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TECHNICAL PRODUCT INFORMATION

Test & measurement instruments

- high - quality
- moderate prices
- excellent precision

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GSM-20H10

Precision Source Meter

FEATURES

- Maximum Output ±210V/±1.05A/22W
- 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)

GW INSTEK
Simply Reliable

Streamline Your Characteristic Analysis

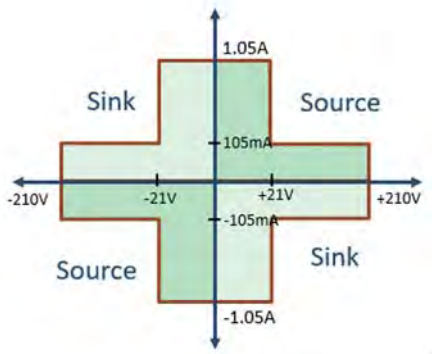
GW Instek GSM-20H10 is a precision source meter that provides highly stable DC power and instrument-grade 6½-digit multimeter measurements. While operating, it can be used as a voltage source, current source, voltmeter, ammeter, and ohmmeter, which is uniquely ideal for the evaluation of component characteristics 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 ±210V/±1.05A/22W. 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 1μV/10pA/10μΩ.

With respect to sampling rate, GSM-20H10 supports a sampling rate of up to 50k 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.

A. MAXIMUM OUTPUT: ±210V/±1.05A/22W

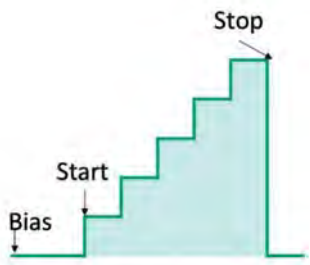


The power source output of the GSM-20H10 has two ranges.

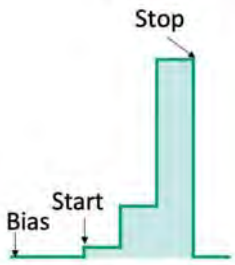
The voltage range is ±21 volts, and the current is ±1.05A.
The voltage range is ±210 volts, and the current range is ±105mA.
The power capacity is 22W.

Provide a full range of four-quadrant measurement without duty cycle limit.

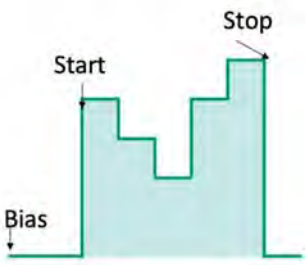
B. BUILT-IN 4 SEQUENCE OUTPUT MODES, UP TO 2500 POINTS



LINEAR STAIRCASE SWEEP



LOG STAIRCASE SWEEP



CUSTOM MODE

GSM-20H10 precision source meter provides four sequence output modes: linear staircase, log staircase, SRC-MEM (source memory) and Custom(self-defined).

With these output modes, users can quickly generate output as needed. The total number of sequence points is 2,500.

C. OVP /OTP PROTECTION FUNCTION

In terms of protection, GSM-20H10 provides OVP/OTP protection modes; in the design of OVP, users can define the range of OVP, and the protection of OTP can effectively prevent errors caused by temperature drift during the test process.

D. 0.012% BASIC MEASURE ACCURACY WITH 6½DIGIT RESOLUTION

GSM-20H10 provides a measurement accuracy of up to 0.012%, and provides a meter display function of up to 6½ digits, allowing users to have more accurate results when measuring small signals..

