DataSheet

Protek 4005,4005G

True RMS 5½ Digital Multimeter

Product Overview

The Protek 4005, 4005G(GPIB) True RMS 5½ Digital Multi-meter incorporating a dual-readout display. They are especially well suited for the needs of high-precision, multifunction, and Automatic Measurement applications.

Application fields

- Research Laboratory
- Development Laboratory
- Repair and maintenance
- Calibration Laboratory
- Automatic Production Test
- General bench-top use

User-Friendly Design

- 4.3" TFT-LCD,480*272 display
- Support double display, Chinese and English Menu
- Built-in front panel accessible help system
- File management (support for U-disk and local storage)

Main Functions

Basic Measurement Functions

- DC Voltage: 200 mV ~ 1000 V
- DC Current: 200 μA ~ 10 A
- AC Voltage: True-RMS, 200 mV ~ 750 V
- AC Current: True-RMS, 20 mA ~ 10 A
- 2/4-Wire Resistance: 200 Ω ~ 100 MΩ
- Capacitance: 2 nF ~ 10000 μF
- Continuity Test: Range is fixed at 2 kΩ
- Diode Test: Range is fixed at 2.0 V
- Frequency Measurement: 20 Hz ~ 1 MHz
- Period Measurement: 1 μs ~ 0.05 s
- Temperature: Support for TC and RTD sensor

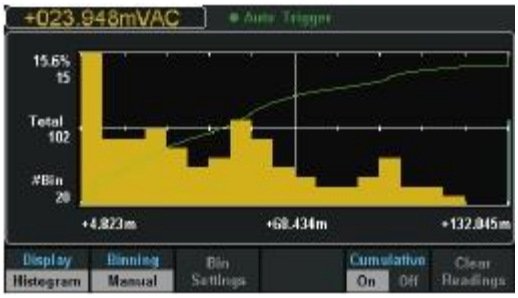
Math Function

Max, Min, Average, Standard Deviation,dBm/dB, Relative Measurement,Pass/Fail Histogram, Trending,Bar Chart

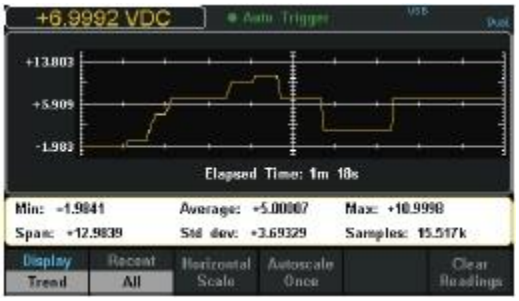
Main Feature

- Real 5½digits readings resolution
- Up to 150 rdgs/s measurement speed
- True-RMS AC Voltage and AC Current measuring
- 1Gb Nand flash size, Mass storage configuration files and data files
- Built-in cold terminal compensation for thermocouple temperature measurements
- Standard interface: USB Device, USB Host, LAN, GPIB (only for SDM3055A)
- Support remote control via commands and compatible with commands of main stream multimeters
- Includes Siglent's EasySDM computer software

Special Features



Historgram



Trend Chart

Bar Chart

Statistics

Double Display

Hold Measurement

dBm Measurement

Interface

Specifications

DC Characteristic

Accuracy ± (% of Reading + % of Range) [1]

