



# GSM-20H10

## Source Measure Unit

### FEATURES

- Maximum Output  $\pm 210V/\pm 1.05A/22W$
- 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  $6\frac{1}{2}$ -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)



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Simply Reliable

# Streamline Your Characteristic Analysis

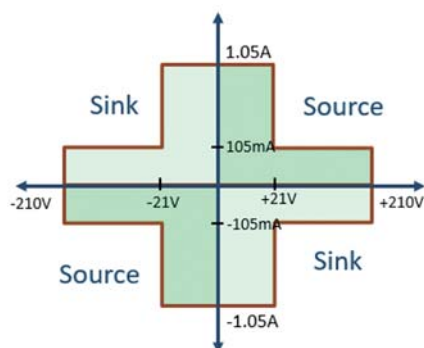
GW Instek GSM-20H10 is a Source Measure Unit that provides highly stable DC power and instrument-grade 6½-digit multimeter measurements. While operating, it can be used as a voltage source, current source, voltmeter, ammeter, and ohmmeter, which is uniquely ideal for the evaluation of component characteristics 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 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: $\pm 210\text{V}/\pm 1.05\text{A}/22\text{W}$



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

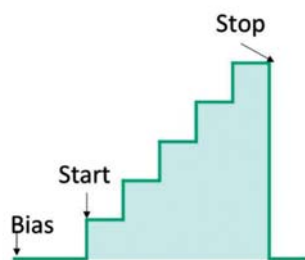
The voltage range is  $\pm 21$  volts, and the current is  $\pm 1.05\text{A}$ .

The voltage range is  $\pm 210$  volts, and the current range is  $\pm 105\text{mA}$ .

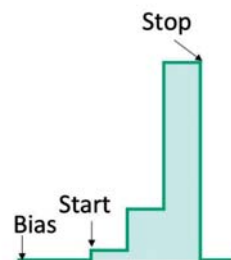
The power capacity is 22W.

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

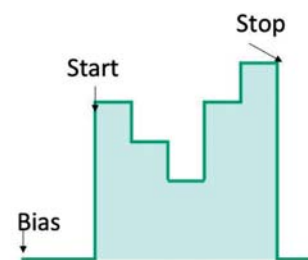
## B. BUILT-IN 4 SEQUENCE OUTPUT MODES, UP TO 2500 POINTS



LINEAR STAIRCASE SWEEP



LOG STAIRCASE SWEEP

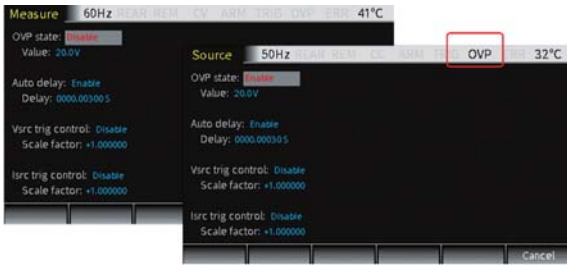


CUSTOM MODE

GSM-20H10 Source Measure Unit 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

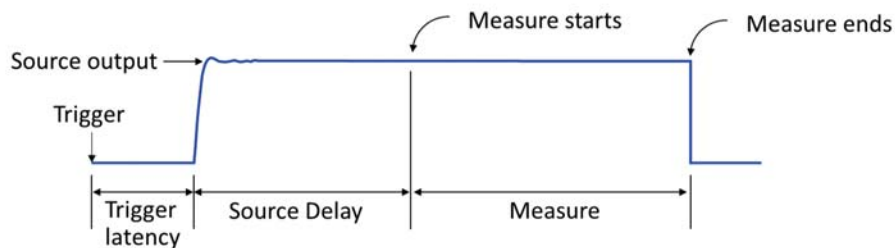


SAMPLING MODE	FAST	MEDIUM	NORMAL	HIGH	OTHER
Speed, NPLC	0.01	0.1	1	10	User defined
Digit	3½	4½	5½	6½	Selectable

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.

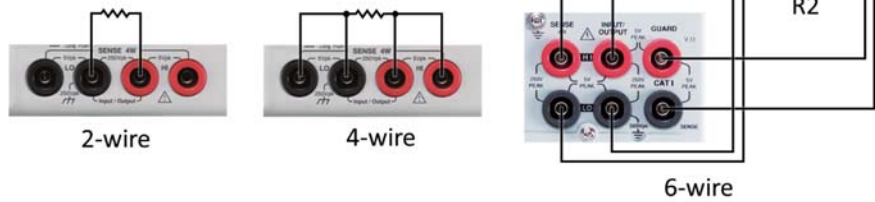
### F. SDM (SOURCE DELAY MEASURE) CYCLE



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 Source Measure Unit 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 =  $V \cdot I$
- CompOhms =  $\frac{(V2-V1)}{(I2-I1)}$
- Vceoff(%) =  $\left[ \frac{\Delta R}{\{R2+\Delta V\}} \right] \cdot 100\%$
- VarAlpha,  $\alpha = \frac{\log(I2+I1)}{\log(V2+V1)}$
- Dev =  $\left[ \frac{(X-Y)}{Y} \right] \cdot 100\%$

