

Keithley Instruments  
28775 Aurora Road  
Cleveland, Ohio 44139  
1-800-935-5595  
www.keithley.com

## 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.

Keithley Instruments  
 28775 Aurora Road  
 Cleveland, Ohio 44139  
 1-800-935-5595  
 www.keithley.com

### S530 Low-Current Parametric Test System

#### Current Source Specifications

Current range	Maximum voltage	SOURCE								
		Resolution	Accuracy							
1 A	20 V	20 $\mu$ A	0.05 %	+	1.8 mA	+	1.29 pA per V			
100 mA	200 V	2 $\mu$ A	0.03 %	+	30.0 $\mu$ A	+	1.29 pA per V			
10 mA	200 V	200 nA	0.03 %	+	6.0 $\mu$ A	+	1.29 pA per V			
1 mA	200 V	20 nA	0.03 %	+	300.0 nA	+	1.29 pA per V			
100 $\mu$ A	200 V	2 nA	0.03 %	+	60.0 nA	+	1.29 pA per V			
10 $\mu$ A	200 V	200 pA	0.03 %	+	5.0 nA	+	1.29 pA per V			
1 $\mu$ 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 $\mu$ A	0.03 %	+	1.5 mA	+	1.3 pA per V			
100 mA	200 V	100 nA	0.02 %	+	20.0 $\mu$ A	+	1.3 pA per V			
10 mA	200 V	10 nA	0.02 %	+	2.5 $\mu$ A	+	1.3 pA per V			
1 mA	200 V	1 nA	0.02 %	+	200.0 nA	+	1.3 pA per V			
100 $\mu$ A	200 V	100 pA	0.02 %	+	25.0 nA	+	1.3 pA per V			
10 $\mu$ A	200 V	10 pA	0.03 %	+	1.5 nA	+	1.3 pA per V			
1 $\mu$ 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			

Keithley Instruments  
 28775 Aurora Road  
 Cleveland, Ohio 44139  
 1-800-935-5595  
 www.keithley.com

**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 $\mu$ V	0.02 %	+	5.13 mV	+	0 V per A		
2 V	1 A	50 $\mu$ V	0.02 %	+	730 $\mu$ V	+	0 V per A		
200 mV	1 A	5 $\mu$ V	0.02 %	+	505 $\mu$ 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 $\mu$ V	0.015 %	+	5.13 mV	+	0 V per A		
2 V	1 A	10 $\mu$ V	0.02 %	+	480 $\mu$ V	+	0 V per A		
200 mV	1 A	1 $\mu$ V	0.015 %	+	355 $\mu$ V	+	0 V per A		

**C-V Measurement Specifications (typical<sup>7</sup>)**

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 %

Keithley Instruments  
 28775 Aurora Road  
 Cleveland, Ohio 44139  
 1-800-935-5595  
 www.keithley.com

### S530 High-Voltage Parametric Test System

#### Current Source Specifications - General Purpose Paths

Current range		Maximum voltage	SOURCE								
			Resolution	Accuracy							
1	A	20 V	20 $\mu$ A	0.05	%	+	1.8	mA	+	4.54	pA per V
100	mA	200 V	2 $\mu$ A	0.03	%	+	30.0	$\mu$ A	+	4.54	pA per V
10	mA	200 V	200 nA	0.03	%	+	6.0	$\mu$ A	+	4.54	pA per V
1	mA	200 V	20 nA	0.03	%	+	300.1	nA	+	4.54	pA per V
100	$\mu$ A	200 V	2 nA	0.03	%	+	60.1	nA	+	4.54	pA per V
10	$\mu$ A	200 V	200 pA	0.03	%	+	5.1	nA	+	4.54	pA per V
1	$\mu$ 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 $\mu$ A	0.05	%	+	1.8	mA	+	0.94	pA per V
100	mA	200 V	2 $\mu$ A	0.03	%	+	30.0	$\mu$ A	+	0.94	pA per V
20	mA	1100 V	500 nA	0.05	%	+	4.0	$\mu$ A	+	0.94	pA per V
10	mA	200 V	200 nA	0.03	%	+	6.0	$\mu$ A	+	0.94	pA per V
1	mA	1100 V	50 nA	0.03	%	+	300.0	nA	+	0.94	pA per V
100	$\mu$ A	1100 V	5 nA	0.03	%	+	60.0	nA	+	0.94	pA per V
10	$\mu$ A	1100 V	500 pA	0.03	%	+	5.0	nA	+	0.94	pA per V
1	$\mu$ 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

Keithley Instruments  
 28775 Aurora Road  
 Cleveland, Ohio 44139  
 1-800-935-5595  
 www.keithley.com

