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TECHNICAL PRODUCT INFORMATION

Test & measurement instruments

- high - quality
- moderate prices
- excellent precision

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GSM-20H10

Source Measure Unit



FEATURES

- * Maximum Output $\pm 210\text{ V}/\pm 1.05\text{ A}/22\text{ W}$
- * Built-in 4 Sequence Output Modes (Stair, Log, SRC-MEM, Custom), up to 2500 Points
- * OVP / OTP Protection Function
- * 0.012% Basic Measure Accuracy with $6\frac{1}{2}$ -digit Resolution
- * Variable Sampling Speed
- * SDM (Source Delay Measure) Cycle
- * 2-, 4-, and 6-wire Remote V-source and Measure Sensing
- * Variable Display Digits
- * Built-in Limit Function
- * Built-in 5 Calculation Functions
- * 4.3" TFT LCD, Digital Number Keyboard
- * Built-in RTC Clock
- * Interface: RS-232, USBTMC, LAN, GPIB (Optional)

APPLICATIONS

- * Semiconductor Component Characteristic Testing
- * Energy and Efficiency Characteristic Testing
- * Organic Material Characteristic Testing
- * Nanomaterial Characteristic Testing

GW Instek GSM-20H10 is a Source Measure Unit that provides highly stable DC power and instrument-grade $6\frac{1}{2}$ -digit multimeter measurements. While operating, it can be used as a voltage source, current source, voltmeter, ammeter, and ohmmeter, which is uniquely ideal for the evaluation of component characteristics and the test applications of production, including nanomaterials and components, semiconductor architecture, organic materials, high-efficiency illumination, passive components and material characteristics analysis, etc.

GSM-20H10 provides four-quadrant operation of $\pm 210\text{ V}/\pm 1.05\text{ A}/22\text{ W}$. The first and third quadrants operate as power supplies to supply power to the load. The second and fourth quadrants function as loads to consume power internally. Voltage value, current value and resistance value can be measured while operating the power supply or load function with an accuracy of 0.012 % and a resolution of $1\text{ }\mu\text{V}/10\text{ pA}/10\text{ }\mu\Omega$.

With respect to sampling rate, GSM-20H10 supports a sampling rate of up to 50 k points/second, which can accurately analyze the characteristics of the DUT. With the large 4.3-inch screen, all measurement settings, parameters and results can be completely displayed on the screen. The SDM (Source Delay Measure) function is provided to delay sampling when the signal changes so as to prevent the unstable signal from being captured and cause misjudgment. There are four built-in sequence output modes (Stair, Log, SRC-MEM, Custom), which can support up to 2500 points of sequence variation output.

Pertaining to protection, GSM-20H10 provides OVP/OTP modes. The design of OVP allows users to self-define the range of OVP. OTP can effectively prevent errors caused by temperature drift during the test process. For interfaces, this product supports standard SCPI commands and provides RS-232, USBTMC, LAN, GPIB (optional) interfaces to meet users' different interface needs.



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SPECIFICATIONS

MAXIMUM RANGE

Voltage	± 210 V
Current	± 1.05 A
Power	22 W
Voltage Resolution	1 µV
Current Resolution	10 pA