Function	Range[2]	Test current or Load voltage	1Year 23℃ ±5℃	Temperature coefficient 0℃~18℃ 28℃~50℃
DC Voltage	200 mV		0.015+ 0.004	0.0015+ 0.0005
	2 V		0.015+ 0.003	0.0010+ 0.0005
	20 V		0.015+ 0.004	0.0020+ 0.0005
	200 V		0.015+ 0.003	0.0015+ 0.0005
	1000V[4]		0.015+ 0.003	0.0015+ 0.0005
DC Current	200 μA	< 8 mV	0.055+ 0.005	0.003+ 0.001
	2 mA	< 80 mV	0.055+ 0.005	0.002+ 0.001
	20 mA	< 0.05 V	0.095+ 0.020	0.008+ 0.001
	200 mA	< 0.5 V	0.070+ 0.008	0.005+ 0.001
	2 A	< 0.1 V	0.170+ 0.020	0.013+ 0.001
	10 A[5]	< 0.3 V	0.250+ 0.010	0.008+ 0.001
Resistance[3]	200 Ω	1 mA	0.030+ 0.005	0.0030+ 0.0006
	2 KΩ	1 mA	0.020+ 0.003	0.0030+ 0.0005
	20 KΩ	100 μA	0.020+ 0.003	0.0030+ 0.0005
	200 KΩ	10 μA	0.020+ 0.010	0.0030+ 0.0005
	2 MΩ	1 μA	0.040+ 0.004	0.0040+ 0.0005
	10 MΩ	200 nA	0.250+ 0.003	0.0100+ 0.0005
	100 MΩ	200 nA ll 10 MΩ	1.75+ 0.004	0.2000+ 0.0005
Diode Test	2.0 V[6]	1 mA	0.05+ 0.01	0.0050+ 0.0005
Continuity Test	2000 Ω	1 mA	0.05+ 0.01	0.0050+ 0.0005

Remarks:
[1]Specifications are for 0.5 Hour warm-up, "Slow" measurement rate and calibration temperature 18℃ ~ 28℃.
[2] 20% over range on all ranges except for DCV 1000 V, ACV 750 V, DCI 10 A and ACI 10 A.
[3]Specifications are for 4-wire measure or 2-wire measure under "REF" operation. ± 0.2 Ω of extra errors will be generated if perform 2-wire measure without "REF" operation.
[4] Plus 0.02 mV of error per 1 V after the first ± 500 VDC.
[5] 30 seconds OFF after 30 seconds ON is recommend foe the continuous current that higher than DC 7 A or AC RMS 7 A.
[6]Accuracy sepcifications are only for voltage measuring at input terminal. The typical value of current under measure is 1 mA. Voltage drop at diode junction may vary with current supply.

AC Characteristic

Accuracy ± (% of Reading + % of Range) [1]

Function	Range[2]	Frequency Range	1Year 23℃ ±5℃	Temperature coefficient 0℃~18℃ 28℃~50℃
True-RMS AC Voltage[3]	200 mV	20 Hz ~ 45 Hz	1.5 + 0.10	0.01 + 0.005
		45 Hz ~ 20 KHz	0.2 + 0.05	0.01 + 0.005
		20 KHz ~ 50 KHz	1.0 + 0.05	0.01 + 0.005
		50 KHz ~ 100 KHz	3.0 + 0.05	0.05 + 0.010
	2 V	20 Hz ~ 45 Hz	1.5 + 0.10	0.01 + 0.005
		45 Hz ~ 20 KHz	0.2 + 0.05	0.01 + 0.005
		20 KHz ~ 50 KHz	1.0 + 0.05	0.01 + 0.005
		50 KHz ~ 100 KHz	3.0 + 0.05	0.05 + 0.010

AC Characteristic

Accuracy ± (% of Reading + % of Range) [1]

