

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 6½-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 6½-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 $1\ \mu\text{V}/10\ \text{pA}/10\ \mu\Omega$.

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	± (0.07 % + 0.001 Ω), Normal
		200.000 Ω	1 mΩ	10 mA	± (0.08 % + 0.03 Ω), Normal
		2.00000 kΩ	10 mΩ	1 mA	± (0.07 % + 0.3 Ω), Normal
		20.0000 kΩ	100 mΩ	100 µA	± (0.06 % + 3 Ω), Normal
		200.000 kΩ	1 Ω	10 µA	± (0.07 % + 30 Ω), Normal
		2.00000 MΩ	10 Ω	5 µA	± (0.11 % + 300 Ω), Normal
		20.0000 MΩ	100 Ω	0.5 µA	± (0.11 % + 1 kΩ), Normal
		200.000 MΩ	1 kΩ	100 nA	± (0.66 % + 10 kΩ), Normal
	> 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). Accuracy is load dependent.				
Guard Output Impedance	< 0.1 Ω in ohms mode				

SPECIFICATIONS

SYSTEM SPEED *6		40 ms (fixed source) *7					
Maximum Measure Auto Range Time		40 ms (fixed source) *7					
Sequence Reading Rates (rdg./second) for 60 Hz (50 Hz) *8	Speed NPLC/ Trig Origin	Fast 0.01 / internal	488.2 0.01 / external	Medium 0.1 / internal	488.2 0.1 / external	Normal 1 / internal	488.2 1 / external
Measure	TO MEMORY	2081 (2030)	1239 (1200)	510 (433)	438 (380)	59 (49)	57 (48)
	TO GPIB	1198 (1210)	1079 (1050)	509 (433)	438 (380)	59 (49)	57 (48)
Source-Measure *10	TO MEMORY	1551 (1515)	1018 (990)	470 (405)	409 (360)	58 (48)	57 (48)
	TO GPIB	1000 (900)	916 (835)	470 (410)	409 (365)	58 (48)	57 (47)
Source-Measure Pass/Fail test *9, *10	TO MEMORY	902 (900)	830 (830)	389 (343)	374 (333)	56 (47)	56 (47)
	TO GPIB	809 (840)	756 (780)	388 (343)	374 (333)	56 (47)	56 (47)
Measure Memory *9, *10	TO MEMORY	165 (162)	163 (160)	133 (126)	131 (125)	44 (38)	44 (38)
	TO GPIB	164 (162)	162 (160)	132 (126)	131 (125)	44 (38)	44 (38)
Single Reading Operation Rates (rdg./second) for 60 Hz (50 Hz)	Speed NPLC/ Trig Origin	488.2 0.01 / external		488.2 0.1 / external		488.2 1 / external	
Measure	TO GPIB	256 (256)		167 (166)		49 (42)	
Source-Measure	TO GPIB *10	79 (83)		72 (70)		34 (31)	
Source-Measure Pass/Fail Test *9, *10	TO GPIB	79 (83)		69 (70)		35 (30)	
Component Interface Handler Time for 60 Hz (50 Hz): *9, *11	Speed NPLC/ Trig Origin	Fast 0.01 / internal		Medium 0.1 / internal		Normal 1 / internal	
Measure	TO GPIB	1.04 ms (1.08 ms)		2.55 ms (2.9 ms)		17.53 ms (20.9 ms)	
Source Pass/Fail Test	TO GPIB	0.5 ms (0.5 ms)		0.5 ms (0.5 ms)		0.5 ms (0.5 ms)	
Source-Measure Pass/Fail Test *10, *12	TO GPIB	4.82 ms (5.3 ms)		6.27 ms (7.1 ms)		21.31 ms (25.0 ms)	
GENERAL SPECIFICATIONS							
System General	Load Impedance Differential Mode Voltage Common Mode Voltage Common Mode Isolation Over Range Max. Voltage Drop Max. Sense Lead Resistance Sense Input Impedance Guard Offset Voltage Source Output Modes Source Memory List Memory Buffer Power on Settings Digital I/O Connector Remote Interface	Stable into 20,000 pF typical 250 VPk 250 VDC > 10 GΩ, < 1000 pF 105 % of range, source and measure. 5 V 1 MΩ > 100 GΩ < 150 μV, typical Fixed DC level, Memory List (mixed function), Stair (linear and log) 100 points max. 5,000 readings @ 5 digits (two 2,500 point buffers). Includes selected measured value(s) and time stamp. Lithium battery backup (3 yr+ battery life). 5 user-definable power-up states plus factory default and *RST. 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					
Insulation		Chassis and terminal: 20 MΩ or above (DC 500V); Chassis and AC cord: 30 MΩ or above (DC 500V)					
Operation Environment		Indoor use, Altitude: ≤ 2000 m Ambient temperature: 0 °C to 40 °C Relative humidity: ≤ 80 %; Installation category: II, Pollution degree: 2					
Storage Environment		Temperature: -20 °C to 70 °C; Humidity: < 80 %					
Input Power		AC 100 V to AC 240 V, 50 Hz or 60 Hz					
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	
GTL-207A Test Lead, Banana to Probe Test Lead, 800 mm	GRA-450-J Rack Mount Kit for JIS type
GTL-246 USB Cable (USB 2.0 A-B Type, approx. 1200 mm)	GRA-450-E Rack Mount Kit for EIA type

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