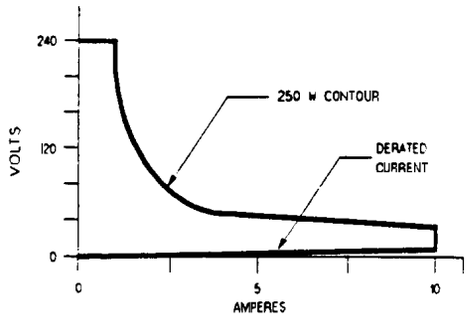
Table 60503-1. Specification and Supplemental Characteristics

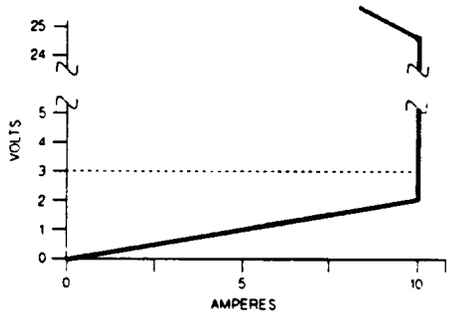
SPECIFICATIONS

DC Input Rating:

Current: 0 to 10 A
Voltage: 3 V to 240 V (minimum dc operation from 0 to 2 V for 0 to 10 A)
Power: 250 W at 40 °C (derated to 187 W at 55 °C)



A. OPERATING CHARACTERISTICS



B. DERATED CURRENT DETAIL

Constant Current Mode:

Ranges:	0 to 1 A; and 0 to 10 A
Accuracy:	(after 30 second wait): ± 0.15% ± 10 mA (both ranges)
Resolution:	0.26 mA (1 A range); 2.6 mA (10 A range)
Regulation:	8 mA (both ranges)
Temperature Coefficient:	150 ppm/°C ± l mA/°C (both ranges)

Constant Resistance Mode:

Ranges:	0.20 to 24 Ω; 24 Ω to 10 kΩ; and 240 Ω to 50 kΩ
Accuracy:	± 0.8% ± 200 mΩ with ≥ 1 A at input (24 Ω range); ± 0.3% ± 0.3 mS with ≥ 24 V at input (10 k and 50 kΩ ranges)
Resolution:	6 mΩ (24 Ω range); 0.011 mS (10 kΩ range); 0.001 mS (50 kΩ range)
Regulation:	10 mV with remote sensing (24 Ω range); 8 mA (10 k and 50 kΩ ranges)
Temperature Coefficient:	800 ppm/°C ± 10 mΩ/°C (24 Ω range); 300ppm/°C ± 0.03 mS/°C (10 k and 50 kΩ ranges)

Constant Voltage Mode:

Range:	0 to 240 V
Accuracy:	± 0.12% ± 120 mV
Resolution:	64 mV
Regulation:	10 mV (remote sense); 40 mV (local sense)
Temperature Coefficient:	120 ppm/°C ± 10 mV/°C

Table 60503-1 Specifications and Supplemental Characteristics (continued)

Transient Operation:

Continuous Mode

Frequency Range:	0.25 Hz to 10 kHz
Frequency Resolution:	4%
Frequency Accuracy:	3%
Duty Cycle Range:	3% to 97% (0.25 Hz to 1 kHz); 6% to 94% (1 kHz to 10 kHz)
Duty Cycle Resolution:	4%
Duty Cycle Accuracy:	6% of setting ± 2%

Pulsed Mode

Pulse Width:	50 µs ± 3% minimum; 4 s ± 3% maximum

Transient Current Level (0 to 1 A and 0 to 10 A ranges):

Resolution:	4 mA (1 A range); 43 mA (10 A range)
Accuracy:	± 0.18% ± 13 mA (1 A range); ± 0.18% ± 50 mA (10 A range)
Temperature Coefficient:	180 ppm/°C ± 1.2 mA/°C

Transient Resistance Level (0.20 to 24 Ω, 24 Ω to 10 kΩ, and 240 Ω to 50 kΩ ranges):

Resolution:	100 mΩ (24 Ω range); 0.18 mS (10 kΩ range); 0.018 mS (50 kΩ range)
Accuracy:	± 0.8% + 200 mΩ with ≥ 1 A at input (24 Ω range) ± 0. 3% + 0.5 mS with ≥ 24 V at input (10 kΩ range) ± 0.3% + 0.4 mS with ≥ 24 V at input (50 kΩ range)

Transient Voltage Level (0 to 240 V):

Resolution:	1.0 V
Accuracy:	± 0.15% ± 1.1 V
Temperature Coefficient:	120 ppm/°C ± 10 mV/°C

Current Readback:

Resolution:	2.7 mA (via GPIB); 10 mA (front panel)
Accuracy:	(after 30 minute wait): ± 0.12% ± 10 mA
Temperature Coefficient:	100 ppm/ °C ± l mA/ °C

