

Keithley Instruments

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SPECIFICATION CONDITIONS

This document contains specifications and supplemental information for the Series 2268 850-Watt DC Power Supplies. Specifications are the standards against which the Series 2268 instruments are tested. Upon leaving the factory, the Series 2268 instruments meet these specifications. Supplemental and typical values are nonwarranted, apply at 23 °C, and are provided solely as useful information.

SPECIFICATIONS
Output

Model	2268-20-42	2268-40-21	2268-60-14	2268-80-10	2268-100-8	2268-150-5
Output voltage and current						
Maximum output voltage ¹	20 V	40 V	60 V	80 V	100 V	150 V
Maximum output current ²	42 A	21 A	14 A	10.5 A	8.5 A	5.6 A
Maximum output power ³	850 W	850 W	850 W	850 W	860 W	850 W
Line regulation (% of rated output + offset)						
Voltage (0.005 % + 2 mV) ⁴	3.0 mV	4 mV	5 mV	6 mV	7 mV	9.5 mV
Current (0.01%+ 1 mA) ⁴	5.2 mA	3.1 mA	2.4 mA	2.1 mA	1.9 mA	1.6 mA
Load regulation (% of rated output + offset)						
Voltage (0.005 % + 2 mV) ⁵	3.0 mV	4 mV	5 mV	6 mV	7 mV	9.5 mV
Current (0.02 % + 4 mA) ⁶	12.4 mA	8.2 mA	6.8 mA	6.1 mA	5.7 mA	5.1 mA
Output noise (RMS, 300 kHz)						
Voltage	8 mV	8 mV	8 mV	8 mV	8 mV	10 mV
Current ⁷	75 mA	45 mA	35 mA	25 mA	20 mA	16 mA
Output ripple (peak-peak, 20 MHz)						
Voltage	50 mV	50 mV	50 mV	80 mV	80 mV	100 mV

¹ When setting 0 V, using either the front panel or digital remote programming, the maximum output voltage is $\leq 0.2\%$ of the rated output voltage.

² When setting 0 A, using either the front panel or digital remote programming, the maximum output current is $\leq 0.4\%$ of the rated output current.

³ Maximum output power is the sum of: (Maximum output voltage \times maximum output current) + 10 W. The 10 W value is the maximum power output from the two auxiliary outputs, AUX1 (5 V \times 0.5 A) and AUX2 (15V \times 0.5A).

⁴ From 85 V AC to 132 V AC or 170 V AC to 265 V AC, constant load.

⁵ From no load to full load, constant input voltage.

⁶ Voltage change is rated output voltage, constant input voltage.

⁷ Measured at 10 % to 100 % output voltage and full output current.

Model	2268-20-42	2268-40-21	2268-60-14	2268-80-10	2268-100-8	2268-150-5
Maximum recommended remote sense line drop compensation per line⁸	1.5 V	2 V	3 V	5 V	5 V	5 V
Protection						
Overvoltage trip point range	1 V to 24 V	2 V to 44 V	3 V to 66 V	3 V to 95 V	3 V to 125 V	3 V to 180 V
Overvoltage trip-point accuracy	±0.24 V	±0.44 V	±0.66 V	±0.95 V	±1.25 V	±1.80 V
Overvoltage programming resolution	2.9 mV	5.3 mV	8 mV	11.4 mV	15 mV	21.6 mV
Overcurrent program setpoint range	0 % to 105 % of rated current					

