

SPECIFICATIONS

Instrument Description

The PS 5004 is a one-wide precision power supply useable in TM 5000-Series power modules. It is not compatible with TM 500 power modules. The instrument is GPIB compatible. The unit provides voltages from 0 V to -20 V over a current range from 0 to 300 mA. The unit operates in the constant voltage or constant current mode. A 4 1/2 digit dvm measures the output voltage, output current, or the current limit. The voltage sense terminals are provided on the front panel. Internal straps select either front panel or rear interface output. The unit is shipped with front panel output.

Standard Accessories

The following items are shipped with the PS 5004.

- 1 Instruction Manual
- 1 Reference Guide
- 1 Instrument Interfacing Guide

IEEE 488 (GPIB) Functions

The PS 5004 can be remotely programmed via the digital interface specified in IEEE Standard 488-1978, IEEE Standard Digital Interface for Programmable Instrumentation. In this manual, the digital interface is called the General Purpose Interface Bus (GPIB).

The IEEE standard identifies the interface function repertoire of an instrument on the GPIB in terms of interface function subsets. The subsets are defined in the standard. The subsets that apply to the PS 5004 are listed in Table 1-1.

NOTE

Refer to IEEE Standard 488-1978 for more detailed information. The standard is published by the Institute of Electrical and Electronics Engineers, Inc., 345 East 47th Street, New York, New York 10017.

Performance Conditions

The electrical characteristics in this specification are valid only if the PS 5004 has been adjusted at an ambient temperature between +21°C and +25°C. The instrument must be in a non-condensing environment whose limits are

Table 1-1
IEEE 488 INTERFACE FUNCTION SUBSETS

Function	Subset	Capability
Source Handshake	SH1	Complete capability.
Acceptor Handshake	AH1	Complete capability.
Basic Talker	T6	Responds to Serial Poll, Untalks if My Listen Address (MLA) is received.
Basic Listener	L4	Unlistens if My Talk Address (MTA) is received.
Service Request	SR1	Complete capability.
Remote-Local Function	RL1	Complete capability.
Parallel Poll	PPO	Does not respond to Parallel Poll.
Device Clear	DC1	Complete capability.
Device Trigger	DT1	Complete capability.
Controller Function	CO	No controller function.
Electrical Interface	E2	Three-state drivers.

described under the environmental part. Allow twenty minutes warm-up time for operation to specified accuracy; sixty minutes after exposure to or storage in a high humidity (condensing) environment. Any conditions that are unique to a particular characteristic are expressly stated as part of that characteristic.

The electrical and environmental performance limits, together with their related validation procedures, comprise a complete statement of the electrical and environmental performance of a calibrated instrument.

Items listed in the Performance Requirements column of the Electrical Characteristics are verified by completing the Performance Check in the Calibration section of this manual. Items listed in the Supplemental Information column are not verified in this manual.

Table 1-2
ELECTRICAL CHARACTERISTICS

Characteristics	Performance Requirement	Supplemental Information
Constant Voltage Mode		
<p>NOTE</p> <p><i>Unless otherwise noted, all constant voltage specifications are valid for $I_{out} < I_{limit}$ (10 mA), measured at the remote sensing points with $\leq 1 \Omega$ output lead resistance and $\leq 5 \Omega$ Sense lead resistance. These specifications are also valid when measuring the voltage at the output terminals with remote sensing disconnected, if $I_{out} \leq 100$ mA.</i></p>		
Range	0 V to 20.0000 V in 0.5 mV steps	
Overall Accuracy (Total Effect)	$\pm(0.01\% + 2 \text{ mV})$ from $+15^{\circ}\text{C}$ to $+30^{\circ}\text{C}$, derating to $\pm(0.035\% + 3 \text{ mV})$ at 0°C and $+50^{\circ}\text{C}$	
Source Effect	$\leq 0.5 \text{ mV}$	
Load Effect	$\leq 1 \text{ mV}$	
Step Size Accuracy (15°C to $+30^{\circ}\text{C}$)	$0.5 \text{ mV} \pm 0.2 \text{ mV}$	
PARD	$\leq 1 \text{ mV p-p}$ 10 Hz to 1 MHz ($< 3 \text{ mV p-p}$ 10 Hz to 5 MHz)	Measured at front panel terminals without using Remote Sense
Load Transient Recovery	$< 200 \mu\text{s}$ to recover within 5.0 mV of final value from a 100 mA load change	Without external energy storage components
<p>Typical voltage change processing times to start of output change. (For total response time, add slew rates listed below)</p> <p>From <DT> command 1.5 ms</p> <p>From <FVOLTS> command 7.5 ms</p> <p>From <VOLTAGE> command 27 ms</p>		
Typical output slew rates		
Risetime (incr voltage)	4 ms	
Falltime (decr voltage)	1 ms — 1.6 ms/V	
Constant Current Mode		
Range	10 mA — 305.0 mA in 2.5 mA steps	
Overall Accuracy	$\pm(2\% + 5 \text{ mA})$	

Table 1-2 (cont)

Characteristics	Performance Requirement	Supplemental Information
Digital Meter		
Configuration		True 4 1/2 digit free running voltmeter. Meter can be selected by front panel controls or via IEEE 488 bus to monitor output voltage, current, or current limit setting. Measurements are displayed on the front panel and are available over the IEEE 488 bus.
Resolution	1 mV or 0.1 mA	
Accuracy		
Output Voltage	+ (0.15% + 6 mV)	
Output Current	± (1.5% + 1 mA)	
Current Limit	+ (1.5% + 5 mA)	
Reading Rate		Approximately 5 per second