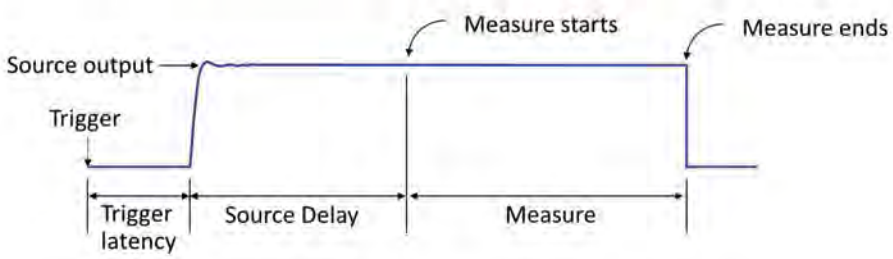
E. VARIABLE SAMPLING SPEED

SAMPLING MODE	FAST	MEDIUM	NORMAL	HIGH	OTHER
Speed, NPLC	0.01	0.1	1	10	User defined
Digit	3½	4½	5½	6½	Selectable

The sampling rate of GSM-20H10 is variable. Therefore, users can choose the sampling rate from 0.01 PLC to 10 PLC according to their needs.

Where NPLC represents the number of power line cycles, for example, AC power frequency is 50Hz, 1 PLC means 20ms, 2 PLC means 40ms, and so on.

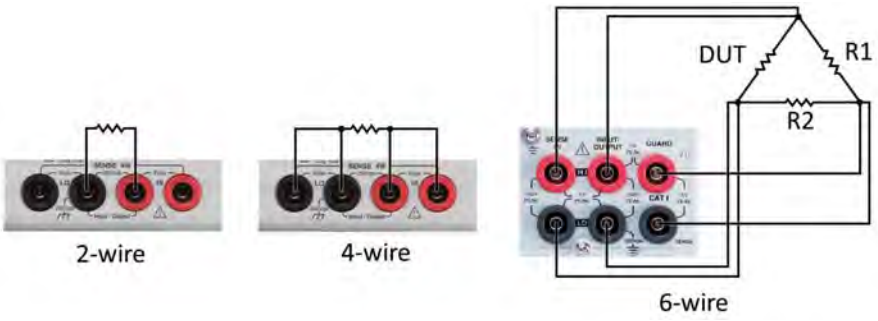
F. SDM (SOURCE DELAY MEASURE) CYCLE



The initial state of the source output may be unstable. If the meter starts measuring after the source is output, users can set the source delay to start the meter measurement after passing the unstable period so as to obtain stable measurement results.

GSM-20H10 precision source meter's delay range is 0 to 9999.999 seconds.

G. 2-, 4-, AND 6-WIRE REMOTE V-SOURCE AND MEASURE SENSING



Other than 2-wire, GSM-20H10 also provides 4-wire and 6-wire resistance measurements.

4-wire measurement eliminates the effect of lead resistance, realizing accurate measurement of small resistances below 100ohm at high currents.

6-wire combining 4-wire connection and the protection of ohm characteristics eliminate the effects of internal parallel resistance, realizing the resistance measurement of a tiny wire.

H. VARIABLE DISPLAY DIGITS

The display bits of GSM-20H10 are variable. Therefore, users can choose the number of display bits among 3.5, 4.5, 5.5, and 6.5 bits according to their needs.

I. BUILT-IN LIMIT FUNCTION

GSM-20H10 has three built-in Pass/Fail limit line tests with a total of 11 sets.

J. BUILT-IN 5 CALCULATION FUNCTIONS

- Power = V∗I
- CompOhms = $\frac{(V2-V1)}{(I2-I1)}$
- Vceoff(%) = $\left[\frac{\Delta R}{(R2*\Delta V)}\right] * 100\%$
- VarAlpha , $\alpha = \frac{log(I2\div I1)}{log(v2\div V1)}$
- Dev = $\left[\frac{(X-Y)}{Y}\right] * 100\%$

GSM-20H10 provides five built-in calculation functions: Power, Offset Compensation Ohms, Voltage Coefficient, Varistor Alpha, and Percent Deviation.