SOURCE

DC Voltage	Output Voltage	± 21 V / ± 1.05 A, ± 210 V / ± 105 mA		
	Current Limit	Min. 0.1 % of range		
	Programming Resolution & Accuracy *1	Range	Resolution	Accuracy
		± 200.000 mV	1 µV	± (0.02 % + 600 µV)
		± 2.00000 V	10 µV	± (0.02 % + 600 µV)
		± 20.0000 V	100 µV	± (0.02 % + 2.4 mV)
		± 200.000 V	1 mV	± (0.02 % + 24 mV)
	Load Regulation	0.01 % of range + 100 µV		
	Line Regulation	0.01 % of range		
	Overshoot	< 0.1 % typical (full scale step, resistive load, 10 mA range)		
Recovery Time (1000% Load Change)	< 250 µs (within 0.1 % plus load regulation errors, 1 A and 100 mA compliance.)			
Ripple and Noise	4 mVrms (20 Hz to 1 MHz) / 10 mVpp (20 Hz to 1 MHz)			
Temperature Coefficient	± (0.15 × accuracy specification) / °C (0 °C to 18 °C & 28 °C to 50 °C)			
DC Current	Output Current	± 1.05 A / ± 21 V, ± 105 mA / ± 210 V		
	Voltage Limit	Min. 0.1 % of range		
	Programmed Source Resolution & Accuracy	Range	Resolution	Accuracy
		± 1.00000 µA	10 pA	± (0.035 % + 600 pA)
		± 10.0000 µA	100 pA	± (0.033 % + 2 nA)
		± 100.000 µA	1 nA	± (0.031 % + 20 nA)
		± 1.00000 mA	10 nA	± (0.034 % + 200 nA)
		± 10.0000 mA	100 nA	± (0.045 % + 2 µA)
		± 100.000 mA	1 µA	± (0.066 % + 20 µA)
		± 1.00000 A	10 µA	± (0.27 % + 900 µA)
	Load Regulation	0.01 % of range + 100 pA		
	Line Regulation	0.01 % of range		
	Overshoot	< 0.1 % typical (1 mA step, RL = 10 kΩ, 20 V range).		
Temperature Coefficient	± (0.15 × accuracy specification) / °C (0 °C to 18 °C & 28 °C to 50 °C)			
General	Output Settling Time *1	100 µs typical time		
	Output Rise Time (± 30 %)	300 µs, 200 V range, 100 mA compliance ; 150 V/µs, 20 V range, 100 mA compliance.		
	DC Floating Voltage	Output can be floated up to ± 250 VDC		
	Remote Sense	Up to 1 V drop per load lead.		
	Compliance Accuracy	Add 0.3 % of range and ± 0.02 % of reading to base specification.		
	Range Change Overshoot *2	Adjacent range changes between 200 mV, 2 V and 20 V ranges, 100 mV typical.		
	Minimum Compliance Value	0.1 % of range		
	Command Processing Time *3	Autorange On:10 ms. Autorange Off: 7 ms.		

MEASUREMENT

Voltage	Input Resistance	>10 GΩ			
	Measurement Resolution & Accuracy	Range		Resolution	Accuracy
		± 200.000 mV		1 μV	± (0.012 % + 300 μV)
		± 2.00000 V		10 μV	± (0.012 % + 300 μV)
		± 20.0000 V		100 μV	± (0.015 % + 1.5 mV)
		± 200.000 V		1 mV	± (0.015 % + 10 mV)
	Temperature Coefficient	± (0.15 × accuracy specification) / °C (0 °C to 18 °C & 28 °C to 50 °C)			
Current	Voltage Burden (4-wire Mode)	< 1 mV			
	Programmed Source Resolution & Accuracy *4	Range		Resolution	Accuracy
		± 1.00000 μA		10 pA	± (0.029 % + 300 pA)
		± 10.0000 μA		100 pA	± (0.027 % + 700 pA)
	± 100.000 μA		1 nA	± (0.025 % + 6 nA)	
	± 1.00000 mA		10 nA	± (0.027 % + 60 nA)	
	± 10.0000 mA		100 nA	± (0.035 % + 600 nA)	
	± 100.000 mA		1 μA	± (0.055 % + 6 μA)	
	± 1.00000 A		10 μA	± (0.22 % + 570 μA)	
	Temperature Coefficient	± (0.15 × accuracy specification) / °C (0 °C to 18 °C & 28 °C to 50 °C)			
Resistance	Range	Resolution		Test current	Accuracy
	< 2.00000 Ω	---		---	Source IACC+Meas.VACC
	2.00000 Ω	10 μΩ		---	Source IACC+Meas.VACC
	20.0000 Ω	100 μΩ	100 mA	± (0.1 % + 0.003 Ω), Normal	± (0.07 % + 0.001 Ω), Enhanced *5
	200.000 Ω	1 mΩ	10 mA	± (0.08 % + 0.03 Ω), Normal	± (0.05 % + 0.01 Ω), Enhanced
	2.00000 kΩ	10 mΩ	1 mA	± (0.07 % + 0.3 Ω), Normal	± (0.05 % + 0.1 Ω), Enhanced
	20.0000 kΩ	100 mΩ	100 μA	± (0.06 % + 3 Ω), Normal	± (0.04 % + 1 Ω), Enhanced
	200.000 kΩ	1 Ω	10 μA	± (0.07 % + 30 Ω), Normal	± (0.05 % + 10 Ω), Enhanced
	2.00000 MΩ	10 Ω	5 μA	± (0.11 % + 300 Ω), Normal	± (0.05 % + 100 Ω), Enhanced
	20.0000 MΩ	100 Ω	0.5 μA	± (0.11 % + 1 kΩ), Normal	± (0.05 % + 500 Ω), Enhanced
	200.000 MΩ	1 kΩ	100 nA	± (0.66 % + 10 kΩ), Normal	± (0.35 % + 5 kΩ), Enhanced
	> 200.000 MΩ	---		---	Source IACC+Meas.VACC
	Temperature Coefficient	± (0.15 × accuracy specification) / °C (0 °C to 18 °C & 28 °C to 50 °C)			
	Source I Mode, Manual OHMS	Total uncertainty = I source accuracy + V measure accuracy (4-wire remote sense).			
Source V Mode, Manual OHMS	Total uncertainty = V source accuracy + I measure accuracy (4-wire remote sense).				
6-wire OHMS Mode	Available using active ohms guard and guard sense. Max. Guard Output Current: 50 mA (except 1 A range).				
Guard Output Impedance	Accuracy is load dependent.				
	< 0.1 Ω in ohms mode				