### 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 $\mu$ A	0.03 %	+	1.5 mA	+	4.54 pA per V	
100 mA	200 V	100 nA	0.02 %	+	20.0 $\mu$ A	+	4.54 pA per V	
10 mA	200 V	10 nA	0.02 %	+	2.5 $\mu$ A	+	4.54 pA per V	
1 mA	200 V	1 nA	0.03 %	+	200.1 nA	+	4.54 pA per V	
100 $\mu$ A	200 V	100 pA	0.03 %	+	25.1 nA	+	4.54 pA per V	
10 $\mu$ A	200 V	10 pA	0.03 %	+	1.6 nA	+	4.54 pA per V	
1 $\mu$ 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 $\mu$ A	0.03 %	+	1.5 mA	+	0.94 pA per V	
100 mA	200 V	100 nA	0.02 %	+	20.0 $\mu$ A	+	0.94 pA per V	
20 mA	1100 V	100 nA	0.04 %	+	1.2 $\mu$ A	+	0.94 pA per V	
10 mA	200 V	10 nA	0.02 %	+	2.5 $\mu$ A	+	0.94 pA per V	
1 mA	1100 V	10 nA	0.03 %	+	200.0 nA	+	0.94 pA per V	
100 $\mu$ A	1100 V	1 nA	0.03 %	+	25.0 nA	+	0.94 pA per V	
10 $\mu$ A	1100 V	100 pA	0.03 %	+	1.5 nA	+	0.94 pA per V	
1 $\mu$ 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	

Keithley Instruments  
 28775 Aurora Road  
 Cleveland, Ohio 44139  
 1-800-935-5595  
 www.keithley.com

### 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 $\mu$ V	0.02 %	+	5.1 mV	+	0 V per A		
2 V	1 A	50 $\mu$ V	0.02 %	+	680.0 $\mu$ V	+	0 V per A		
200 mV	1 A	5 $\mu$ V	0.02 %	+	680.0 $\mu$ 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 $\mu$ V	0.015 %	+	5.0 mV	+	0 V per A		
2 V	1 A	10 $\mu$ V	0.02 %	+	374.0 $\mu$ V	+	0 V per A		
200 mV	1 A	1 $\mu$ V	0.015 %	+	324.0 $\mu$ V	+	0 V per A		

#### C-V Measurement Specifications (typical<sup>7</sup>)

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 %

Keithley Instruments  
 28775 Aurora Road  
 Cleveland, Ohio 44139  
 1-800-935-5595  
 www.keithley.com

## Typical Performance Addendum

### S530 Low-Current Parametric Test System

#### Current Source Specifications (typical<sup>7</sup>)

Current range	Maximum voltage	SOURCE								
		Resolution	Accuracy							
1 A	20 V	20 $\mu$ A	0.03 %	+	0.18 mA	+	0.2 pA per V			
100 mA	200 V	2 $\mu$ A	0.005 %	+	2.5 $\mu$ A	+	0.2 pA per V			
10 mA	200 V	200 nA	0.005 %	+	0.80 $\mu$ A	+	0.2 pA per V			
1 mA	200 V	20 nA	0.005 %	+	25 nA	+	0.2 pA per V			
100 $\mu$ A	200 V	2 nA	0.005 %	+	6.5 nA	+	0.2 pA per V			
10 $\mu$ A	200 V	200 pA	0.005 %	+	0.30 nA	+	0.2 pA per V			
1 $\mu$ 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 (typical<sup>7</sup>)

Current range	Maximum voltage	MEASURE								
		Resolution	Accuracy							
1 A	20 V	1 $\mu$ A	0.03 %	+	0.18 mA	+	0.2 pA per V			
100 mA	200 V	100 nA	0.005 %	+	2.5 $\mu$ A	+	0.2 pA per V			
10 mA	200 V	10 nA	0.005 %	+	0.80 $\mu$ A	+	0.2 pA per V			
1 mA	200 V	1 nA	0.005 %	+	25 nA	+	0.2 pA per V			
100 $\mu$ A	200 V	100 pA	0.005 %	+	6.5 nA	+	0.2 pA per V			
10 $\mu$ A	200 V	10 pA	0.005 %	+	0.30 nA	+	0.2 pA per V			
1 $\mu$ 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			

Keithley Instruments  
 28775 Aurora Road  
 Cleveland, Ohio 44139  
 1-800-935-5595  
 www.keithley.com

**S530 Low-Current Parametric Test System (continued)**
**Voltage Source Specifications (typical<sup>7</sup>)**

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 $\mu$ V	0.005 %	+	0.70 mV	+	0 V per A		
2 V	1 A	50 $\mu$ V	0.005 %	+	80 $\mu$ V	+	0 V per A		
200 mV	1 A	5 $\mu$ V	0.005 %	+	70 $\mu$ V	+	0 V per A		

**Voltage Measure Specifications (typical<sup>7</sup>)**

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 $\mu$ V	0.005 %	+	0.70 mV	+	0 V per A		
2 V	1 A	10 $\mu$ V	0.005 %	+	80 $\mu$ V	+	0 V per A		
200 mV	1 A	1 $\mu$ V	0.005 %	+	70 $\mu$ V	+	0 V per A		

**C-V Measurement Specifications (typical<sup>7</sup>)**

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 %

Specifications are subject to change without notice.