Accuracy and resolution

Model	2268-20-42	2268-40-21	2268-60-14	2268-80-10	2268-100-8	2268-150-5
Accuracy						
Voltage programming ⁹	±20 mV	±40 mV	±60 mV	±80 mV	±100 mV	±150 mV
Current programming ¹⁰	±84 mA	±42 mA	±28 mA	±21 mA	±17 mA	±11.2 mA
Power programming ¹¹	±2.52 W	±2.52 W	±2.52 W	±2.52 W	±2.55 W	±2.52 W
Voltage readback ⁹	±20 mV	±40 mV	±60 mV	±80 mV	±100 mV	±150 mV
Current readback ¹⁰	±84 mA	±42 mA	±28 mA	±21 mA	±17 mA	±11.2 mA
Power readback ¹¹	±2.52 W	±2.52 W	±2.52 W	±2.52 W	±2.55 W	±2.52 W
Meter accuracy	0.5 % of output voltage or current ±1 count					
Resolution¹²						
Voltage programming	2.4 mV	4.8 mV	7.2 mV	9.6 mV	12 mV	18 mV
Current programming	5.04 mA	2.52 mA	1.68 mA	1.26 mA	1.02 mA	0.67 mA
Power programming	102 mW	102 mW	102 mW	102 mW	102 mW	102 mW
Voltage readback	2.4 mV	4.8 mV	7.2 mV	9.6 mV	12 mV	18 mV
Current readback	5.04 mA	2.52 mA	1.68 mA	1.26 mA	1.02 mA	0.67 mA
Power readback	100.8 mW	100.8 mW	100.8 mW	100.8 mW	102 mW	100.8 mW

⁸ When using remote sense, the total of the load voltage and the load line drops must not exceed the rated output of the power supply.

⁹ Calculation: ±0.1 % of output voltage specification.

¹⁰ Calculation: ±0.2 % of output current specification.

¹¹ Calculation: ±0.3 % of output power specification.

¹² Calculation: 0.012 % of full scale parameter.

Timing

Response time (by model)	2268-20-42	2268-40-21	2268-60-14	2268-80-10	2268-100-8	2268-150-5
Up-programming, 0~V _{max} ¹³	60 ms	60 ms	60 ms	100 ms	100 ms	100 ms
Down-programming, full load	50 ms	50 ms	50 ms	80 ms	100 ms	150 ms
Down-programming, no load	600 ms	800 ms	900 ms	1000 ms	1200 ms	1800 ms
Output hold-up time	Typical 20 ms at any rated input line					
Transient response time ¹⁴	Less than 1 ms for 20 V, 40 V, and 60 V models Less than 2 ms for 80 V, 100 V, and 150 V models					
Data readback transfer time ¹⁵	3 ms					
Programming and readback time	< 300 ms (time from sending command to getting readback voltage and current)					

Analog control

Analog voltage input programming range for voltage and current output	0.0 V to a maximum voltage which can be set from 2.0 V to 10 V; resolution of the maximum voltage is 0.1 V; 0.0 V to maximum voltage corresponds to 0 to rated output
Analog resistance input programming range for voltage and current output	0.0 k Ω to a maximum resistance which can be set from 2.0 k Ω to 10 k Ω ; resolution of the maximum voltage is 0.1 k Ω ; 0 k Ω to the maximum resistance corresponds to 0 V to the rated output voltage
Voltage and current monitor outputs	0.0 V to a maximum voltage which can be set from 2.0 V to 10 V; resolution of the maximum voltage is 0.1 V; 0.0 V to maximum voltage corresponds to 0 V to rated voltage output and 0 A to rated current output
Voltage programming accuracy	± 0.5 % of rated output voltage, typical
Current programming accuracy	± 1.0 % of rated output current, typical
Voltage readback accuracy	± 1.0 % of maximum monitor voltage
Current readback accuracy	± 1.0 % of maximum monitor voltage
Isolation: Programming and readback lines	Non-isolated I/O lines: 500 V, with respect to chassis potential Isolated I/O lines: 600 V, with respect to chassis potential 1500 V, to either output
Shutdown control (isolated input) ¹⁶	Shutdown can be programmed either on logic high or logic low; dry contact compatible Logic low: 0 V to 1.4 V Logic high: 2 V to 15 V
Auxiliary output on/off control (isolated output)	TTL level or dry-contact compatible On: TTL high Off: TTL low
Power supply status signal (isolated output)	OK: TTL high (4 V to 5 V) Fail: TTL low (0 V to 0.6 V)

¹³ With rated, resistive load.

¹⁴ Time for the output voltage to recover within 0.5 % at its rated output for a load change 10 % to 90 % of rated output current. Output set point 10 % to 100 %.