Voltage Readback:

Resolution:	67 mV (via GPIB); 100 mV (front panel)
Accuracy:	± 0.1% ± 150 mV
Temperature Coefficient:	100 ppm/°C ± 8 mV/°C
Maximum Readback Capability:	260 V (typical)

Power Readback:

Accuracy:	± 0.2% ± 3 W

Table 60503-1 Specifications and Supplemental Characteristics (continued)

External Analog Programming 0 to 10 V (dc or ac):

Bandwidth:	10 kHz (3 db frequency)
Accuracy:	± 3% ± 10 mA (0 to 1 A range)
	± 3% ± 20 mA (0 to 10 A range)
	± 0.5% ± 150 mV (0 to 240 V range)
Temperature Coefficient:	150 ppm/°C ± 1 mA/°C (current ranges)
	120 ppm/°C ± 10 mV/°C (voltage range)

External Current Monitor (0 to 10 V):

Accuracy:	± 3% ± 10 mA (referenced to analog common)
Temperature Coefficient:	100 ppm/°C ± l mA/°C

External Voltage Monitor (0 to 10 V):

Accuracy:	± 0.4% ± 240 mV (referenced to analog common)
Temperature Coefficient:	70 ppm/ °C ± 1.2 mV/ °C

Remote Sensing: 5 Vdc maximum between sense and input binding posts

Maximum Input Levels:

Current:	10.2 A (programmable to lower limits)
Voltage:	250 V

Minimum Operating Voltage: 2 V (derated to 0 V at 0 A)

PARD (20 Hz to 10 MHz noise):

Current:	1 mA rms/10 mA p-p
Voltage:	6 mV rms

DC Isolation Voltage: ± 240 Vdc between + or - input binding post and chassis ground

Digital Inputs:

Vlo**:**	0.9 V maximum at **I**lo = -1 mA
Vhi	3.15 V minimum (pull-up resistor on input)

Digital Outputs:

Vlo:	0.72 V maximum at **I**lo = 1 mA
Vhi:	4.4 V minimum at **I**lo - 20 µA

SUPPLEMENTAL CHARACTERISTICS

Programmable Slew Rate (For any given input transition, the time required will be either the total slew time or a minimum transition time, whichever is longer. The minimum transition time increases when operating with input currents under 0.2 A and decreases with input currents over 2 A. The following are typical values; ± 25% tolerance):

Table 60503-1 Specifications and Supplemental Characteristics (continued)

Current Slew Rate:*

Rate #	10 A Range Step	1 A Range Step	Transition Time
1	0.17 A/ms	17 A/s	8.0 ms
2	0.42 A/ms	42 A/s	3.2 ms
3	0.83 A/ms	83 A/s	1.6 ms
4	1.7 A/ms	0.17 A/ms	800 µs
5	4.2 A/ms	0.42 A/ms	320 µs
6	8.3 A/ms	0.83 A/ms	160 µs
7	17 A/ms	1.7 A/ms	80 µs
8	42 A/ms	4.2 A/ms	32 µs
9	83 A/ms	8.3 A/ms	20 µs
10	0.17 A/µs	17 A/ms	20 µs
11	0.42 A/µs	42 A/ms	16 µs
12	0.83 A/µs	83 A/ms	16 µs

*AC performance specified from 3 to 240 V.

Voltage Slew Rate:

Rate #	Voltage Range Step	Transition Time*
1	4 V/ms	8.0 ms
2	10 V/ms	3.2 ms
3	20 V/ms	1.6 ms
4	40 V/ms	800 µs
5	100 V/ms	320 µs
6	200 V/ms	160 µs
7	0.4 V/µs	100 µs
8	1 V/µs	100 µS
9	2 V/µs	100 µS

*Transition time based on low capacitance current source.

Resistance Slew Rate (24 Ω range): Uses the value programmed for voltage slew rate.

Resistance Slew Rate (10 k and 50 kΩ ranges): Uses the value programmed for current slew rate.

Transient Current Overshoot (When programmed from 0A):

Range	Transient Current Level	Current Slew Rate	Overshoot*
10 A	2-10 A	All slew rates	0
	0.5 A	0.17 A/µs to 0.83 A/µs	5%
	0.5 A	0.17 A/ms to 42 A/ms	0
	1 A	0.83 A/µs	1%
	1 A	0.17 A/ms to 0.17 A/µs	0
1 A	0.5 A	8.3 A/ms	4%
	0.5 A	0.17 A/s and 0.17 A/ms	0
	1 A	All slew rates	0

*All overshoot values assume a total inductance of lµH, or less, in the load leads connected to the D.U.T.