SPECIFICATIONS							
SYSTEM SPEED *6							
Maximum Measure Auto Range Time			40 ms (fixed source) *7				
Sequence Reading Rates (rdg./second) for 60 Hz (50 Hz) *8	Speed		Fast	488.2	Medium	488.2	Normal
	NPLC/ Trig Origin		0.01 / internal	0.01 / external	0.1 / internal	0.1 / external	1 / internal
Measure	TO MEMORY		2081 (2030)	1239 (1200)	510 (433)	438 (380)	59 (49)
	TO GPIB		1198 (1210)	1079 (1050)	509 (433)	438 (380)	59 (49)
Source-Measure *10	TO MEMORY		1551 (1515)	1018 (990)	470 (405)	409 (360)	58 (48)
	TO GPIB		1000 (900)	916 (835)	470 (410)	409 (365)	58 (48)
Source-Measure Pass/Fail test *9, *10	TO MEMORY		902 (900)	830 (830)	389 (343)	374 (333)	56 (47)
	TO GPIB		809 (840)	756 (780)	388 (343)	374 (333)	56 (47)
Measure Memory *9, *10	TO MEMORY		165 (162)	163 (160)	133 (126)	131 (125)	44 (38)
	TO GPIB		164 (162)	162 (160)	132 (126)	131 (125)	44 (38)
Single Reading Operation Rates (rdg./second) for 60 Hz (50 Hz)	Speed		488.2	488.2	488.2	488.2	488.2
	NPLC/ Trig Origin		0.01 / external	0.1 / external	0.1 / external	1 / external	1 / external
Measure	TO GPIB		256 (256)	167 (166)	72 (70)	49 (42)	34 (31)
	TO GPIB *10		79 (83)	69 (70)	35 (30)	34 (31)	35 (30)
Source-Measure	TO GPIB		79 (83)	69 (70)	35 (30)	34 (31)	35 (30)
	TO GPIB		79 (83)	69 (70)	35 (30)	34 (31)	35 (30)
Component Interface Handler Time for 60 Hz (50 Hz): *9, *11	Speed		Fast	Medium	Normal	Normal	Normal
	NPLC/ Trig Origin		0.01 / internal	0.1 / internal	1 / internal	1 / internal	1 / internal
Measure	TO GPIB		1.04 ms (1.08 ms)	2.55 ms (2.9 ms)	17.53 ms (20.9 ms)	17.53 ms (20.9 ms)	17.53 ms (20.9 ms)
	TO GPIB		0.5 ms (0.5 ms)	0.5 ms (0.5 ms)	0.5 ms (0.5 ms)	0.5 ms (0.5 ms)	0.5 ms (0.5 ms)
Source Pass/Fail Test	TO GPIB		4.82 ms (5.3 ms)	6.27 ms (7.1 ms)	21.31 ms (25.0 ms)	21.31 ms (25.0 ms)	21.31 ms (25.0 ms)
	TO GPIB		4.82 ms (5.3 ms)	6.27 ms (7.1 ms)	21.31 ms (25.0 ms)	21.31 ms (25.0 ms)	21.31 ms (25.0 ms)
GENERAL SPECIFICATIONS							
System General	Load Impedance	Stable into 20,000 pF typical					
	Differential Mode Voltage	250 Vpk					
	Common Mode Voltage	250 VDC					
	Common Mode Isolation	> 10 GΩ, < 1000 pF					
	Over Range	105 % of range, source and measure.					
	Max. Voltage Drop	5 V					
	Max. Sense Lead Resistance	1 MΩ					
	Sense Input Impedance	> 100 GΩ					
	Guard Offset Voltage	< 150 μV, typical					
	Source Output Modes	Fixed DC level, Memory List (mixed function), Stair (linear and log)					
Insulation	Source Memory List	100 points max.					
	Memory Buffer	5,000 readings @ 5 digits (two 2,500 point buffers). Includes selected measured value(s) and time stamp.					
	Power on Settings	Lithium battery backup (3 yr+ battery life).					
	Digital I/O Connector	5 user-definable power-up states plus factory default and *RST.					
	Remote Interface	Active low input. Start of test, end of test, 3 category bits. ; +5V@ 300 mA supply. ; 1 trigger input, 4 TTL/Relay Drive outputs (33V @ 500 mA, diode)					
		USB, GPIB, LAN, RS-232					
		Chassis and terminal: 20 MΩ or above (DC 500V); Chassis and AC cord: 30 MΩ or above (DC 500V)					
		Indoor use, Altitude: ≤ 2000 m Ambient temperature: 0 °C to 40 °C Relative humidity: ≤ 80 %;					
		Installation category: II, Pollution degree: 2					
		Temperature: -20 °C to 70 °C; Humidity: < 80 %					
Operation Environment	Storage Environment	AC 100 V to AC 240 V, 50 Hz or 60 Hz					
	Input Power	80 W					
	Power Consumption	80 W					
	Dimensions & Weight	214 mm x 86 mm x 356.5 mm (W x H x D), Approx. 4.8 kg					