PANEL INTRODUCTION

CE | RS-232 | USB Host | USB Device | LAN | Digit I/O | GPIB

1. LCD Display
2. USB Host
3. Number Pad/ Secondary Function Key
4. Power On/Off Button
5. Direction Keys And Enter Key
6. Function Key
7. Front Panel Input/Output Terminals
8. Auxiliary Function Key
9. AC Power Switch
10. GPIB Port (Option)
11. Heat Sink Fan
12. LAN
13. USB Device
14. Real Panel Inputs/Outputs
15. RS-232
16. Digital I/O
17. AC Power Socket and Fuse

SPECIFICATIONS

MAXIMUM RANGE	Voltage		±210V						
	Current		±1.05A						
	Power		22W						
	Voltage Resolution		1µV						
	Current Resolution		10pA						
SOURCE	DC Voltage	Output Voltage	±21V / ±1.05A, ±210V / ±105 mA						
		Current Limit	Min. 0.1% of range						
		Programming Resolution & Accuracy *1	Range	±200.000mV	±2.00000V	±20.0000V	±200.000V		
			Resolution	1µV	10µV	100µV	1mV		
			Accuracy	±(0.02%+600µV)	±(0.02%+600µV)	±(0.02%+2.4mV)	±(0.02%+24mV)		
		Load Regulation	0.01% of range + 100µV						
		Line Regulation	0.01% of range						
		Overshoot	<0.1% typical (full scale step,resistive load, 10mA range)						
		Recovery Time (1000% Load Change)	<250µs (within 0.1% plus load regulation errors, 1A and 100mA compliance)						
		Ripple and Noise	4mVrms(20Hz~ 1MHz) / 10mVpp(20Hz~ 1MHz)						
		Temperature Coefficient	±(0.15 x accuracy specification)/°C (0°~18°C & 28°~50°C)						
	DC Current	Output Current	±1.05A / ±21V, ±105 mA / ±210V						
		Voltage Limit	Min. 0.1% of range						
		Programmed Source Resolution & Accuracy *1	Range	±1.00000µA	±10.0000µA	±100.000µA	±1.00000mA	±10.00000mA	±100.000mA	±1.00000A
			Resolution	10pA	100pA	1nA	10nA	100nA	1µA	10µA
			Accuracy	±(0.035%+600pA)	±(0.033%+2nA)	±(0.031%+20nA)	±(0.034%+200nA)	±(0.045%+2µA)	±(0.066%+20µA)	±(0.27%+900µA)
		Load Regulation	0.01% of range + 100pA						
		Line Regulation	0.01% of range						
		Overshoot	<0.1% typical (1mA step, RL = 10kΩ, 20V range)						
		Temperature Coefficient	±(0.15 x accuracy specification)/°C (0°~18°C & 28°~50°C)						
	General	Output Settling Time *2	100µs typical time						
		Output Rise Time (±30%)	300µs, 200V range, 100mA compliance ; 150V/µs, 20V range, 100mA compliance						
		DC Floating Voltage	Output can be floated up to ±250VDC						
		Remote Sense	Up to 1V drop per load lead						
		Compliance Accuracy	Add 0.3% of range and ±0.02% of reading to base specification						
		Range Change Overshoot *3	Adjacent range changes between 200mV, 2V and 20V ranges, 100mV typical						
		Minimum Compliance Value	0.1% of range						
		Command Processing Time *4	Autorange On:10ms. Autorange Off: 7ms						

SPECIFICATIONS

MEASUREMENT

Voltage	Input Resistance	>10 GΩ							
	Measurement Resolution & Accuracy	Range	±200.000mV		±2.00000V		±20.0000V		±200.000V	
		Resolution	1µV		10µV		100µV		1mV	
		Accuracy	±(0.012%+300µV)		±(0.012%+300µV)		±(0.015%+1.5mV)		±(0.015%+10mV)	
	Temperature Coefficient	±(0.15 × accuracy specification) /°C (0°~18°C & 28°~50°C)							
Current	Voltage Burden (4-wire mode)	< 1mV							
	Programmed Source Resolution & Accuracy *1	Range	±1.00000µA	±10.0000µA	±100.000µA	±1.00000mA	±10.00000mA	±100.000mA	±1.00000A
		Resolution	10pA	100pA	1nA	10nA	100nA	1µA	10µA
		Accuracy	±(0.029%+300pA)	±(0.027%+700pA)	±(0.025%+6nA)	±(0.027%+60nA)	±(0.035%+600nA)	±(0.055%+6µA)	±(0.22%+570µA)
	Temperature Coefficient	±(0.1 × accuracy specification) / °C (0°~18°C & 28°~50°C)							