¹⁵ Time to provide data back to the controller using the LAN interface (does not include A/D conversion time).

¹⁶ The shutdown input has user-selectable negative logic operation from the front panel or remote digital input/output.

Interlock enable/disable (isolated input line)	Dry contact; open/short: On or off, programmable
Constant voltage (CV) and constant current (CC) indicator (non-isolated output)	CV: TTL high (4 V to 5 V) CC: TTL low (0 V to 0.6 V)

GENERAL CHARACTERISTICS

Parallel operation	Up to 4 instruments in a master/slave configuration	
Series operation	Up to 2 instruments (with external diodes)	
Power supply rated AC input voltage/frequency	100 V AC to 240 V AC, 47 Hz to 63 Hz	
Operational AC input voltage/frequency	85 V AC to 265 V AC, continuous, single-phase, 47 Hz to 63 Hz, 360 Hz to 440 Hz	
Input current (100/200 V AC)	11.5/6 A (850 W)	
Input power	1100 VA	
Inrush current (100/200 V AC)	< 25 A (850 W)	
Power factor correction	0.99 at 100/200 V AC, rated output power	
Efficiency¹⁷ (100/200 V AC input)	Model 2268-20-42: 82/85 % All other models: 83/87 %	
Temperature coefficient	100 PPM/°C from rated output voltage, after a 30-minute warm-up period	
Drift (8 hours)	0.05 % of rated output (over an 8-hour interval with constant line, load, and temperature, after a 30-minute warm-up period)	
Auxiliary outputs (2)¹⁸	+5 V: 0.5 A maximum recommended load current +15 V: 0.5 A maximum recommended load current	
Isolation¹⁹	1500 V AC or 2121 V DC between mains terminals and accessible conductive parts/chassis ground; output to chassis 500 V AC	
Digital interfaces	RS-232:	57.6 Kbps maximum data rate
	RS-485:	57.6 Kbps maximum data rate
	LAN:	100-BaseT
	USB:	USB 2.0
	GPIO:	IEEE-488.2

¹⁷ At maximum output power.

¹⁸ Current: 0.51 A minimum guaranteed, 0.72 A typically available. The maximum current with these outputs shorted is limited to 0.4 A. Overcurrent protection (each output) is automatic, non-latching. When overcurrent protection (OCP) is tripped, the auxiliary voltage folds back and will recover to nominal condition when the overcurrent condition is removed (typical < 0.2 A). To protect external circuits attached to the auxiliary outputs, use an appropriately rated fuse in series with the auxiliary outputs in use.

¹⁹ Double insulation on primary to secondary isolation barriers. Basic insulation primary to protective earth ground.

Rear-panel connectors	Power output connectors 2268-20-42, 2268-40-21:	Terminal bars with 6.5 mm (0.039 in.) diameter holes
	All other models:	Terminal blocks
	Analog I/O connector:	18-pin terminal block
	Isolated analog I/O and auxiliary output connector:	15-pin D-sub connector
	GPIB connector:	21-pin, female connector
	USB:	USB 2.0 device
	RS-232/RS-485 and RS-485 connectors:	8-pin, RJ-45 jack
Cooling	Forced air cooling by internal fans	
Operating temperature range	0 °C to 50 °C, 100 % load	
Storage temperature range	-20 °C to 70 °C	
Operating humidity range	30 % to 90 % relative humidity (no condensation)	
Storage humidity range	10 % to 95 % relative humidity (no condensation)	
Operating altitude	Up to 2000 m (6500 ft)	
Installation category	II (IEC 1010-1)	
Pollution degree	2 (IEC 1010-1)	
Safety	CSA 22.2 No. 61010-1, 60950-1-07 and UL61010-1 and UL60950-1 (2nd ed.) ¹⁹ Marked with cCSAus, CE for EMC and European Union Low Voltage Directive	
EMC	Conforms with European Union Low Voltage Directive	
Dimensions	44 mm high x 214 mm wide x 495 mm deep (1.72 in. x 8.43 in. x 19.48 in.)	
Weight	5 kg (11 lb)	
Warranty	Three (3) years	