Function	Range[2]	Frequency Range	1Year 23℃ ± 5℃	Temperature coefficient 0℃~18℃ 28℃~50℃
True-RMS AC Voltage[3]	20 V	20 Hz ~ 45 Hz	1.5 + 0.10	0.01 + 0.005
		45 Hz ~ 20 KHz	0.2 + 0.05	0.01 + 0.005
		20 KHz ~ 50 KHz	1.0 + 0.05	0.01 + 0.005
		50 KHz ~ 100 KHz	3.0 + 0.05	0.05 + 0.010
	200 V	20 Hz ~ 45 Hz	1.5 + 0.10	0.01 + 0.005
		45 Hz ~ 20 KHz	0.2 + 0.05	0.01 + 0.005
		20 KHz ~ 50 KHz	1.0 + 0.05	0.01 + 0.005
		50 KHz ~ 100 KHz	3.0 + 0.05	0.05 + 0.010
	750 V	20 Hz ~ 45 Hz	1.5 + 0.10	0.01 + 0.005
		45 Hz ~ 20 KHz	0.2 + 0.05	0.01 + 0.005
		20 KHz ~ 50 KHz	1.0 + 0.05	0.01 + 0.005
		50 KHz ~ 100 KHz	3.0 + 0.05	0.05 + 0.010
True-RMS AC Current[4]	20 mA	20 Hz ~ 45 Hz	1.5 + 0.10	0.015 + 0.015
		45 Hz ~ 2 KHz	0.5 + 0.10	0.015 + 0.006
		2 KHz ~ 10 KHz	2.50 + 0.20	0.015 + 0.006
	200 mA	20 Hz ~ 45 Hz	1.5 + 0.10	0.015 + 0.005
		45 Hz ~ 2 KHz	0.50 + 0.10	0.015 + 0.005
		2 KHz ~ 10 KHz	2.50 + 0.20	0.015 + 0.005
	2 A	20 Hz ~ 45 Hz	1.5 + 0.20	0.015 + 0.005
		45 Hz ~ 2 KHz	0.50 + 0.20	0.015 + 0.005
		2 KHz ~ 10 KHz	2.50 + 0.20	0.015 + 0.005
	10 A[5]	20 Hz ~ 45 Hz	1.5 + 0.15	0.015 + 0.005
		45 Hz ~ 2 KHz	0.50 + 0.15	0.015 + 0.005
		2 KHz ~ 10 KHz	2.50 + 0.20	0.015 + 0.005

Additional wave crest factor error (not Sine) [6]	
Wave crest coefficient	Error (% Range)
1–2	0.05
2–3	0.2

Remarks:

[1] Specifications are for 0.5 Hour warm-up, "Slow" measurement rate and calibration temperature 18°C ~ 28°C.
[2] 20% over range on all ranges except for DCV 1000 V, ACV 750 V, DCI 10 A and ACI 10 A.
[3] Specifications are for amplitude of sine wave input > 5% of range. For inputs from 1% to 5% of range and <50 kHz, add 0.1% of range extra error.
[4] Specifications are for sine wave input > 5% of range. 0.1% errors will be added when the range of input sine wave is 1% to 5%.
[5] 30 seconds OFF after 30 seconds ON is recommend foe the continuous current that higher than DC 7 A or AC RMS 7 A.

Frequency and Period Characteristic

Accuracy ± (% of Reading + % of Range) [1]

Function	Range	Frequency Range	1Year 23℃ ±5℃	Temperature coefficient 0℃~18℃ 28℃~50℃
Frequency /Period	200 mV ~750 V[2]	20 Hz ~ 2 KHz	0.01+0.003	0.002+0.001
		2 KHz ~ 20 KHz	0.01+0.003	0.002+0.001
		20 KHz ~ 200 KHz	0.01+0.003	0.002+0.001
		200 KHz ~ 1 MHz	0.01+0.006	0.002+0.002

Remarks:
[1] Specifications are for 0.5 Hour warm-up.
[2] Except for special marks, the AC input voltage is 15% to 120% of range when <100 kHz and 30% to 120% of range when >100 kHz. 750 V range is limited to 750 Vrms.

Capacitance Characteristic

Accuracy ± (% of Reading + % of Range) [1]

Function	Range[2]	Max Testing Current	1Year 23℃ ±5℃	Temperature coefficient 0℃~18℃ 28℃~50℃
Capacitance	2 nF	10 μA	3+1.0	0.08+0.002
	20 nF	10 μA	1+0.5	0.02+0.001
	200 nF	100 μA	1+0.5	0.02+0.001
	2 μF	100 μA	1+0.5	0.02+0.001
	20 μF	1mA	1+0.5	0.02+0.001
	200 μF	1mA	1+0.5	0.02+0.001
	10000 μF	1mA	2+0.5	0.02+0.001

Remarks:
[1] Specifications are for 0.5 Hour warm-up and "REF" operation. Using of non-film capacitor may generate additional errors.
[2] Specifications are for from 1% to 120% on 2 nF range and ranges from 10% to 120% on other ranges.