Specifications subject to change without notice. GSM-20H10_E_D2DH

- NOTE:** Required to reach 0.1 % of final value after Command is processed. Resistive load, 10 μA to 100 mA range.
- Overshoot into a fully resistive 100 kΩ load, 10 Hz to 1 MHz BW, adjacent ranges: 100 mV typical, except 20 V / 200 V.
 - Maximum time required for the output to begin to change following the receipt of: SOURce: VOLTage | CURRent <nr> Command
 - Speed = Normal (1 PLC). For 0.1 PLC, add 0.005 % of range to offset specifications, except 200 mV, 1 A ranges, add 0.05 %.
 - For 0.01 PLC, add 0.05 % of range to offset specifications, except 200 mV, 1 A ranges, add 0.5 %.
 - Enhanced mode is Source readback ON, offset compensation ON, add system noise but don't include offsets.
 - Reading rates applicable for voltage or current measurements, autorange off, filter off, display off, trigger delay = 0, and binary reading forma.
 - Purely resistive load. 1 μA and 10 μA ranges < 65 ms.
 - 1000 point sweep was characterized with the source on a fixed rang.
 - Pass/Fail test performed using one high limit and one low math limit.
 - Includes time to re-program source to a new level before making measurement.
 - Time from falling edge of START OF TEST signal to falling edge of END OF TEST signal.
 - Command processing time of: SOURce: VOLTage | CURRent: TRIGgered <nr> Command not included.

SM-01/SM-02 Digital I/O Adapter



ORDERING INFORMATION

GSM-20H10 (GPIB) Precision Source Measure Unit with GPIB
GSM-20H10 Precision Source Measure Unit

ACCESSORIES

Power Cord x 1, GTL-207A Test Lead x 1, Alligator Clip x 2

OPTIONAL ACCESSORIES

SM-01	Digital I/O Adapter, Convert DB15 to DB9 + 8-pin micro-DIN	GTL-248	GPIB Cable (25 pin Micro-D Connector)
SM-02	Digital I/O Adapter, Convert DB15 to DB37 + 8-pin micro-DIN	GRA-450-J	Rack Mount Kit for JIS type
GTL-207A	Test Lead, Banana to Probe Test Lead, 800 mm	GRA-450-E	Rack Mount Kit for EIA type
GTL-246	USB Cable (USB 2.0 A-B Type, approx. 1200 mm)		

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