1 nA	200 V	20 fA	0.05 %	+	0.3 pA	+	0.5 pA per V		

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S530 High-Voltage Parametric Test System (continued)

Current Measure Specifications (typical⁷) - General Purpose Paths

Current range	Maximum voltage	MEASURE						
		Resolution	Accuracy					
1 A	20 V	1 μ A	0.03 %	+	1.2 mA	+	2 pA per V	
100 mA	200 V	100 nA	0.005 %	+	2.5 μ A	+	2 pA per V	
10 mA	200 V	10 nA	0.005 %	+	2 μ A	+	2 pA per V	
1 mA	200 V	1 nA	0.005 %	+	25 nA	+	2 pA per V	
100 μ A	200 V	100 pA	0.005 %	+	10 nA	+	2 pA per V	
10 μ A	200 V	10 pA	0.005 %	+	0.3 nA	+	2 pA per V	
1 μ A	200 V	1 pA	0.01 %	+	100 pA	+	2 pA per V	
100 nA	200 V	100 fA	0.02 %	+	23 pA	+	2 pA per V	
10 nA	200 V	10 fA	0.03 %	+	21 pA	+	2 pA per V	
1 nA	200 V	1 fA	0.05 %	+	20 pA	+	2 pA per V	
100 pA	200 V	0.1 fA	0.05 %	+	20 pA	+	2 pA per V	

Current Measure Specifications (typical⁷) - High Performance / High Voltage Paths

Current range	Maximum voltage	MEASURE						
		Resolution	Accuracy					
1 A	20 V	1 μ A	0.03 %	+	1.2 mA	+	0.5 pA per V	
100 mA	200 V	100 nA	0.005 %	+	2.5 μ A	+	0.5 pA per V	
20 mA	1100 V	100 nA	0.005 %	+	2 μ A	+	0.5 pA per V	
10 mA	200 V	10 nA	0.005 %	+	2 μ A	+	0.5 pA per V	
1 mA	1100 V	10 nA	0.005 %	+	25 nA	+	0.5 pA per V	
100 μ A	1100 V	1 nA	0.005 %	+	10 nA	+	0.5 pA per V	
10 μ A	1100 V	100 pA	0.005 %	+	0.3 nA	+	0.5 pA per V	
1 μ A	1100 V	10 pA	0.01 %	+	80 pA	+	0.5 pA per V	
100 nA	200 V	100 fA	0.02 %	+	3 pA	+	0.5 pA per V	
10 nA	200 V	10 fA	0.03 %	+	1 pA	+	0.5 pA per V	
1 nA	200 V	1 fA	0.05 %	+	0.3 pA	+	0.5 pA per V	
100 pA	200 V	0.1 fA	0.05 %	+	0.3 pA	+	0.5 pA per V	

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S530 High-Voltage Parametric Test System (continued)

Voltage Source Specifications (typical⁷)

Voltage range	Maximum current	SOURCE							
		Resolution	Accuracy						
1000 V	20 mA	50 mV	0.005 %	+	50 mV	+	0 V per A		
200 V	100 mA	5 mV	0.005 %	+	7 mV	+	0 V per A		
20 V	1 A	500 μ V	0.005 %	+	0.8 mV	+	0 V per A		
2 V	1 A	50 μ V	0.005 %	+	80 μ V	+	0 V per A		
200 mV	1 A	5 μ V	0.005 %	+	70 μ V	+	0 V per A		

Voltage Measure Specifications (typical⁷)

Voltage range	Maximum current	MEASURE							
		Resolution	Accuracy						
1000 V	20 mA	10 mV	0.005 %	+	50 mV	+	0 V per A		
200 V	100 mA	1 mV	0.005 %	+	7 mV	+	0 V per A		
20 V	1 A	100 μ V	0.005 %	+	0.8 mV	+	0 V per A		
2 V	1 A	10 μ V	0.005 %	+	80 μ V	+	0 V per A		
200 mV	1 A	1 μ V	0.005 %	+	70 μ V	+	0 V per A		

C-V Measurement Specifications (typical⁷)

Capacitance	Frequency		
	10 kHz	100 kHz	1 MHz
10 pF	0.50 %	0.50 %	3.00 %
100 pF	0.50 %	0.50 %	2.00 %
1 nF	0.50 %	0.50 %	7.00 %
10 nF	0.50 %	0.50 %	5.00 %
100 nF	1.00 %	1.00 %	5.00 %