Temperature Characteristic

Accuracy ± (% of Reading + % of Range) [1]

Function	Probe Type	Probe Model	Working Temperature Range	1Year 23℃ ±5℃	Temperature coefficient 0℃~18℃ 28℃~50℃
Temperature	RTD[2]	α=0.00385	-200℃ ~ 660℃	0.16℃	0.08+0.002
	TC[3]	B	20℃ ~ 1820℃	0.76 ℃	0.14℃
		E	-270℃ ~ 1000℃	0.5℃	0.02℃
		J	-210℃ ~ 1200℃	0.5℃	0.02℃
		K	-270℃ ~ 1370℃	0.5℃	0.03℃
		N	-270℃ ~ 1300℃	0.5℃	0.04℃
		R	-50℃ ~ 1760℃	0.5℃	0.09℃
		S	-50℃ ~ 1760℃	0.6℃	0.11℃
		T	-270℃ ~ 400℃	0.5℃	0.03℃

Remarks:
[1] Specifications are for 0.5 Hour warm-up, not include probe error.
[2] Specifications are for 4-wire measure or 2-wire measure under "REF" operation.
[3] Built-in cold terminal compensation for thermocouple, accuracy is ±1℃.

Measuring Method and other Characteristics

DC Voltage		
Input Resistance	200mV and 2V Range	10 MΩ or10GΩ selectable
	20V,200V and 1000V Rang	10 MΩ ± 2%
Input Bias Current	<90 pA, 25℃	
Input Protection	1000 V on all ranges	
CMRR	120 dB (For the 1 KΩ unbalanced resistance in LO lead, max ± 500 VDC)	
NMRR	60 dB at "slow" measurement rate	
	20 dB are added if open the "AC" filter.	
Resistance		
Testing Method	4-wire resistance or 2-wire resistance selectable	
Input Protection	1000 V on all ranges	
DC Current		
Shunt Resistor	200 μA sampling voltage < 8 mV	
	2 mA sampling voltage < 80mV	
	1 Ω for 20 mA, 200 mA	
	0.01 Ω for 2 A, 10 A	
Input Protection	Rear panel : accessible 10 A,250 V fast-melt fuse	
	Internal :12 A,250 V slow-melt fuse	
Continuity/Diode Test		
Measurement Method	1 mA ± 5% constant-current source or open-circuit voltage	
Beeper	yes	
Continuity Threshold	Adjustable	
Input Protection	1000 V	
True-RMS AC Voltage		
Measurement Method	AC Coupled true RMS measure – up to 1000 V DC bias are permitted on every range.	
Wave Crest Factor	≤3 at full scale	
Input Impedance	1 MΩ ± 2% in parallel with <100 pF on all ranges	
AC Filter Bandwidth	20 Hz ~ 100 KHz	
CMRR	60 dB (For the 1 KΩ imbalance resistance among Lo ead and <60Hz, Max ± 500 VDC)	
True-RMS AC Current		
Measurement Method	DC Coupled to the fuse and shunt; AC Coupled the True-RMS measurement (measures the AC components only)	
Wave Crest Factor	≤3 at full scale	
Max Input	<10A (include DC component)	
Shunt Resistor	1 Ω for 20 mA, 200 mA 1 Ω ; 0.01 Ω for 2 A, 10 A	
Input Protection	Rear panel : accessible 10 A,250 V fast-melt fuse	
	Internal :12 A,250 V slow-melt fuse	
Frequency/Period		
Measurement Method	Reciprocal-counting technique, AC Coupled input, AC voltage or AC current measurement function	
Measure Attentions	Error are leaded into all frequency counters when measuring low voltage or loe frequency signal.	