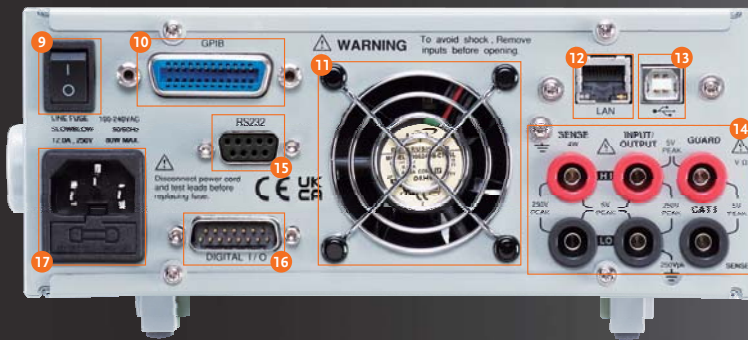


GSM-20H10 provides five built-in calculation functions: Power, Offset Compensation Ohms, Voltage Coefficient, Varistor Alpha, and Percent Deviation.

## PANEL INTRODUCTION



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						
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	±200.000V	±200.000V
		Resolution	1μV	10μV	100μV	100μV	1mV	1mV
		Accuracy	±(0.02%+600μV)	±(0.02%+600μV)	±(0.02%+2.4mV)	±(0.02%+2.4mV)	±(0.02%+24mV)	±(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 × accuracy specification)/°C (0°~18°C & 28°~50°C)							
SOURCE	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
		Resolution	10pA	100pA	1nA	10nA	100nA	1μA
		Accuracy	±(0.035%+600pA)	±(0.033%+2nA)	±(0.031%+20nA)	±(0.034%+200nA)	±(0.045%+2μA)	±(0.066%+20μA)
	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 × accuracy specification)/°C (0°~18°C & 28°~50°C)						
	Output Settling Time *2	100μs typical time						
Output Rise Time (±30%)	300μs, 200V range, 100mA compliance; 150μs, 20V range, 100mA compliance							
DC Floating Voltage	Output can be floated up to ±250VDC							
General	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 x 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 x accuracy specification) / °C (0°-18°C & 28°-50°C)									
	Resistance	Range	Resolution	<2.00000Ω	2.00000Ω	20.0000Ω	200.000Ω	2.00000kΩ	20.0000kΩ		
			Test current	---	---	100μA	10mA	10mΩ	1mA	100mΩ	
			Accuracy	Source IACC+Meas.VACC	Source IACC+Meas.VACC	±(0.1%+0.003Ω), Normal	±(0.08%+0.03Ω), Normal	±(0.07%+0.3Ω), Normal	±(0.06%+3Ω), Normal	±(0.06%+3Ω), Normal	
			Accuracy	200.000kΩ	2.00000MΩ	20.0000MΩ	200.000MΩ	>200.000MΩ	---		
			Resolution	1Ω	10Ω	100Ω	1kΩ	---		---	
Test current			10μA	5μA	0.5μA	100nA	---		---		
Accuracy			±(0.07%+30Ω), Normal	±(0.11%+300Ω), Normal	±(0.11%+1kΩ), Normal	±(0.66%+10kΩ), Normal	Source IACC+Meas.VACC		---		
Accuracy			±(0.05%+10Ω), Enhanced	±(0.05%+100Ω), Enhanced	±(0.05%+500Ω), Enhanced	±(0.35%+5kΩ), Enhanced	---		---		
Temperature Coefficient			±(0.15 x 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									
	Sequence Reading Rates *7 (rdg./second) for 60Hz (50Hz)	Speed	NPLC / Trig Origin	Measure		Source-Measure *9		Source-Measure Pass/Fail test *8, *9		Measure Memory *9	
		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		---	
		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		---	
		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	>10CΩ, <1000pF									
	Over Range	105% of range, source and measure									
	Max. Voltage Drop	5V									
	Max. Sense lead Resistance	1MΩ									
	Sense Input Impedance	>100CΩ									
	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 : 30MΩ 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 <nr> 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 <nr> Command not included.

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



Specifications subject to change without notice. GSM-20H10\_E\_D1BH

## ORDERING INFORMATION

GSM-20H10 with GPIB Source Measure Unit  
GSM-20H10 Source Measure Unit

## 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 GTL-248 GPIB Cable, 2000mm  
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)



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