Table 60503-1 Specifications and Supplemental Characteristics (continued)

Source Turn-On Current Overshoot: Less than 5% of final value (in CC and CR modes when connected to power supplies with voltage rise times of greater than 500µs).

Programmable Short Circuit: 0.20 Ω (0.10 Ω typical)

Programmable Open Circuit: 80 kΩ (typical)

Drift Stability (over an 8 hour interval):

Current:	±0.03% ±1.5 mA
Voltage:	±0.01% ±20 mV

Reverse Current Capacity: 20 A when unit is on; 10 A when unit is off

Weight: 3.2 kg (7 lbs.)

Table 60503-2. Programming Ranges

Function	Front Panel Key	Front Panel Display	HPSL Command (Short Form)	Range of Values
Constant Current				
Set Range	Range	C:RNG value	"CURR:RANG value"	
Low Range				≥ 0 and ≤ 1 A
High Range				> l A and ≤ 10 A
Set Main Level	CURR	CURR value	"CURR value"	
Low Range				0 to 1 A
High Range				0 to 10 A
Set Slew Rate	(shift) Slew	C:SLW value	"CURR:SLEW value"	
Low Range				0.000007 to .083 (A/µs)
High Range				0.00017 to 0.83 (A/µs)
Set Transient Level	Tran Level	C:TLV value	"CURR:TLEV value"	same as main level
*Set Triggered Level			"CURR:TRIG value"	same as main level
Constant Resistance				
Set Range	Range	R:RNG value	"RES:RANG value"	
Low Range				≥ 0 and ≤ 24 Ω
Middle Range				> 24 Ω and ≤ 24 kΩ
High Range				>24 kΩ and ≤ 24 kΩ
Set Main Level	RES	RES value	"RES value"	
Low Range				0 to 24 Ω
Middle Range				24 Ω to 24 kΩ
High Range				240 Ω to 240 kΩ
Set Slew Rate	(shift) Slew			
Low Range		V:SLW value	"VOLT:SLEW value"	same as voltage slew
Middle/High Range		C:SLW value	"CURR:SLEW value"	same as current slew
Set Transient Level	Tran Level	R:TLV value	"RES:TLEV value"	same as main level
*Set Triggered Level			"RES:TRIG value"	same as main level
Constant Voltage				
Set Main Level	VOLT	VOLT value	"VOLT value"	0 to 240 V
Set Slew Rate	(shift) Slew	V:SLW value	"VOLT:SLEW value"	0.004 to 2 (V/µs)
Set Transient Level	Tran Level	V:TLV value	"VOLT:TLEV value"	same as main level
*Set Triggered Level			"VOLT:TRIG value"	same as main level

Table 60503-2. Programming Ranges (continued)

Function	Front Panel Key	Front Panel Display	HPSL Command (Short Form)	Range of Values
Transient Operation				
Set Frequency	FREQ	FREQ value	"TRAN:FREQ value"	0.25 Hz to 10 kHz
Set Duty Cycle	(shift) Dcycle	DCYCLE value	"TRAN:DCYC value"	3-97% (0.25 Hz-1 kHz) 6-94% (1 kHz-10 kHz)
*Set Pulse Width			"TRAN:TWID value"	0.00005 to 4 s
Trigger Operation				
*Set Trigger Period			"TRIG:TIM value"	0.000008 to 4 s
Current Protection				
*Set Current Level			"CURR:PROT value"	0 to 10.2 A
*Set Delay Time			"CURR:PROT:DEL value"	0 to 60 s
*Can only be programmed remotely via the GPIB.				

Table 60503-3. Factory Default Settings

Function	Settings	Function	Setting
CURR level	0 A	Mode (CC, CR, CV)	CC
CURR transient level	0 A	Input (on/off)	on
*CURR slew rate	0.17 A/μs	Short (on/off)	off
CURR range	10 A		
		Transient operation (on/off)	off
*CURR protection (on/off)	off	***TRAN mode	continuous
**CURR protection level	10.2 A	(continuous, pulse, toggle)	
**CURR protection delay	15 s	TRAN frequency	1 kHz
		TRAN duty cycle	50%
RES level	50 kΩ	**TRAN pulse width	0.5 ms
RES transient level	50 kΩ		
RES range	50 kΩ	**TRIG source	hold
		(bus, external, hold, timer, line)	
VOLT level	240 V	**TRIG period	0.001 s
VOLT transient level	240 V	**PORT0 output (on/off)	off (logic 0)
VOLT slew rate	2 V/μs	**CAL mode (on/off)	off

The *RST command resets the CURR slew rate to 0.83 A/μ, not to the factory default.

**Can only be programmed remotely via the GPIB.

***Continuous transient mode is the only mode available at the front panel. Pulsed, toggled, and continuous modes can all be programmed remotely via the GPIB.