Resistance	Range		<2.00000Ω	2.00000Ω	20.0000Ω	200.000Ω	2.00000kΩ	20.0000kΩ
		Resolution	---	10µΩ	100µΩ	1mΩ	10mΩ	100mΩ
		Test current	---	---	100mA	10mA	1mA	100µA
		Accuracy	Source IACC+Meas.VACC	Source IACC+Meas.VACC	±(0.1%+0.003Ω), Normal ±(0.07%+0.001Ω), Enhanced	±(0.08%+0.03Ω), Normal ±(0.05%+0.01 Ω), Enhanced	±(0.07%+0.3Ω), Normal ±(0.05%+0.1Ω), Enhanced	±(0.06%+3Ω), Normal ±(0.04%+1Ω), Enhanced
			200.000kΩ	2.00000MΩ	20.0000MΩ	200.000MΩ	>200.000M Ω	
		Resolution	1Ω	10Ω	100Ω	1kΩ	---	
		Test current	10µA	5µA	0.5µA	100nA	---	
		Accuracy	±(0.07%+30Ω), Normal ±(0.05%+10Ω), Enhanced	±(0.11%+300Ω), Normal ±(0.05%+100Ω), Enhanced	±(0.11%+1kΩ), Normal ±(0.05%+500Ω), Enhanced	±(0.66%+10kΩ), Normal ±(0.35%+5kΩ), Enhanced	Source IACC+Meas.VACC	

Temperature Coefficient	±(0.15 × accuracy specification)/°C (0°~18°C & 28°~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: 50mA (except 1A range). Accuracy is load dependent	
Guard Output Impedance	<0.1Ω in ohms mode	

SYSTEM SPEED *5

Maximum Range Change Rate	75/second									
Maximum Measure Auto Range Time	40ms (fixed source) *6									
Speed	NPLC / Trig Origin	Measure		Source-Measure *9		Source-Measure Pass/Fail test *8, *9		Measure Memory *9	
		TO MEMORY	TO GPIB	TO MEMORY	TO GPIB	TO MEMORY	TO GPIB	TO MEMORY	TO GPIB
Sequence Reading Rates *7 (rdg./second) for 60Hz (50Hz)									
Fast	0.01 / internal	2081 (2030)	1198 (1210)	1551 (1515)	1000 (900)	902 (900)	809 (840)	165 (162)	164 (162)
488.2	0.01 / external	1239 (1200)	1079 (1050)	1018 (990)	916 (835)	830 (830)	756 (780)	163 (160)	162 (160)
Medium	0.1 / internal	510 (433)	509 (433)	470 (405)	470 (410)	389 (343)	388 (343)	133 (126)	132 (126)
488.2	0.1 / external	438 (380)	438 (380)	409 (360)	409 (365)	374 (333)	374 (333)	131 (125)	131 (125)
Normal	1 / internal	59 (49)	59 (49)	58 (48)	58 (48)	56 (47)	56 (47)	44 (38)	44 (38)
488.2	1 / external	57 (48)	57 (48)	57 (48)	57 (47)	56 (47)	56 (47)	44 (38)	44 (38)

Single Reading Operation Rates (rdg./second) for 60Hz (50Hz)	Speed	NPLC/ Trig Origin	Measure	Source-Measure *9	Source-Measure Pass/Fail test *8, *9
			TO GPIB	TO GPIB	TO GPIB
Fast(488.2)		0.01 / internal	256 (256)	79 (83)	79 (83)
Medium(488.2)		0.1 / internal	167 (166)	72 (70)	69 (70)
Normal(488.2)		1 / internal	49 (42)	34 (31)	35 (30)
Component Interface Handler Time for 60Hz (50Hz) *8, *10	Speed	NPLC / Trig Origin	Measure	Source Pass/Fail test	Source-Measure Pass/Fail test *9, *11
			TO GPIB	TO GPIB	TO GPIB
Fast		0.01 / internal	1.04 ms (1.08 ms)	0.5 ms (0.5 ms)	4.82 ms (5.3 ms)
Medium		0.1 / internal	2.55 ms (2.9 ms)	0.5 ms (0.5 ms)	6.27 ms (7.1 ms)
Normal		1 / internal	17.53 ms (20.9 ms)	0.5 ms (0.5 ms)	21.31 ms (25.0 ms)