Protek

Protek 4005,4005G

Capacitance Measuring		
Measurement Method	Measure the rate of change of voltage generated during the current flowing the capacitance	
Connection Type	2-wire	
Input Protection	1000 V on all ranges	
Temperature Measuring		
Measurement Method	Support for TC and RTD types of sensor	
Trigger and Memory		
Samples/Trigger	1 ~ 10000	
Samples/Trigger	6ms ~ 10000ms optional	
External Trigger Input	Input Level	TTL compatible (High level when left input terminal is hanging in the air)
	Trigger Condition	Rising and Falling selectable
	Input Impendance	≥20KΩ//400pF.DC-coupled
	Min Pulse	500μS
VMC Ouput	Level	TTL compatible
	Output Polarity	Straight and negative optional
	Output Impendance	200Ω, typical
History Records		
Volatile Memory	10K reading of history records	
Nonvolatile Memory	1Gb Nand Flash,Mass storage configuration files and data files, Support U-disk external storage	
Math Functions		
Min/Max/Average, dBm, dB, Pass/Fail, Relative, Standard deviation, Hold, histogram, Trend chart, Bar chart		
General Specifications		
Power Supply		
AC 100 V ~ 120 V	400 Hz	
AC 100 V ~ 240 V	50/66 Hz	
Consumption	20VA max	
Mechanism		
Dimension	282mm x 260mm x 105mm	
Weight	3.33Kg	
Other Characteristics		
Display Screen	4.3" TFT-LCD with resolution 480*272	
Operation Environment	Full accuracy from 0℃~50℃,80%RH and 40℃,non condensing	
	Storage Temperature: -20℃ ~ 70℃	
	Shock and Vibration: conforming to MIL-T-28800E, Ⅲ Calss, 5 level (only foe sine)	
	Height above sea level: up to 3000 meters	
Electromagnetic Compatibility	2004/1081EC Directive,Applicable standards EN61326-1:2013	
Safety	Conforming to IEC61010-1:2010. Measure CAT Ⅰ 1000V/CAT 600V Class of pollution: 2	
Remote Interface	USB-GPIB(only for Protek 4005G), 10/100Mbit LAN, USB2.0 Full Speed Device&Host	
Programmer Language	Standard SCPI, compatible with commands of main stream multimeters	
Warm Up Time	30 minutes	

Purchase Information

Product Name	Protek 4005. 4005G	
Models	Protek 4005	Protek 4005G
Standard Accessories	A Power Cord that fits the standard of destination country	
	Two Test Leads,Two Alligator Clips	
	USB to GPIB Adaptor (Only 4005G Model)	
	A USB Cable	
	A Quick Start	
	A Guaranty Card	
	A CD (GUI Program CD)	

참고

본 데이터시트상 사양은 당사 공장 출하 전을 기준으로 하며, 제품 성능 향상 및 품질 개선에 따라 예고 없이 변경 될 수 있습니다.

This is global GSI

HEAD OFFICE
GS Instruments Co.,Ltd.
70, Gilpa-ro 71beon-gil, Nam-gu, Incheon 402-854, Korea
Tel : +82-1688-6820
Fax : +82-32-870-5640
isale@gsinstrument.com
www.gsinstrument.com

USA OFFICE
GS Teletech Inc.
320 NW Victoria Dr, Lee's Summit MO64086, USA
Tel : +1-913-469-6699
Fax : +1-913-661-0163
protek@gsteletechinc.com
www.gsteletechinc.com

CHINA OFFICE
HCQ Electronics Co., Ltd.
Danshan Industrial Park, Chengyang District, Qingdao, Shandong, China
Tel : +86-532-66913900
Fax : +86-532-66910908
sales@hcqelectronic.com
www.hcqelectronic.com

www.gsi-protek.com