Keithley Instruments  
 28775 Aurora Road  
 Cleveland, Ohio 44139  
 1-800-935-5595  
 www.keithley.com

## S530 High-Voltage Parametric Test System

### Current Source Specifications (typical<sup>7</sup>) - General Purpose Paths

Current range		Maximum voltage	SOURCE							
			Resolution	Accuracy						
1	A	20 V	20 $\mu$ A	0.03	%	+	1.2 mA	+	2	pA per V
100	mA	200 V	2 $\mu$ A	0.005	%	+	2.5 $\mu$ A	+	2	pA per V
10	mA	200 V	200 nA	0.005	%	+	2 $\mu$ A	+	2	pA per V
1	mA	200 V	20 nA	0.005	%	+	25 nA	+	2	pA per V
100	$\mu$ A	200 V	2 nA	0.005	%	+	10 nA	+	2	pA per V
10	$\mu$ A	200 V	200 pA	0.005	%	+	0.3 nA	+	2	pA per V
1	$\mu$ 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 (typical<sup>7</sup>) - High Performance / High Voltage Paths

Current range		Maximum voltage	SOURCE							
			Resolution	Accuracy						
1	A	20 V	20 $\mu$ A	0.03	%	+	1.2 mA	+	0.5	pA per V
100	mA	200 V	2 $\mu$ A	0.005	%	+	2.5 $\mu$ A	+	0.5	pA per V
20	mA	1100 V	500 nA	0.005	%	+	2 $\mu$ A	+	0.5	pA per V
10	mA	200 V	200 nA	0.005	%	+	2 $\mu$ A	+	0.5	pA per V
1	mA	1100 V	50 nA	0.005	%	+	25 nA	+	0.5	pA per V
100	$\mu$ A	1100 V	5 nA	0.005	%	+	10 nA	+	0.5	pA per V
10	$\mu$ A	1100 V	500 pA	0.005	%	+	0.3 nA	+	0.5	pA per V
1	$\mu$ 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

Keithley Instruments  
 28775 Aurora Road  
 Cleveland, Ohio 44139  
 1-800-935-5595  
 www.keithley.com

**S530 High-Voltage Parametric Test System (continued)**
**Current Measure Specifications (typical<sup>7</sup>) - General Purpose Paths**

Current range	Maximum voltage	MEASURE						
		Resolution	Accuracy					
1 A	20 V	1 $\mu$ A	0.03 %	+	1.2 mA	+	2 pA per V	
100 mA	200 V	100 nA	0.005 %	+	2.5 $\mu$ A	+	2 pA per V	
10 mA	200 V	10 nA	0.005 %	+	2 $\mu$ A	+	2 pA per V	
1 mA	200 V	1 nA	0.005 %	+	25 nA	+	2 pA per V	
100 $\mu$ A	200 V	100 pA	0.005 %	+	10 nA	+	2 pA per V	
10 $\mu$ A	200 V	10 pA	0.005 %	+	0.3 nA	+	2 pA per V	
1 $\mu$ 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 (typical<sup>7</sup>) - High Performance / High Voltage Paths**

Current range	Maximum voltage	MEASURE						
		Resolution	Accuracy					
1 A	20 V	1 $\mu$ A	0.03 %	+	1.2 mA	+	0.5 pA per V	
100 mA	200 V	100 nA	0.005 %	+	2.5 $\mu$ A	+	0.5 pA per V	
20 mA	1100 V	100 nA	0.005 %	+	2 $\mu$ A	+	0.5 pA per V	
10 mA	200 V	10 nA	0.005 %	+	2 $\mu$ A	+	0.5 pA per V	
1 mA	1100 V	10 nA	0.005 %	+	25 nA	+	0.5 pA per V	
100 $\mu$ A	1100 V	1 nA	0.005 %	+	10 nA	+	0.5 pA per V	
10 $\mu$ A	1100 V	100 pA	0.005 %	+	0.3 nA	+	0.5 pA per V	
1 $\mu$ 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	

Specifications are subject to change without notice.

Keithley Instruments  
 28775 Aurora Road  
 Cleveland, Ohio 44139  
 1-800-935-5595  
 www.keithley.com

### S530 High-Voltage Parametric Test System (continued)

#### Voltage Source Specifications (typical<sup>7</sup>)

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 μV	0.005 %	+	0.8 mV	+	0 V per A		
2 V	1 A	50 μV	0.005 %	+	80 μV	+	0 V per A		
200 mV	1 A	5 μV	0.005 %	+	70 μV	+	0 V per A		

#### Voltage Measure Specifications (typical<sup>7</sup>)

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 μV	0.005 %	+	0.8 mV	+	0 V per A		
2 V	1 A	10 μV	0.005 %	+	80 μV	+	0 V per A		
200 mV	1 A	1 μV	0.005 %	+	70 μV	+	0 V per A		

#### C-V Measurement Specifications (typical<sup>7</sup>)

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 %