Table 1-3
MISCELLANEOUS

Characteristics	Performance Requirement	Supplemental Information
Isolation Voltage (Maximum allowable voltage between any output or sense terminal and chassis ground)	42 V peak ac + dc	
Typical shunting capacitance distributed between supply and chassis ground	0.035 μ F	
Warm-up Time	20 minutes, 60 minutes after removal from a condensing environment.	
Recommended Calibration Interval	2000 hours or 1 year.	
Power Consumption		35 W maximum
Fuse Data		
25 Vac power winding P1010-13A&B		1.6 A slow, 3 AG, 125 V
25 Vac control winding P1010-1A&B		0.5 A slow, 3 AG, 125 V
+8.0 V P1010-2		1.6 A slow, 3 AG, 125 V
+26 V P1010-8		0.5 A fast, 3 AG, 125 V
Output		1.0 A fast, 3 AG, 125 V

Table 1-4
ENVIRONMENTAL^a

Characteristics	Description
Temperature	Meets MIL-T-28800C, class 5.
Operating	0°C to +50°C
Nonoperating	−40°C to +75°C

ENGINEERING REFERENCE INFORMATION

The test procedures conform to MIL-T-28800C specified in paragraph 6.4.7.1.

Humidity	95% RH, 0°C to 30°C 75% RH, to 40°C 45% RH, to 50°C	Meets MIL-T-28800C, class 5
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ENGINEERING REFERENCE INFORMATION

Test procedures conform to MIL-T-28800C specified in paragraph 6.4.7.1

Altitude		Exceeds MIL-T-28800C, class 5.
Operating	4.6 km (15,000 ft)	
Nonoperating	15 km (50,000 ft)	

ENGINEERING REFERENCE INFORMATION

Test procedures conform to MIL-STD-810C Method 500.1, Procedure I, as specified in paragraph 4.5.5.2 of MIL-T-28800C.

Vibration ^c	0.38 mm (0.015") peak to peak, 5 Hz to 55 Hz, 75 minutes.	Meets MIL-T-28800C, class 5, when installed in qualified power modules. ^b
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ENGINEERING REFERENCE INFORMATION

Test procedures conform to MIL-STD-80C, Method 514, Procedure X specified in paragraph 4.5.5.3.1 of MIL-T-28800C, class 3. Plug-ins must be operating on flexible extender cables outside of power module.

Shock ^c	30 g's (1/2 sine), 11 ms duration, 3 shocks in each direction along 3 major axes, 18 total shocks.	Meets MIL-T-28800C, class 5, when installed in qualified power modules. ^b
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ENGINEERING REFERENCE INFORMATION

Test procedures conform to MIL-STD-810C, Method 516, Procedure I as specified in paragraph 4.5.5.4.1 of MIL-T-28800C, class I-VI. Test to 50 g's (1/2 sine) without power module.

Batch Handling (Plug-in only)	12 drops from 45, 4" or equilibrium, whichever occurs first.	Meets MIL-T-28800C, class 5.
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ENGINEERING REFERENCE INFORMATION

The test procedures conform to MIL-STD-810C, Method 516, Procedure V, modified as specified in paragraph 4.5.5.4.3 of MIL-T-28800C.

Packaged Product Vibration and Shock (Plug-in only)	Qualified under National Safe Transit Association Preshipment Test Procedures 1A-B-1 and 1A-B-2.	
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Table 1-4 (cont)

Characteristics	Description
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ENGINEERING REFERENCE INFORMATION

Test to Tektronix Standard 062-2858-00, Section 9.

Electromagnetic Interference	Within limits of F.C.C. Regulations, Part 15, Subpart J, Class A; and MIL-STD-461B (April 1, 1980) class B.
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ENGINEERING REFERENCE INFORMATION

Test to Tektronix Standard 062-2866-00 and F.C.C. Regulations, Part 15, Subpart J, Class A. Unused Plug-in compartments must be covered with a blank plug-in. Dress power cord for worst case validated emanations.

Electromagnetic Susceptibility	Meets MIL-STD-461B (April 1, 1980) class B with either output terminal grounded.
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ENGINEERING REFERENCE INFORMATION

Test to Tektronix Standard 062-2866-00. CS02 and CS06 tests require strapping power module chassis to ground.

Electrostatic Immunity	At least 15 kV discharge from 500 pF in series with 100 ohms to instrument case or any front panel connector without damage or permanent performance degradation.
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ENGINEERING REFERENCE INFORMATION

Test to Tektronix Standard 062-2862-00. Changes of instrument state that require power off-on recycling to clear, or that create potentially hazardous or damaging output signals are considered test failures.

^aWith TM 5000-Series power module. System performance subject to exceptions of power module or other individual plug-ins.

^bRefer to TM 5000 power module specifications.

^cRequires power module retainer bar or clip.

Table 1-5
PHYSICAL

Characteristics	Description
Finish	Chassis: Chromate conversion coated aluminum Front subpanel: Molded polycarbonate Front panel: 0.010" thick polycarbonate sheet with pressure sensitive adhesive.
Net Weight	2.0 lb (0.92 kg)
Enclosure Type and Style per MIL-T-2800B	
Type	III
Style	E (Style F in rackmount power module)
Overall dimensions (nom.)	
Height	126.0 mm (4.96 in)
Width	66.8 mm (2.63 in)
Length	296.6 mm (11.68 in)