SYSTEM GENERAL

Load Impedance	Stable into 20,000pF typical
Differential Mode Voltage	250VPk
Common Mode Voltage	250VDC
Common Mode Isolation	>10GΩ, <1000pF
Over Range	105% of range, source and measure
Max. Voltage Drop	5V
Max. Sense lead Resistance	1MΩ
Sense Input Impedance	>100GΩ
Guard Offset Voltage	<150µV, typical
Source Output Modes	Fixed DC level, Memory List (mixed function), Stair (linear and log)
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. Lithium battery backup(3 yr + battery life)
Programmability	IEEE-488.2 (SCPI), RS-232 ; 5 user-definable power-up states plus factory default and *RST.
Digital I/O Connector	Active low input. Start of test, end of test, 3 category bits. ; +5V@ 300mA supply. ; 1 trigger input, 4 TTL/Relay Drive outputs (33V@500mA, diode)
Remote Interface	USB/GPIB/LAN/RS-232
Insulation	Chassis and terminal : 20MΩ or above (DC 500V) ; Chassis and AC cord : 30M Ω or above (DC 500V)
Operation Environment	Indoor use, Altitude: ≤ 2000m Ambient temperature: 0 ~ 40°C Relative humidity: ≤ 80%; Installation category: II, Pollution degree: 2
Storage Environment	Temperature: -20°C ~ 70°C; Humidity: < 80%
Input Power	100-240VAC, 50-60Hz
Power Consumption	80W
Dimensions & Weight	214 (W) x 86 (H) x 356.5 (D) mm, Approx. 4.8kg

NOTE :
1. Speed = Normal (1 NPLC). For 0.1 PLC, add 0.005% of range to offset specifications, except 200mV, 1A ranges, add 0.05%. For 0.01 PLC, add 0.05% of range to offset specifications, except 200mV, 1A ranges, add 0.5%.
2. Required to reach 0.1% of final value after Command is processed. Resistive load. 10µA to 100mA range.
3. Overshoot into a fully resistive 100kΩ load, 10Hz to 1MHz BW, adjacent ranges: 100mV typical, except 20V/200V.
4. Maximum time required for the output to begin to change following the receipt of : SOURce : VOLTage|CURRent <nrf> Command.
5. Reading rates applicable for voltage or current measurements, autorange off, filter off, display off, trigger delay = 0, and binary reading forma.
6. Purely resistive lead. 1µA and 10µA ranges <65ms.
7. 1000 point sweep was characterized with the source on a fixed rang.
8. Pass/Fail test performed using one high limit and one low math limit.
9. Includes time to re-program source to a new level before making measurement.
10. Time from falling edge of START OF TEST signal to falling edge of END OF TEST signal.
11. Command processing time of : SOURce : VOLTage|CURRent : TRIGgered <nrf> Command not included.

Specifications subject to change without notice. GSM-20H10_E_D1BH_202205

ORDERING INFORMATION

GSM-20H10 with GPIB **Precision Source Meter**
GSM-20H10 **Precision Source Meter**

ACCESSORIES

CD User manual x 1, Quick Start manual x 1, Test Lead GTL-207A x 1, Alligator Clip x 2

OPTIONAL ACCESSORIES

SM-01 Digital I/O Adapter, Convert DB15 to DB9 + 8-pin micro-DIN
SM-02 Digital I/O Adapter, Convert DB15 to DB37 + 8-pin micro-DIN
GTL-246 USB Cable (USB 2.0 A-B Type, approx.. 1200mm)
GTL-258 GPIB Cable (25 pin Micro-D Connector)

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